

Application Note

VLAN Configuration of G6 Devices

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Summary

This Application Note helps to configure and operate VLAN functionality of a Microsens G6 switch. It explains basic VLAN concepts and then leads through the appropriate setup steps for configuring VLAN options and parameters by means of documented configuration examples.

MICROSENS Switches allow i.e. external IP networks to connect to AVAYA Fabric Connect networks seamlessly by working as a gateway on an AVAYA Fabric Connect edge port. One of the documented configuration examples shows, how to configure the MICROSENS G6 switch as an AVAYA Fabric Attach gateway (see "Example 4: Working as an AVAYA Fabric Attach Device" on page 28).

This Application Note builds on information provided with the Quick Installation Guide that is shipped together with each MICROSENS G6 device. Additionally, familiarity with the foundations of IP Networks and Virtual LANs is required to take advantage out of this Application Note.

For further information about VLAN facilities, standards, parameters and options please refer to the chapter "Virtual LANs (VLANs)" in the document "Product Manual Firmware, Generation 6". This manual is included in each software archive containing Firmware G6. It can also be downloaded from the link "Documentation" in the firmwares Web Manager navigation bar.

Glossary

Terms, acronyms and abbreviations used in the document.

| Term | Description |
|----------------------|---|
| AVAYA Fabric Attach | The network component that is attached as a gateway to an edge port of an AVAYA Fabric Connect network. |
| AVAYA Fabric Connect | A special Multi-Path-Ethernet network using IS-IS routing and SPB, supplied by AVAYA. |
| CFI | Canonical Format Indicator (part of VLAN Tag) |
| I-SID | Independent Service Identifier (IEEE 802.1aq, next generation VLAN) |
| LAN | Local Area Network |
| MAC | Media Access Control |
| MSTP | Multiple Spanning Tree Protocol (IEEE 802.1s) |
| MVRP | Multiple VLAN Registration Protocol (IEEE 802.1ak, GVRP successor) |
| PCP | Priority Code Point (part of VLAN Tag) |
| PVID | Port VLAN Identifier |
| QoS | Quality of Service |
| RSTP | Rapid Spanning Tree Protocol (IEEE 802.1w) |
| SPB | Shortest Path Bridging (IEEE 802.1aq) |
| STP | Spanning Tree Protocol (IEEE 802.1D) |
| TPID | Tag Protocol Identifier (EtherType for VLAN, value is "0x8100") |

| | |
|------|--|
| VID | VLAN Identifier |
| VLAN | Virtual Local Area Network (IEEE 802.1Q) |



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Typographical Conventions

The following typographical elements are used in this document:

| Typographical Elements | Explanation |
|---|---|
| • | List element, 1 st order |
| ◦ | List element, 2 nd order |
| www.microsens.de | Hyperlink to a website or email address |
| Note: | A note tags an important fact |
| □ | Work step |
| <...> | Placeholder for a real value. Replace <IP Address> with e.g. 192.168.1.2. |
| {... ...} | Choose one of the values offered, e.g. from {Disabled Enabled}, choose Enabled. |
| Visualization | A string that appears in the Web Manager |
| Command | A string to enter in the Command Line Interface |
| » Output | A string output by the Command Line Interface |
|  | Work step(s) in the Web Manager (GUI) |
|  | Work step(s) in the Command Line Interface (CLI) |

The following symbols are used in this document:

| Symbol | Explanation |
|---|--------------------|
|  | Switch |
|  | Arbitrary computer |
|  | Server |

Information available from the MICROSENS Website

Registered users can find the latest firmware versions as well as further information on our web site:

- Registration: www.microsens.de > Partner-Login > Follow the link 'Please register here' > Fill in the [online registration form](#) and submit it
 - You will receive an email from MICROSENS with a user name and a password
- Login: www.microsens.de > Partner-Login > Enter user name and password > Click the 'Login' button
 - Firmware images: Navigate to your device and select the tab 'Services'
 - For further information select one of the other tabs

Note:

Make sure your browser allows scripts.

1 Introduction into VLANs (Virtual LAN)

1.1 Motivation for the deployment of VLANs

There are several reasons for using VLANs in a company network:

- Separate an existing physical infrastructure into isolated logical sub-networks without the need for an extra investment in network hardware.
- Easy adaption of infrastructure or operation changes without recabling or complex reconfiguration of network management hardware like switches or routers.
- Separate several services like VoIP and data streaming to get a better performance for each of those.
- Minimise broadcast traffic to the crucial network segment, thus reducing bandwidth on the non-involved network and increasing network security.

The latter is relevant especially for Layer-2 switches:

A switch may from time to time flood frames – even those with known unicast destination addresses – because their MAC table entries have aged out. Until the relearning of the MAC address as the source address of an incoming frame, the respective MAC address is treated as an unknown unicast MAC address and it is flooded to all ports.

This behavior ensures the uninterrupted communication between two network nodes. As a side effect, amongst other reasons like transition from L2 to L3, the result is a fraction of frames being flooded throughout the network. This can pose a security problem because they can be received by a rogue network node configured to receive frames not only with its own MAC address but with any destination address.

For a network administrator there is usually the need to prevent the unlimited flooding of frames. Such a limitation could be achieved by using separate physical LANs. This solution is usually too expensive and too inflexible, so VLANs (virtual LANs) were invented.

In general, a VLAN-capable switch behaves like a collection of software-configurable LANs, including the desired separation of LANs considering the flooding of all frame types. It also offers a configurable interconnection among the VLANs. With MICROSENS G6 switches this behaviour is described as "VLAN Filtering".

1.2 VLAN Basics

Put in a simplified way, VLANs are implemented by adding a 32 bits long tag to each Ethernet frame – the so-called VLAN tag as it is specified in the IEEE 802.1Q standard. This VLAN tag contains a unique 12 bits long VLAN ID (VID). Frames with different VIDs will be treated as being in different LANs unless the connection of LANs is explicitly allowed by the switch's VLAN configuration.

Corresponding to the existing VLANs in the network the switch's VLAN configuration specifies which of its ports are members of the respective VLAN. The VLAN filter table determines which VLAN tagged Ethernet frames are forwarded to the corresponding port or whether these frames are forwarded anyway.

VLAN ID tags expand Ethernet packets up to 1522 Bytes (normally an Ethernet packet without VLAN tag has a size of 1518 Byte). If the frame leaves a port, the VLAN tag can be stripped, restoring the original frame size. This way, a VLAN-capable switch with a trivial (default) VLAN configuration works transparently for untagged frames, i.e. its behavior is indistinguishable from a non-VLAN-capable switch and ensures backwards compatibility.

However, by setting up a specific VLAN configuration for a switch, the administrator can take full control over VLAN separation and interconnectivity without the need for any additional hardware.

1.3 VLAN-incapable Switching

In contrast, a VLAN-incapable switch usually completely ignores the VLAN tags of incoming frames and does not perform any filtering (in rare cases the VLAN-incapable switch discards the VLAN-tagged Ethernet frames due to e.g. misconfiguration on how to handle those frames). On default the global parameter "VLAN filtering" is disabled on MICROSENS switches. Therefore these devices just forward incoming VLAN-tagged Ethernet frames, but neither filter nor tag them or remove the VLAN tag from the frames.

