

# How To Add and Use Tagged and Untagged VLANs Trunks on pfSense Router Interfaces

**(Compliable and tested with Cisco switches)**

*Updated May 13, 2018: Configuration can be done completely within the pfSense GUI*

**Objective:**

Using VLANs and Trunking to provide subnet 192.168.10.0 tagged on interfaces em3 & em4 to trunked interfaces on switches.

**Requirements:**

Available Interfaces  
em2 (OPT1), em3 (OPT2), em4 (OPT3)  
3 subnets each on its own router interface to its own switch  
192.168.10.0 on em2 (VLAN10)  
192.168.20.0 on em3 (VLAN20)  
192.168.30.0 on em4 (VLAN30)

**Note:**

192.168.10.0 on em2 will be untagged  
192.168.10.0 on em3 will be tagged  
192.168.10.0 on em4 will be tagged  
192.168.20.0 on em3 will be untagged  
192.168.30.0 on em4 will be untagged

This was developed on pfSense  
2.4.3-RELEASE (amd64)  
built on Mon Mar 26 18:02:04 CDT 2018  
FreeBSD 11.1-RELEASE-p7

(Click on screenshots to zoom, back button to return)

## Configure Interfaces via pfSense GUI

Interfaces -> OPT1  
Check Enable interface  
IPv4 Configuration Type: IPv4  
IPv4 Address: 192.168.10.1/24

General Configuration

Enable  Enable interface

Description  Enter a description (name) for the interface here.

IPv4 Configuration Type

IPv6 Configuration Type

MAC Address  This field can be used to modify ("spoof") the MAC address of this interface. Enter a MAC address in the following format: xx:xxxx:xxxx:xx or leave blank.

MTU  If this field is blank, the adapter's default MTU will be used. This is typically 1500 bytes but can vary in some circumstances.

MSS  If a value is entered in this field, then MSS clamping for TCP connections to the value entered above minus 40 (TCP/IP header size) will be in effect.

Speed and Duplex  Explicitly set speed and duplex mode for this interface. WARNING: MUST be set to autoselect (automatically negotiate speed) unless the port this interface connects to has its speed and duplex forced.

Static IPv4 Configuration

IPv4 Address  / 24

IPv4 Upstream gateway  If this interface is an internet connection, select an existing Gateway from the list or add a new one using the "Add" button.

Click Save

Interfaces -> OPT2

Check Enable interface

IPv4 Configuration Type: IPv4

IPv4 Address: 192.168.20.1/24

General Configuration

Enable  Enable interface

Description  Enter a description (name) for the interface here.

IPv4 Configuration Type

IPv6 Configuration Type

MAC Address  This field can be used to modify ("spoof") the MAC address of this interface. Enter a MAC address in the following format: xx:xxxx:xxxx:xx or leave blank.

MTU  If this field is blank, the adapter's default MTU will be used. This is typically 1500 bytes but can vary in some circumstances.

MSS  If a value is entered in this field, then MSS clamping for TCP connections to the value entered above minus 40 (TCP/IP header size) will be in effect.

Speed and Duplex  Explicitly set speed and duplex mode for this interface. WARNING: MUST be set to autoselect (automatically negotiate speed) unless the port this interface connects to has its speed and duplex forced.

Static IPv4 Configuration

IPv4 Address  / 24

IPv4 Upstream gateway  If this interface is an internet connection, select an existing Gateway from the list or add a new one using the "Add" button. On local area network interfaces the upstream gateway should be "none". Gateways can be managed by [clicking here](#).

Click Save

Interfaces -> OPT3  
 Check Enable interface  
 IPv4 Configuration Type: IPv4  
 IPv4 Address: 192.168.30.1/24

**General Configuration**

- Enable:  Enable interface
- Description: OPT3  
Enter a description (name) for the interface here.
- IPv4 Configuration Type: Static IPv4
- IPv6 Configuration Type: None
- MAC Address: xx:xx:xx:xx:xx:xx  
This field can be used to modify ("spoof") the MAC address of this interface. Enter a MAC address in the following format: xx:xx:xx:xx:xx:xx or leave blank.
- MTU:  If this field is blank, the adapter's default MTU will be used. This is typically 1500 bytes but can vary in some circumstances.
- MSS:  If a value is entered in this field, then MSS clamping for TCP connections to the value entered above minus 40 (TCP/IP header size) will be in effect.
- Speed and Duplex: Default (no preference, typically autoselect)  
Explicitly set speed and duplex mode for this interface.  
WARNING: MUST be set to autoselect (automatically negotiate speed) unless the port this interface connects to has its speed and duplex forced.

**Static IPv4 Configuration**

- IPv4 Address: 192.168.30.1 / 24
- IPv4 Upstream gateway: None [+ Add a new gateway](#)

If this interface is an internet connection, select an existing Gateway from the list or add a new one using the "Add" button. On local area network interfaces the upstream gateway should be "none". Gateways can be managed by [clicking here](#).