1.4 VLAN Tag Structure

VLAN-tagging is based on the IEEE 802.1Q standard. A VLAN tag (as represented by the four-byte sequence in an Ethernet frame sent over a connection) consists of several units:

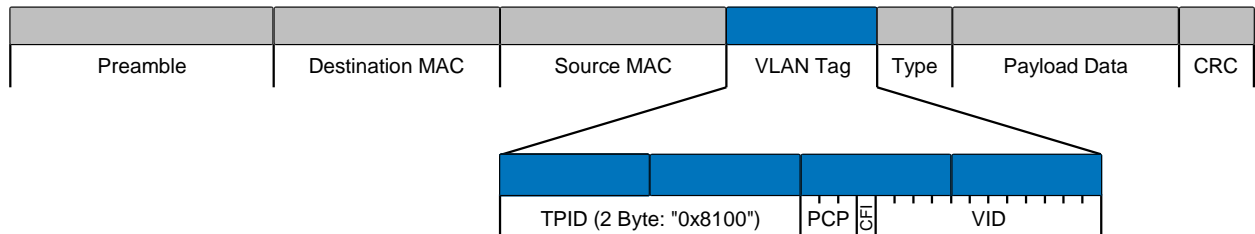


Figure 1: Ethernet frame with VLAN tag

- **Tag Protocol ID (TPID):**
A fixed two-byte sequence with a value of "0x8100" identifying the frame as a VLAN-tagged frame.
- **Priority Code Point (PCP):**
A 3-bit field which refers to the IEEE 802.1p class of service and maps to the frame priority level.
- **Canonical Format Indicator (CFI):**
A one-bit value with value of "0" indicating a MAC address in canonical (Ethernet) format.
- **VLAN ID (VID):**
A twelve-bit value in the two last bytes denoting the VLAN ID; valid values are 1...4094 (VID 0 has a special meaning, VID 4095 is explicitly invalid)

1.5 VLAN Processing in a Switch (Static VLANs)

A VLAN-capable switch adds two steps to the forwarding process, the so-called ingress rules (rules applied to incoming frames) and egress rules (applied to outgoing frames):

- Ingress rules decide which frames are accepted and how they are tagged.
- Egress rules decide which frames may be sent on which ports and if they are tagged.

VLAN processing is configured in the switch's VLAN table:

VLAN Table (7 Entries of 256)

Smart Preset (without apply)

| # | en. | Alias | VID | MSTP Group | PRIOR override | I-SID | | Mgmt | 1/1 | 1/2 | 1/3 | 1/4 | 1/5 | 1/6 | Action |
|---|-------------------------------------|---------------|-----|------------|----------------|-------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------|
| | | | | | | | select all | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 1 | <input checked="" type="checkbox"/> | VLAN filter 1 | 1 | 0 | 0 | 0 | <input type="checkbox"/> | all | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Remove |
| 2 | <input checked="" type="checkbox"/> | VLAN filter 2 | 2 | 0 | 0 | 0 | <input type="checkbox"/> | all | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Remove |
| 3 | <input checked="" type="checkbox"/> | VLAN filter 3 | 33 | 0 | 0 | 0 | <input type="checkbox"/> | all | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Remove |
| 4 | <input checked="" type="checkbox"/> | VLAN filter 4 | 44 | 0 | 0 | 0 | <input type="checkbox"/> | all | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Remove |
| 5 | <input type="checkbox"/> | VLAN filter 5 | 5 | 0 | 0 | 0 | <input type="checkbox"/> | none | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Remove |
| 6 | <input type="checkbox"/> | VLAN filter 6 | 6 | 0 | 0 | 0 | <input type="checkbox"/> | none | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Remove |
| 7 | <input type="checkbox"/> | VLAN filter 7 | 7 | 0 | 0 | 0 | <input type="checkbox"/> | none | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Remove |

add table entry

refresh apply to running configuration

Figure 2: VLAN processing

1.5.1 Port VLAN Modes

The port's VLAN mode plays a major role in ingress and egress rules.

| Port VLAN Mode | Purpose | Incoming frames | Outgoing frames |
|----------------|--|--|--|
| Access | For ports connected to terminal devices | <ul style="list-style-type: none"> • Untagged frames are tagged with port's default VID and priority | VID is removed and frames are always sent untagged. |
| Hybrid | For ports connected to a VoIP phone/PC combination and uplinks to e.g. CISCO switches | <ul style="list-style-type: none"> • Tagged frames' VIDs <ul style="list-style-type: none"> ◦ are either kept or ◦ are forced to the port's default VID (configurable) • Tagged frames' VLAN priorities | <ul style="list-style-type: none"> • untagged for frames with the port's default VID • tagged for frames with other VIDs |
| Trunk | For ports connected to other switches | <ul style="list-style-type: none"> ◦ are either kept or ◦ are forced to the port's default VLAN priority (configurable) | Frames are always sent tagged. |

1.5.2 Ingress Rules

In addition to the ingress rules determined by the port VLAN mode, the following settings belong to the ingress rules:

- The port's default VID (for untagged frames)
- Enable or disable the enforcement of the port default VID (for tagged frames)
- The port's default priority (for untagged frames)
- Enable or disable the enforcement of the port default priority (for tagged frames)
- Each port's membership in the given VLAN

1.5.3 Egress Rules

In addition to the egress rules determined by the port VLAN mode, the following settings belong to the egress rules, per VLAN:

- The VLAN's ID
- The VLAN's overriding priority (configurable, if Priority Override is enabled)
- Each port's membership in the given VLAN.

2 VLAN Settings

The VLAN configuration contains three sections:

- Basic Configuration
- VLAN Port Configuration
- VLAN Filter Table

2.1 Basic Configuration

This section deals with enabling the VLAN functionality generally.

| Parameter | Explanation | Valid Values | Default |
|--------------------------------|--|---------------------|----------|
| VLAN Filtering Enabled | If enabled, VLAN Filtering is globally activated on the switch. If disabled, the switch's behavior is VLAN-incapable. | Disabled Enabled | Disabled |
| MVRP Enabled | If enabled, the switch processes incoming MVRP frames to dynamically set up the advertised VLANs. It also advertises its VLANs. If disabled, it ignores MVRP frames and does not send any. | Disabled Enabled | Disabled |
| Management VLAN ID | Defines the VID for frames sent by the switch's management engine (e.g. in response to SNMP requests). | 1 ... 4094 | 1 |
| Management Priority | Defines the VLAN priority for frames sent by the switch's management engine (e.g. in response to SNMP requests). | 0 ... 7 | 0 |
| Voice VLAN ID | Defines the Voice VLAN ID used by the "Smart Preset" function. | 1 ... 4094 | 1 |
| RSTP VLAN ID | Defines the VLAN ID used for sending (R)STP frames and for processing received (R)STP frames. | 1 ... 4094 | 1 |
| VLAN ID for Unauthorized Users | Defines the VLAN ID used for tagging and forwarding received frames whose source MAC address could not be verified as authorized by protocols like port security. | 1 ... 4094 | 1 |

2.2 VLAN Port Configuration

This section describes the VLAN configuration relating to the respective port.

| Parameter | Explanation | Valid Values | Default |
|-----------------------------|---|---------------------------|----------|
| Port Mode | Defines the Port's VLAN Mode, see also "Port VLAN Modes" in section "1.5 VLAN Processing in a Switch (Static VLANs)". | Access Hybrid Trunk | Access |
| Port Default VID | Defines the VID the switch applies when tagging incoming frames. | 1 ... 4094 | 1 |
| Force Port Default VID | If enabled, the switch applies the Port Default VID also to incoming frames that are already tagged. | Disabled Enabled | Disabled |
| Port Default Priority | Defines the port's VLAN (layer 2) priority the switch applies when tagging incoming frames. | 0 ... 7 | 0 |
| Force Port Default Priority | If enabled, the switch applies the Port Default Priority also to incoming frames that are already tagged. | Disabled Enabled | Disabled |

2.3 VLAN Filter Table

VLAN filter tables contain more information about the respective VLAN IDs.

| Parameter | Explanation | Valid Values | Default |
|----------------------|--|---------------------|--------------|
| VLAN enabled ("en.") | If enabled, the given VLAN and its settings are active. Otherwise they are ignored. | Disabled Enabled | Disabled |
| Alias | The VLAN's alias name. This name can be used e.g. for RADIUS authentication. | Max. 32 characters | Empty string |
| VID | The VLAN's ID. | 1 ... 4094 | 1 |
| MSTP Group | All filter entries with the same MSTP group number will share an MSTP instance. Note: A value of "0" indicates that MSTP is not used for this VLAN. Note: For more information about using VLAN with MSTP please refer to the Application Note "Using Redundancy Protocols with G6 Devices" ¹ . | 0 ... 64 | 0 |

¹ This application note will be published at a later schedule following the first publication of this application note.

| Parameter | Explanation | Valid Values | Default |
|-------------------------------|--|-------------------------------|---------|
| Prio. Override | If set to a value 0 ... 7, this priority is inserted into the sent frame, i.e. it overrides the frame's previous priority value. The value "-" means that the frame is sent with its actual priority. | -, 0 ... 7 | - |
| Management Interface ("Mgmt") | <p>If set to "All", frames addressed to the switch's management and tagged with the given VID will be forwarded to the management CPU. If set to "none", the frames will not reach the management CPU.</p> <p>These frames can be unicast frames with the management CPU's MAC address or multicast and broadcast frames. A typical useful scenario for the value "None" is if the VLAN transports a lot of multicast or broadcast frames that put a load on the CPU although the frames are not destined for the CPU. Only set the value to "None if you are sure that the switch management does not need to receive any frames from this VLAN. In doubt, leave the setting "All" (default).</p> | All CPU 1 CPU 2 None | All |
| Physical Ports | If enabled, the given port is a member in the VLAN, i.e. it will be considered as a destination port. If disabled, frames tagged with the respective VID will never be sent out on this port. | Disabled Enabled | Enabled |

3 Creating a VLAN Configuration

This section leads through the VLAN configuration of MICROSENS G6 devices by means of two documented examples:

- Example 1 describes a VLAN setup using the switch's default configuration for a fast operation in a simple VLAN environment (see section 3.4).
- Example 2 describes the modification of an existing G6 switch's VLAN setup to fit a modified VLAN environment (see section 3.5).
- Example 3 describes the necessary modification of the management VID when merging two formerly independent company networks.

The necessary basics for all setup examples concerning the default VLAN configuration, possible pitfalls during VLAN setup and typical VLAN setup scenarios are specified in the next following three sections.

3.1 Default VLAN Configuration

A switch without an explicit VLAN configuration in fact has a default configuration. However, the default configuration disables VLAN filtering so the default configuration details do not take effect. The default configuration comprises:

- VLAN filtering is globally disabled (essential)
- All ports' modes are "Access"
- All ports' default VIDs are 1
- Tagged frames keep their VID
- All ports' default VLAN priorities are 0
- Tagged frames keep their VLAN priority
- The VLAN keeps any frame's priority
- All ports are member in VLAN 1
- Frames are sent out untagged

If VLAN filtering were globally enabled, it would result in the following switching behavior:

- Untagged frames are forwarded as untagged
- Frames tagged with VID 1 are forwarded as untagged
- Frames tagged with any other VID are dropped
- Frames may be sent out at any port (no port restriction)

3.2 Pitfalls During VLAN Setup

A viable VLAN setup needs to take into account the intrinsic dependencies between ingress and egress rules.

Failure to heed these dependencies (e.g. setting up a port's default VID *before* the respective VLAN has been created in the switch) may result in a loss of connectivity, i.e. an interruption of user data traffic. This interruption may even affect the connection to the switch under configuration itself, leading to a possible deadlock because the broken configuration cannot be reverted without a working network connection.

If the switch is on a remote location (e.g. an offshore wind energy plant), this can imply that substantial effort is necessary to rectify the situation.

Recommended Sequence of Setup Steps

To set up or modify an existing VLAN configuration for a remotely located switch while maintaining administrative connectivity and minimizing interruption to user traffic,

MICROSENS recommends following a sequence of steps. These will be detailed in the following setup examples.

3.3 Setup Scenario Classes

Physical Access to Switch with Default Configuration

The simplest way is when you have physical access to the switch (e.g. on your desk) because you can connect your administration workstation to another switch port in case you lock yourself out on a particular port. This use case is common.

Remote Switch not yet in Operation

The situation is also less severe if you set up a remote switch's VLAN configuration before the switch is deployed because there is no user traffic that may be affected. This use case is less likely than the one above.

Remote Switch in Operation with Default Configuration

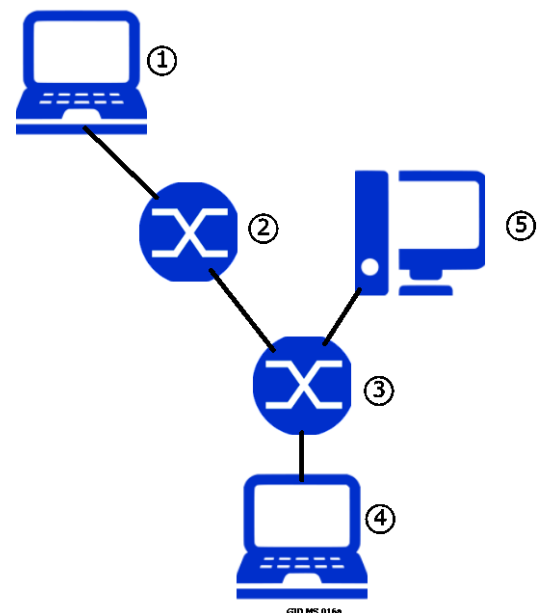
When you have to configure a switch already in operation but you can start from a default VLAN configuration, the scenario is somewhat easier because there are fewer specific settings to consider. However, this use case is uncommon in practice.

Remote Switch in Full Operation

One of the more demanding scenarios is to modify the configuration of a remote switch already in operation. This use case is also common. As some configuration steps would inevitably cause interruptions in network connectivity, an accurate planning in terms of reconfiguring ports or shifting VLANs is mandatory. Such work is usually shifted to a scheduled maintenance window when there is little network traffic expected.

3.3.1 Network Topology Example

- ① Arbitrary client computer, representing a workgroup
- ② Workgroup switch
- ③ Core switch
- ④ Administration workstation
- ⑤ Server



3.3.2 Global Prerequisites Example

The network VLAN IDs for employees of different departments shall be different in order to separate the respective network traffic (e.g. for security considerations). The department/VID association is:

- Network Management: 100
- Production Department: 200
- Accounting Department: 300

Figure 3:
Simplified Company Network

3.4 Example 1: Simple Setup

This simple scenario assumes that you want to configure a 6-port micro switch out-of-the-box, using a locally connected admin workstation (see Figure 3, ④), and start with the default configuration. The switch shall be deployed as a workgroup switch (see Figure 3, ②)

We use the following assumptions to keep the example simple:

- VLANs:
 - VLANs with VIDs 100, 200 and 300 are needed.
 - VLAN 1 has to be disabled.
- Ports' VLAN Membership:
 - Ports 1 and 2 are members of VLAN 200 only.
 - Ports 3 and 4 are members of VLAN 300 only.
 - Port 5 is the uplink and needs to be configured as a member of all given VLANs.
 - Port 6 is currently unused, so we use it for configuring the switch; port 6 therefore has to be member of VLAN 100.
- Port VLAN Modes:
 - Ports 1 ... 4 are access ports.
 - Port 5 is the uplink and needs to be configured as a trunk port.
 - Port 6 is also an access port, because we use it for configuring the switch and our directly connected administration workstation is an end device.
- Port Default VID:
 - Ports 1 and 2 need the port default VID 200.
 - Ports 3 and 4 need the port default VID 300.
 - Port 5 is the uplink port and needs no port default VID, so we leave it as "1" (default).

The VLAN with VID 1 will be "disabled" in the course of the configuration by detaching it from all ports. Any untagged frames received on port 1 will therefore be dropped. This is cautionary because you expect only tagged frames to arrive on an uplink port. If untagged frames arrive the reason might be a misconfiguration or even a network attack. By dropping untagged frames, you limit the impact of the misconfiguration or the attack.
 - Port 6 needs the port default VID 100.
- Switch Management Port:
 - The switch management port needs to be member in VLAN 100 only; we set its membership to "All" as the default for VID 100 and to "none" for all other VLANs.

3.4.1 Overview

| # | En. | Alias | VID | Port | 1 | 2 | 3 | 4 | 5 | 6 | Mgmt |
|---|-----|--------------|-----|-----------------|------|------|------|------|-------|------|------|
| 1 | X | Network Mgmt | 100 | | | | | | X | X | All |
| 2 | X | Production | 200 | | X | X | | | X | | None |
| 3 | X | Accounting | 300 | | | | X | X | X | | None |
| | | | | Mode | Acc. | Acc. | Acc. | Acc. | Trunk | Acc. | |
| | | | | Def. VID | 200 | 200 | 200 | 300 | 1 | 100 | |

3.4.2 Sequence of Setup Steps

The sequence of configuration steps in this example is predominantly uncritical because you can enable VLAN filtering as the last step (VLAN filtering is disabled out-of-the-box). Therefore, the configuration steps will only take effect after VLAN filtering is enabled. Another important point is that the configuration steps will take effect simultaneously.

- Disable VLAN filtering

Note:

In the Web Manager, apply the tab's settings before you switch to another tab.

- Configure new VLANs in filter table
- Configure the ports' VLAN memberships
- Disable VLAN 1
- Configure the ports' VLAN modes and default VIDs
- Set Management VID
- Enable VLAN filtering

Using the Web Manager:

Configuration Steps for Example 1

- ☐ Select the **VLANs** screen, then select the tab **Basic Configuration**.
- ☐ Verify that **VLAN filtering enabled** is unchecked (default).
- ☐ If it is checked, unmark it and click the button **apply to running configuration** to save the changes to the running configuration.
- ☐ Select the tab **VLAN Table**.
- ☐ Click the button **add table entry** to create a new VLAN (for VID 100).
- ☐ Assign for **VID** the value 100.
- ☐ Mark the checkbox in the **en.** column for the new VLAN.
- ☐ Assign for **Alias** the value "Network Mgmt".
- ☐ In the **Mgmt** column select **all** in the drop-down-list for the **VID** 100 (default).
- ☐ Unmark the checkboxes in the **1/1 ... 1/4** port columns for the **VID** 100.
- ☐ Mark the checkboxes in the **1/5** and **1/6** port columns for the **VID** 100 (default).
- ☐ Click the button **add table entry** to create a new VLAN (for VID 200).

Configuration Steps for Example 1

- Assign for **VID** the value 200.
- Mark the checkbox in the **en.** column for the new VLAN.
- Assign for **Alias** the value "Production".
- In the **Mgmt** column select **none** in the drop-down-list for the **VID** 200.
- Mark the checkboxes in the **1/1** and **1/2** port columns for the **VID** 200 (default).
- Unmark the checkboxes in the **1/3** and **1/4** port columns for the **VID** 200.
- Mark the checkbox in the **1/5** port column for the **VID** 200 (default).
- Unmark the checkbox in the **1/6** port column for the **VID** 200.
- Click the button **add table entry** to create a new VLAN (for VID 300).
- Assign for **VID** the value 300.
- Mark the checkbox in the **en.** column for the new VLAN.
- Assign for **Alias** the value "Accounting".
- In the **Mgmt** column select **none** in the drop-down-list for the **VID** 300.
- Unmark the checkboxes in the **1/1** and **1/2** port columns for the **VID** 300.
- Mark the checkboxes in the **1/3 ... 1/5** port columns for the **VID** 300 (default).
- Unmark the checkbox in the **1/6** port column for the **VID** 300.
- Leave the **VID** 1 enabled (**en.** marked) and uncheck all port's checkboxes **1/1 ... 1/6**.
- Click the button **apply to running configuration** to save the VLAN Table configuration to the running configuration (see Figure 4).

| VLAN Table (4 Entries of 256) | | | | | | | | | | | | | | | |
|-------------------------------|-------------------------------------|--------------|-----|------------|---------------|-------|--------------------------|--------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------|
| Smart Preset (without apply) | | | | | | | | | | | | | | | |
| # | en. | Alias | VID | MSTP Group | PRI0 override | I-SID | | Mgmt | 1/1 | 1/2 | 1/3 | 1/4 | 1/5 | 1/6 | Action |
| | | | | | | | select all | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 1 | <input checked="" type="checkbox"/> | Unassigned | 1 | 0 | - | 0 | <input type="checkbox"/> | all | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Remove |
| 2 | <input checked="" type="checkbox"/> | Network Mgmt | 100 | 0 | - | 0 | <input type="checkbox"/> | all | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Remove |
| 3 | <input checked="" type="checkbox"/> | Production | 200 | 0 | - | 0 | <input type="checkbox"/> | none | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | Remove |
| 4 | <input checked="" type="checkbox"/> | Accounting | 300 | 0 | - | 0 | <input type="checkbox"/> | none | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | Remove |
| add table entry | | | | | | | | | | | | | | | |
| refresh | | | | | | | | apply to running configuration | | | | | | | |

Figure 4: Example 1 - VLAN Table

- Select the tab **VLAN Port Configuration**.
- In the line **Slot/Port 1/1**, set the **Mode** to "Access" (default) and **VID** to 200.
- In the line **Slot/Port 1/2**, set the **Mode** to "Access" (default) and **VID** to 200.
- In the line **Slot/Port 1/3**, set the **Mode** to "Access" (default) and **VID** to 300.

Configuration Steps for Example 1

- In the line **Slot/Port 1/4**, set the **Mode** to "Access" (default) and **VID** to 300.
- In the line **Slot/Port 1/5**, set the **Mode** to "Trunk" and **VID** to 1 (default).
- In the line **Slot/Port 1/6**, set the **Mode** to "Access" (default) and **VID** to 100.
- Click the button **apply to running configuration** to save the VLAN Port configuration to the running configuration (see Figure 5).

| VLAN Port Configuration | | | | | | |
|-------------------------|--------|-------------|--------------------------|------------------|--------------------------|---------------|
| Slot/Port | Mode | default VID | force default VID | default priority | priority override | Fabric Attach |
| 1/1 | Access | 200 | <input type="checkbox"/> | 0 | <input type="checkbox"/> | disabled |
| 1/2 | Access | 200 | <input type="checkbox"/> | 0 | <input type="checkbox"/> | disabled |
| 1/3 | Access | 300 | <input type="checkbox"/> | 0 | <input type="checkbox"/> | disabled |
| 1/4 | Access | 300 | <input type="checkbox"/> | 0 | <input type="checkbox"/> | disabled |
| 1/5 | trunk | 1 | <input type="checkbox"/> | 0 | <input type="checkbox"/> | disabled |
| 1/6 | Access | 100 | <input type="checkbox"/> | 0 | <input type="checkbox"/> | disabled |

refresh
apply to running configuration

Figure 5: Example 1 - VLAN Port Configuration

- Select the tab **Basic Configuration**.
- Set the **Management VLAN ID** to 100.
- Mark **VLAN filtering enabled**.
- Click the button **apply to running configuration** to save the changes to the running configuration (see Figure 6).

| Basic Configuration | |
|--|-------------------------------------|
| VLAN filtering enabled (see also VLAN Port Configuration) | <input checked="" type="checkbox"/> |
| MVRP enabled (see also MVRP Port Configuration) | <input type="checkbox"/> |
| Management VLAN ID | 100 |
| Management Priority | 0 |
| Voice VLAN ID | 1 |
| RSTP VLAN ID | 1 |
| VLAN ID for unauthorised users | 1 |

refresh
apply to running configuration

Figure 6: Example 1 - Basic Configuration

Using the Command Line Interface (CLI):

Configuration Steps for Example 1

- `Protocol.VLAN.enable_vlan_filtering = Disabled`
- `Protocol.VLAN.filter_config[*].vlan_id = 100`
- `Protocol.VLAN.filter_config[100].entry_mode = Enabled`

Configuration Steps for Example 1

- `Protocol.VLAN.filter_config[100].alias = Network Mgmt`
- `Protocol.VLAN.filter_config[100].management_members = ALL`
- `Protocol.VLAN.filter_config[100].port_members = 1/5, 1/6`
- `Protocol.VLAN.filter_config[*].vlan_id = 200`
- `Protocol.VLAN.filter_config[200].entry_mode = Enabled`
- `Protocol.VLAN.filter_config[200].alias = Production`
- `Protocol.VLAN.filter_config[200].management_members = NONE`
- `Protocol.VLAN.filter_config[200].port_members = 1/1, 1/2, 1/5`
- `Protocol.VLAN.filter_config[*].vlan_id = 300`
- `Protocol.VLAN.filter_config[300].entry_mode = Enabled`
- `Protocol.VLAN.filter_config[300].alias = Accounting`
- `Protocol.VLAN.filter_config[300].management_members = NONE`
- `Protocol.VLAN.filter_config[300].port_members = 1/3, 1/4, 1/5`
- `Protocol.VLAN.filter_config[1].port_members =`
- `Protocol.VLAN.port_config[1/1].vlan_mode = ACCESS`
- `Protocol.VLAN.port_config[1/1].default_vlan_id = 200`
- `Protocol.VLAN.port_config[1/2].vlan_mode = ACCESS`
- `Protocol.VLAN.port_config[1/2].default_vlan_id = 200`
- `Protocol.VLAN.port_config[1/3].vlan_mode = ACCESS`
- `Protocol.VLAN.port_config[1/3].default_vlan_id = 300`
- `Protocol.VLAN.port_config[1/4].vlan_mode = ACCESS`
- `Protocol.VLAN.port_config[1/4].default_vlan_id = 300`
- `Protocol.VLAN.port_config[1/5].vlan_mode = TRUNK`
- `Protocol.VLAN.port_config[1/5].default_vlan_id = 1`
- `Protocol.VLAN.port_config[1/6].vlan_mode = ACCESS`
- `Protocol.VLAN.port_config[1/6].default_vlan_id = 100`
- `Protocol.VLAN.vlan_id_config.management_vlan_id = 100`
- `Protocol.VLAN.enable_vlan_filtering = Enabled`

3.5 Example 2: Advanced Setup

This advanced scenario assumes that you want to modify a working VLAN configuration on a remote switch that is already in operation.

Note:

As VLANs usually span several switches (see Figure 3, ② and ③), VLAN changes inevitably affect a number of switches at once. E.g. focused on a single workgroup switch to remain simple yet correct, we assume that the necessary modifications on other network components are properly performed prior to as well as afterwards our work.

Starting Point

The accounting employees' PCs (see Figure 3, ①) are connected to VLAN 300.

Requested Changes

A new network policy requires that all accounting employees' PCs be moved to VLAN 400.

Maintenance Conditions

Due to time constraints, the network maintenance has to be done during working hours.

Prearranged Modifications

The core switch's VLAN configuration has already been updated to an intermediate state, i.e. it has the VLAN 400 already set up in addition to VLAN 300. Purpose: frames tagged with VID 400 sent to the core switch will already be processed correctly – as will frames tagged with the current VID 300.

Post-Modification Work

After the workgroup switch has been set up, the core switch's VLAN configuration can be updated to the final state, i.e. by removing VLAN 300.

Local Prerequisite Changes

None

3.5.1 Planning Steps

VLAN Changes:

- VLAN 400 has to be created.
- VLAN 300 has to be disabled.

Ports' VLAN Membership changes:

- Ports 3 and 4 shall become members of VLAN 400 only.
- Port 5 shall become member also of VLAN 400.
- All other ports shall not become member of VLAN 400.

Port Role Changes:

- None

Port Default VID Changes:

- Ports 3 and 4 need the new port default VID 400.

Switch Management Port Changes:

- Has to be "none" for new VLAN 400.

3.5.2 Overview

| # | En. | Alias | VID | Port | 1 | 2 | 3 | 4 | 5 | 6 | Mgmt |
|---|-----|--------------|-----|-----------------|------|------|------|------|-------|------|------|
| 1 | X | Network Mgmt | 100 | | | | | | X | X | All |
| 2 | X | Production | 200 | | X | X | | | X | | None |
| 3 | X | Accounting | 300 | | | | | | | | None |
| 4 | X | Accounting | 400 | | | | X | X | X | | None |
| | | | | Mode | Acc. | Acc. | Acc. | Acc. | Trunk | Acc. | |
| | | | | Def. VID | 200 | 200 | 400 | 400 | 1 | 100 | |

3.5.3 Pitfalls

There are three potential hurdles you have to circumnavigate to ensure continued network connectivity:

- If you disable VLAN 300 before you have created VLAN 400, you will disrupt network connectivity for the ports 3 and 4.
Reason: If VLAN 300 no longer exists, frames entering ports 3 or 4 will be assigned VID 300 and will therefore be dropped. This also applies for frames destined to be sent out on ports 3 or 4 because they are received tagged with VID 300 on port 1.
- If you disable VLAN 300 or change the ports 3 and 4 default VID before you have set up the ports' VLAN 400 memberships, you will also disrupt network connectivity.
Reason: If ports 3 and 4 are not yet members of VLAN 400, frames entering these ports will be dropped. The same applies for frames destined to be sent out on ports 3 or 4.

Note:

This is a minor issue because in a newly created VLAN, all ports are member by default, thus facilitating connectivity.

- If you change the ports 3 and 4 default VID before you have created VLAN 400 and assigned the VLAN membership if necessary, you will also disrupt network connectivity.
Reason: If VLAN 400 does not yet exist or does not have the ports 3, 4 and 5 as members, frames entering ports 3 or 4 will be dropped, i.e. not reach any destination port. The same applies to frames destined to be sent out on ports 3 or 4.

3.5.4 Conclusion

- Set up any new VLANs first.
- Then assign the port memberships.
- Then change the ports' default VIDs.
- Delete or disable any VLANs no longer required.

3.5.5 Sequence of Setup Steps

These considerations lead to the following sequence:

- Leave VLAN filtering enabled (essential).
- Create new VLAN 400 in the filter table.
- Configure the ports' VLAN 400 memberships.

Note:

In a newly created VLAN, all ports are member by default. You only have to remove membership for the ports unassociated with the new VLAN.

- Configure the ports 3 and 4's default VLANs.
- Disable VLAN 300.

Using the Web Manager:

Configuration Steps for Example 2

- Select the **VLANs** screen, then select the tab **VLAN Table**.
- Click the button **add table entry** to create a new VLAN (for VID 400).
- Assign for **VID** the value 400.
- Mark the checkbox in the **en.** column for the new VLAN.
- Assign for **Alias** the value "Accounting".
- In the **Mgmt** column select **none** in the drop-down-list for the **VID** 400.
- Unmark the checkboxes in the **1/1** and **1/2** port columns for the **VID** 400.
- Mark the checkboxes in the **1/3 ... 1/5** port columns for the **VID** 400 (default).
- Unmark the checkboxes in the **1/6** port column for the **VID** 400.
- Click the button **apply to running configuration** to save the VLAN Table configuration to the running configuration (see Figure 7).

| VLAN Table (5 Entries of 256) | | | | | | | | | | | | | | | |
|-------------------------------|-------------------------------------|--------------|-----|------------|---------------|-------|--------------------------|--------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------|
| Smart Preset (without apply) | | | | | | | | | | | | | | | |
| # | en. | Alias | VID | MSTP Group | PVID override | I-SID | | Mgmt | 1/1 | 1/2 | 1/3 | 1/4 | 1/5 | 1/6 | Action |
| | | | | | | | select all | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 1 | <input checked="" type="checkbox"/> | Unassigned | 1 | 0 | - | 0 | <input type="checkbox"/> | all | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Remove |
| 2 | <input checked="" type="checkbox"/> | Network Mgmt | 100 | 0 | - | 0 | <input type="checkbox"/> | all | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Remove |
| 3 | <input checked="" type="checkbox"/> | Production | 200 | 0 | - | 0 | <input type="checkbox"/> | none | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | Remove |
| 4 | <input checked="" type="checkbox"/> | Accounting | 300 | 0 | - | 0 | <input type="checkbox"/> | none | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | Remove |
| 5 | <input checked="" type="checkbox"/> | Accounting | 400 | 0 | - | 0 | <input type="checkbox"/> | none | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | Remove |
| add table entry | | | | | | | | | | | | | | | |
| refresh | | | | | | | | apply to running configuration | | | | | | | |

Figure 7: Example 2 - VLAN Table

- Select the tab **VLAN Port Configuration**.

Configuration Steps for Example 2

- In the line **Slot/Port 1/3**, set the **VID** to 400.
- In the line **Slot/Port 1/4**, set the **VID** to 400.
- Click the button **apply to running configuration** to save the VLAN Port configuration to the running configuration (see Figure 8).

| VLAN Port Configuration | | | | | | |
|-------------------------|--------|-------------|--------------------------|------------------|--------------------------|---------------|
| Slot/Port | Mode | default VID | force default VID | default priority | priority override | Fabric Attach |
| 1/1 | Access | 200 | <input type="checkbox"/> | 0 | <input type="checkbox"/> | disabled |
| 1/2 | Access | 200 | <input type="checkbox"/> | 0 | <input type="checkbox"/> | disabled |
| 1/3 | Access | 400 | <input type="checkbox"/> | 0 | <input type="checkbox"/> | disabled |
| 1/4 | Access | 400 | <input type="checkbox"/> | 0 | <input type="checkbox"/> | disabled |
| 1/5 | trunk | 1 | <input type="checkbox"/> | 0 | <input type="checkbox"/> | disabled |
| 1/6 | Access | 100 | <input type="checkbox"/> | 0 | <input type="checkbox"/> | disabled |

refresh apply to running configuration

Figure 8: Example 2 - VLAN Port Configuration

- Select the tab **VLAN Table**.
- Unmark all checkboxes in the **1/1 ... 1/2** port columns for the **VID 300**.
- Click the button **apply to running configuration** to save the changes to the running configuration (see Figure 9).

| VLAN Table (5 Entries of 256) | | | | | | | | | | | | | | | |
|-------------------------------|-------------------------------------|--------------|-----|------------|---------------|-------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------|
| # | en. | Alias | VID | MSTP Group | Prio override | I-SID | | Mgmt | 1/1 | 1/2 | 1/3 | 1/4 | 1/5 | 1/6 | Action |
| | | | | | | | select all | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 1 | <input checked="" type="checkbox"/> | Unassigned | 1 | 0 | - | 0 | <input type="checkbox"/> | all | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Remove |
| 2 | <input checked="" type="checkbox"/> | Network Mgmt | 100 | 0 | - | 0 | <input type="checkbox"/> | all | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Remove |
| 3 | <input checked="" type="checkbox"/> | Production | 200 | 0 | - | 0 | <input type="checkbox"/> | none | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | Remove |
| 4 | <input checked="" type="checkbox"/> | Accounting | 300 | 0 | - | 0 | <input type="checkbox"/> | none | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Remove |
| 5 | <input checked="" type="checkbox"/> | Accounting | 400 | 0 | - | 0 | <input type="checkbox"/> | none | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | Remove |

add table entry

refresh apply to running configuration

Figure 9: Example 2 - VLAN Table

Using the Command Line Interface (CLI):

Configuration Steps for Example 2

- ❑ `Protocol.VLAN.filter_config[*].vlan_id = 400`
- ❑ `Protocol.VLAN.filter_config[400].entry_mode = Enabled`
- ❑ `Protocol.VLAN.filter_config[400].alias = Accounting`
- ❑ `Protocol.VLAN.filter_config[400].management_members = NONE`
- ❑ `Protocol.VLAN.filter_config[400].port_members = 1/3, 1/4, 1/5`
- ❑ `Protocol.VLAN.port_config[1/3].default_vlan_id = 400`
- ❑ `Protocol.VLAN.port_config[1/4].default_vlan_id = 400`
- ❑ `Protocol.VLAN.filter_config[300].port_members =`

3.6 Example 3: Changing the Management VID

This scenario assumes that you want to change the management VLAN ID of a switch due to changes in network infrastructure or just deployed misconfiguration in the field.

Starting Point

- The respective switch's management VID is VLAN 20, assigned to port 1 in access mode.
- There are two additional VLANs 30 and 40 for Data and VoIP subnets assigned to ports 2 and 3 respectively ports 4 and 5.
- The default VID 1 is assigned to all ports in trunk mode.

Requested Changes

The switch's management VID has to be changed into VLAN 21. All other VLAN settings remain unaffected.

Note:

Make sure not to delete or change VID 1 settings!

Maintenance Conditions

Because the VLAN settings concerning the communication between all other VLAN subnets and their associated participants stay untouched, this change can be made without any arrangements as long as the IP address of the switch remains unaffected.

Prearranged Modifications

None.

Post-Modification Work

None.

Local Prerequisite Changes

None.

3.6.2 Planning Steps

VLAN Changes:

- VLAN 21 has to be created.
- VLAN 20 has to be disabled.

Ports' VLAN Membership changes:

- None.

Port Role Changes:

- None

Port Default VID Changes:

- Port 1 needs the new port default VID 21.

Switch Management Port Changes:

- None.

Note:

Make sure to change the VLAN settings in the correct order when using configuration tools like Webmanager, Telnet or SSH over a remote network connection. Otherwise there is a risk of losing connection to the device by accidentally disabling the respective port.

3.6.3 Overview

Port settings before modification:

| # | En. | Alias | VID | Port | 1 | 2 | 3 | 4 | 5 | 6 | Mgmt |
|-----------------|-----|--------------|-----|------|------|------|------|------|------|-------|------|
| 1 | X | Network Mgmt | 20 | | X | | | | | | All |
| 2 | X | Data | 30 | | | X | X | | | | None |
| 3 | X | VoIP | 40 | | | | | X | X | | None |
| Mode | | | | | Acc. | Acc. | Acc. | Acc. | Acc. | Trunk | |
| Def. VID | | | | | 20 | 30 | 30 | 40 | 40 | 1 | |

Note:

The default **VID 1** is assigned to all ports 1 to 6 in trunk mode. Make sure not to delete or change **VID 1** settings!

Port settings after modification

| # | En. | Alias | VID | Port | 1 | 2 | 3 | 4 | 5 | 6 | Mgmt |
|---|-----|--------------|-----|------|---|---|---|---|---|---|------|
| 1 | X | Network Mgmt | 20 | | X | | | | | | All |
| 2 | X | Network Mgmt | 21 | | X | | | | | | All |
| 3 | X | Data | 30 | | | X | X | | | | None |
| 4 | X | VoIP | 40 | | | | | X | X | | None |

| # | En. | Alias | VID | Port | 1 | 2 | 3 | 4 | 5 | 6 | Mgmt |
|---|-----|-------|----------|------|------|------|------|------|------|-------|------|
| | | | | Mode | Acc. | Acc. | Acc. | Acc. | Acc. | Trunk | |
| | | | Def. VID | | 21 | 30 | 30 | 40 | 40 | 1 | |

Note:

Changed or new settings in comparison to example 1 are in *italics*, removed or disabled settings are struck through (i.e. "X", "20").

Using the Web Manager:

Configuration Steps for Example 3

- Select the **VLANs** screen, then select the tab **VLAN Table**.
- Click the button **add table entry** to create a new VLAN (for VID 21).
- Assign for **VID** the value 21.
- Assign for **Alias** the value "Network Mgmt".
- In the **Mgmt** column select **all** in the drop-down-list for the **VID** 21.
- Unmark the checkboxes in the **1/2 ... 1/6** port columns for the **VID** 21.
- Mark the checkbox in the **en.** column for the new VLAN.
- Click the button **apply to running configuration** to save the VLAN Table configuration to the running configuration (see Figure 10).
- Select the tab **Basic Configuration**.
- In the field **Management VLAN ID**, set the **VID** to 21.
- Click the button **apply to running configuration** to save the basic configuration to the running configuration (see Figure 10).

| Basic Configuration | |
|---|-------------------------------------|
| VLAN filtering enabled (see also VLAN Port Configuration) | <input checked="" type="checkbox"/> |
| MVRP enabled (see also MVRP Port Configuration) | <input type="checkbox"/> |
| Management VLAN ID | 21 |
| Management Priority | 0 |
| Voice VLAN ID | 1 |
| RSTP VLAN ID | 1 |
| VLAN ID for unauthorised users | 1 |
| <div> <div>refresh</div> <div>apply to running configuration</div> </div> | |

Figure 10: Example 3 - Basic Configuration

- Select the tab **VLAN Port Configuration**.
- In the line **Slot/Port 1/1**, set the **Mode** to "Access" (default) and **VID** to 21.
- Click the button **apply to running configuration** to save the changes to the running configuration (see Figure 11).

Configuration Steps for Example 3

| VLAN Port Configuration | | | | | | |
|-------------------------|--------|-------------|--------------------------|--------------------------------|--------------------------|---------------|
| Slot/Port | Mode | default VID | force default VID | default priority | priority override | Fabric Attach |
| 1/1 | Access | 21 | <input type="checkbox"/> | 0 | <input type="checkbox"/> | disabled |
| 1/2 | Access | 30 | <input type="checkbox"/> | 0 | <input type="checkbox"/> | disabled |
| 1/3 | Access | 30 | <input type="checkbox"/> | 0 | <input type="checkbox"/> | disabled |
| 1/4 | Access | 40 | <input type="checkbox"/> | 0 | <input type="checkbox"/> | disabled |
| 1/5 | Access | 40 | <input type="checkbox"/> | 0 | <input type="checkbox"/> | disabled |
| 1/6 | trunk | 1 | <input type="checkbox"/> | 0 | <input type="checkbox"/> | disabled |
| refresh | | | | apply to running configuration | | |

Figure 11: Example 3 - VLAN Port Configuration

- Select the tab **VLAN Table**.
- For the old **VID** 20 either unmark the checkbox in the **en.** column [1], select **none** in the drop-down-list in the **Mgmt** column [2] or remove the entry [3] (see Figure 12).
- Click the button **apply to running configuration** to save the changes to the running configuration.

| VLAN Table (5 Entries of 256) | | | | | | | | | | | | | | |
|-------------------------------|-------------------------------------|--------------|-----|------------|----------------|-------|------------|-------------------------------------|-------------------------------------|--------------------------|-------------------------------------|-------------------------------------|--------------------------|--------------------------|
| Smart Preset (without apply) | | | | | | | | | | | | | | |
| # | en. | Alias | VID | MSTP Group | PRIOR override | I-SID | Mgmt | 1/1 | 1/2 | 1/3 | 1/4 | 1/5 | 1/6 | Action |
| 1 | <input checked="" type="checkbox"/> | Unauthorised | 1 | 0 | - | 0 | select all | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2 | <input type="checkbox"/> | Network Mgmt | 20 | 0 | - | 0 | none | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Remove |
| 3 | <input checked="" type="checkbox"/> | Data | 30 | 0 | - | 0 | none | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Remove |
| 4 | <input checked="" type="checkbox"/> | VoIP | 40 | 0 | - | 0 | none | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | Remove |
| 5 | <input checked="" type="checkbox"/> | Network Mgmt | 21 | 0 | - | 0 | all | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Remove |
| add table entry | | | | | | | | | | | | | | |
| refresh | | | | | | | | apply to running configuration | | | | | | |

Figure 12: Example 3 - VLAN Table

Using the Command Line Interface (CLI):

Configuration Steps for Example 3

- `Protocol.VLAN.filter_config[*].vlan_id = 21`
- `Protocol.VLAN.filter_config[21].entry_mode = Enabled`
- `Protocol.VLAN.filter_config[21].alias = Network Mgmt`
- `Protocol.VLAN.filter_config[21].management_members = ALL`
- `Protocol.VLAN.filter_config[21].port_members = 1/1`

Configuration Steps for Example 3

- `Protocol.VLAN.vlan_id_config.management_vlan_id = 21`
- `Protocol.VLAN.port_config[1/1].default_vlan_id = 21`

There are three possible ways to dispose VID 20:

The following command deactivates the VID:

- `Protocol.VLAN.filter_config[20].entry_mode = Disabled`

The following command deactivates the management access for this VID:

- `Protocol.VLAN.filter_config[20].management_members = NONE`

The following command deletes the VID:

- `Protocol.VLAN.filter_config[20].vlan_id =`
 - » This will remove the current element from the table or list
 - Type y to continue, else to quit: y
 - [*].vlan_id:

Important:

Using the CLI to delete a VID that is still in use by other configurations will terminate those respective functions as well without further warning!

3.7 Example 4: Working as an AVAYA Fabric Attach Device

This scenario assumes that you want to connect an existing IP network to an AVAYA Fabric Connect network.

Note:

For more information about AVAYA Fabric Connect please refer to the AVAYA website www.avaya.de. **The AVAYA Fabric Attach function is available as of release of Firmware G6 v10.6.1!**

In order for general IP based devices to benefit from the numerous advantages of the AVAYA Fabric Connect Core or Connect network, a gateway called "AVAYA Fabric Attach" is needed. A MICROSENS G6 switch can perform this gateway function, when an AVAYA Switch is deployed near the edge of an AVAYA Fabric Connect network. The MICROSENS switch not only works as a gateway but also supports additional access protection in various ways:

- Access can be limited by MAC address or number of MAC per port.
- User credentials can be verified locally or from a central RADIUS or TACACS+ server.
- Additionally, an Access Control List (ACL) may be specified to further limit the access to certain machines or applications.

All these access protection mechanisms will take place before the data are forwarded to the fabric.

The communication between the MICROSENS switch and the AVAYA Fabric Connect network is performed using the LLDP protocol.

The MICROSENS G6 switch can also use LLDP to communicate with local IP telephones to negotiate PoE requirements, the voice-VLAN ID and QoS parameters.

Furthermore, MICROSENS G6 switches support various other functions such as:

- QoS (Quality of Service),
- DHCP snooping (to detect malicious DHCP messages) or
- ARP inspection to safeguard against DOS attacks.

These functions in association with the MICROSENS SmartOffice features provide a seamless and efficient connection to the AVAYA Fabric Connect network.

This example defines a configuration for the MICROSENS switch in order to map access ports to the AVAYA Fabric Connect by mapping the switch's VLANs to the respective Fabric Connect's I-SID values. This mapping is possible for every VLAN ID (VID) supported in this network segment (except the management VID of the MICROSENS switch, otherwise no binding will be applied on the AVAYA switch). Up to 256 VLANs may be used concurrently.

3.7.1 Network Topology

To describe the configuration we use a given AVAYA Fabric Connect network to which the MICROSENS switch connects two external network components (see Figure 13).

Inside the Fabric Connect network there are two different I-SIDs in use:

- I-SID1 (value: 1000)
- I-SID2 (value: 2000)

The MICROSENS switch maps the VID of the respective network partner to the respective I-SID of the Fabric Connect network.

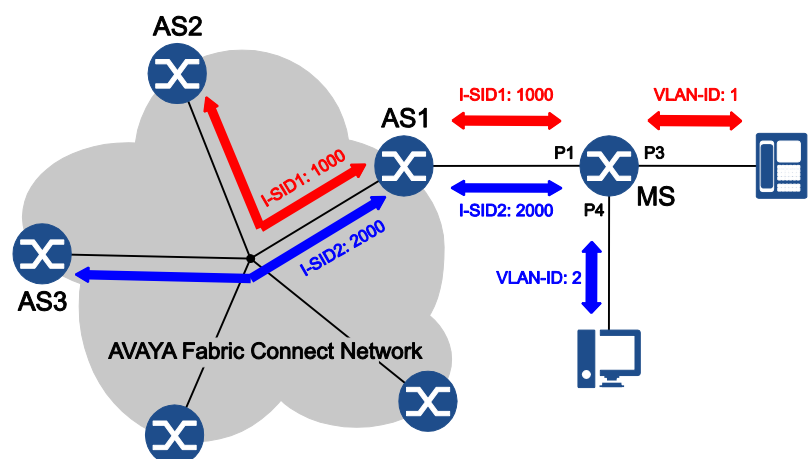


Figure 13: Example of AVAYA Fabric Connect with Fabric Attach

| Element | Description |
|------------|---|
| AS1 – AS3 | AVAYA switches, representing the edge ports to the AVAYA Fabric Connect network |
| MS | MICROSENS G6 switch, working as Fabric Attach gateway |
| P1, P3, P4 | Ports connecting the respective switches: <ul style="list-style-type: none"> • P1: Port that connects the MICROSENS switch to the AVAYA edge port switch AS1. • P3: Port that connects a VOIP phone to the MICROSENS switch (via VID 1) • P4: Port that connects a desktop PC to the MICROSENS switch. (via VID 2) |

3.7.2 Sequence of Setup Steps

There are four main settings required to connect a MICROSENS switch to an AVAYA Fabric Connect:

- Define the local VLAN settings as usual. For each access port a default VLAN setting is specified.

Note:

The Fabric Attach feature is enabled on a port basis.

- Enable SPB feature in client mode for the client access ports (e.g. P3 and P4 in Figure 13).
Shortest path bridging (SPB) Fabric Attach feature can be used to simplify configuration in an SBP enabled network.

Note:

Please also generally enable the LLDP function to use this feature

- Define the I-SID value to be used. This handle defines the entire connection path. This parameter defines the VLAN to I-SID binding when the shortest path bridging (SPB) Fabric Attach feature is used.
- In order to be able to communicate to Fabric Connect Core, the LLDP protocol must be enabled for all affected ports, especially for the port connecting to Fabric Connect (e.g. P1 in in Figure 13).

Using the Web Manager:

Configuration Steps for Example 4

- ☐ Select the **VLANs screen**, then select the tab **VLAN Table**.
- ☐ Select the tab **VLAN Table**.
- ☐ Click the button **add table entry** to create a new VLAN (for VID 1).
- ☐ Assign for **VID** the value 1.
- ☐ Mark the checkbox in the **en.** column for the new VLAN.
- ☐ Assign for **Alias** the value "Port 3".
- ☐ Assign for **I-SID** the value "1000".
- ☐ In the **Mgmt** column select **none** in the drop-down-list for the **VID 1**.
- ☐ Mark the checkboxes in the **1/1** and **1/3** port columns for the **VID 1**.
- ☐ Unmark the checkboxes in the **1/2**, **1/4** and **1/5** port columns for the **VID 1**.
- ☐ Click the button **add table entry** to create a new VLAN (for VID 2).
- ☐ Assign for **VID** the value 2.
- ☐ Mark the checkbox in the **en.** column for the new VLAN.
- ☐ Assign for **Alias** the value "Port 4".
- ☐ Assign for **I-SID** the value "2000".
- ☐ In the **Mgmt** column select **none** in the drop-down-list for the **VID 2**.

Configuration Steps for Example 4

- Mark the checkboxes in the **1/1** and **1/4** port columns for the **VID 2**.
- Unmark the checkboxes in the **1/2**, **1/3** and **1/5** port columns for the **VID 2**.

VLAN Table (2 Entries of 256)

Smart Preset (without apply)

| # | en. | Alias | VID | MSTP Group | PRIOR override | I-SID | | Mgmt | 1/1 | 1/2 | 1/3 | 1/4 | 1/5 | 1/6 | Action |
|---|-------------------------------------|--------|-----|------------|----------------|-------|--------------------------|--------------------------|-------------------------------------|--------------------------|-------------------------------------|-------------------------------------|--------------------------|--------------------------|--------|
| | | | | | | | select all | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 1 | <input checked="" type="checkbox"/> | Port 3 | 1 | 0 | - | 1000 | <input type="checkbox"/> | none | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Remove |
| 2 | <input checked="" type="checkbox"/> | Port 4 | 2 | 0 | - | 2000 | <input type="checkbox"/> | none | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Remove |

add table entry

refresh apply to running configuration

Figure 14: VLAN Table for AVAYA Fabric Connect

- Click the button **apply to running configuration** to save the VLAN Table configuration to the running configuration.
- Select the tab **VLAN Port Configuration**.
- In the line **Slot/Port 1/1**, set the **Mode** to "trunk" and the **Fabric Attach** to "Client".
- In the line **Slot/Port 1/3**, leave the **Mode** on "Access", change the **default VID** to "1" and set the **Fabric Attach** to "Client".
- In the line **Slot/Port 1/4**, leave the **Mode** on "Access", change the **default VID** to "2" and set the **Fabric Attach** to "Client".
- Leave the other port settings as they are.

VLAN Port Configuration

| Slot/Port | Mode | default VID | force default VID | default priority | priority override | Fabric Attach |
|-----------|--------|-------------|--------------------------|------------------|--------------------------|---------------|
| 1/1 | trunk | 10 | <input type="checkbox"/> | 0 | <input type="checkbox"/> | disabled |
| 1/2 | Access | 1 | <input type="checkbox"/> | 0 | <input type="checkbox"/> | disabled |
| 1/3 | Access | 1 | <input type="checkbox"/> | 0 | <input type="checkbox"/> | Client |
| 1/4 | Access | 2 | <input type="checkbox"/> | 0 | <input type="checkbox"/> | Client |
| 1/5 | Access | 1 | <input type="checkbox"/> | 0 | <input type="checkbox"/> | disabled |
| 1/6 | Access | 1 | <input type="checkbox"/> | 0 | <input type="checkbox"/> | disabled |

refresh apply to running configuration

Figure 15: VLAN Port Configuration for AVAYA Fabric Connect

- Click the button **apply to running configuration** to save the changes to the running configuration.
- Select the tab **Basic Configuration**.

Configuration Steps for Example 4

- Mark **VLAN filtering enabled**.

| Basic Configuration | |
|--|-------------------------------------|
| VLAN filtering enabled (see also VLAN Port Configuration) | <input checked="" type="checkbox"/> |
| MVRP enabled (see also MVRP Port Configuration) | <input type="checkbox"/> |
| Management VLAN ID | 1 |
| Management Priority | 0 |
| Voice VLAN ID | 1 |
| RSTP VLAN ID | 1 |
| VLAN ID for unauthorised users | 1 |
| <div>refresh</div> <div>apply to running configuration</div> | |

Figure 16: Enable VLAN filtering for AVAYA Fabric Attach

- Click the button **apply to running configuration** to save the changes to the running configuration.
- Select the **LLDP / CDP** screen, then select the tab **Basic Configuration**.
- Mark **LLDP enabled**.

| Basic Configuration | |
|--|-------------------------------------|
| LLDP enabled | <input checked="" type="checkbox"/> |
| CDP enabled | <input type="checkbox"/> |
| CDP version | V1 + V2 |
| receive only | <input type="checkbox"/> |
| forward on Link | <input type="checkbox"/> |
| force transmission | <input type="checkbox"/> |
| prefer LLDP | <input checked="" type="checkbox"/> |
| advertised MED class | Network Device |
| disable LLDP MED inventory | <input type="checkbox"/> |
| disable voice VLAN TLV | <input type="checkbox"/> |
| Time to live (sec.) | 128 |
| TX delay (sec.) | 2 |
| TX interval (sec.) | 30 |
| <div>refresh</div> <div>apply to running configuration</div> | |

Figure 17: Enable LLDP for AVAYA Fabric Attach

- Click the button **apply to running configuration** to save the changes to the running configuration.

Using the Command Line Interface (CLI):

Configuration Steps for Example 4

- ❑ `Protocol.VLAN.port_config[1/1"Port 1"].vlan_mode = TRUNK`
- ❑ `Protocol.VLAN.port_config[1/3"Port 3"].default_vlan_id = 1`
- ❑ `Protocol.VLAN.port_config[1/3"Port 3"].vlan_mode = ACCESS`
- ❑ `Protocol.VLAN.port_config[1/4"Port 4"].default_vlan_id = 2`
- ❑ `Protocol.VLAN.port_config[1/4"Port 4"].vlan_mode = ACCESS`
- ❑ `Protocol.VLAN.enable_vlan_filtering = Enabled`
- ❑ `Protocol.VLAN.port_config[1/3"Port 3"].fabric_attach = CLIENT`
- ❑ `Protocol.VLAN.port_config[1/4"Port 4"].fabric_attach = CLIENT`
- ❑ `Protocol.VLAN.filter_config[3].fabric_attach_i_sid = 1000`
- ❑ `Protocol.VLAN.filter_config[4].fabric_attach_i_sid = 2000`
- ❑ `Protocol.LLDP.config.enable_lldp = Enabled`

Application Note

VLAN Configuration of G6 Devices



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Application Note

VLAN Configuration of G6 Devices



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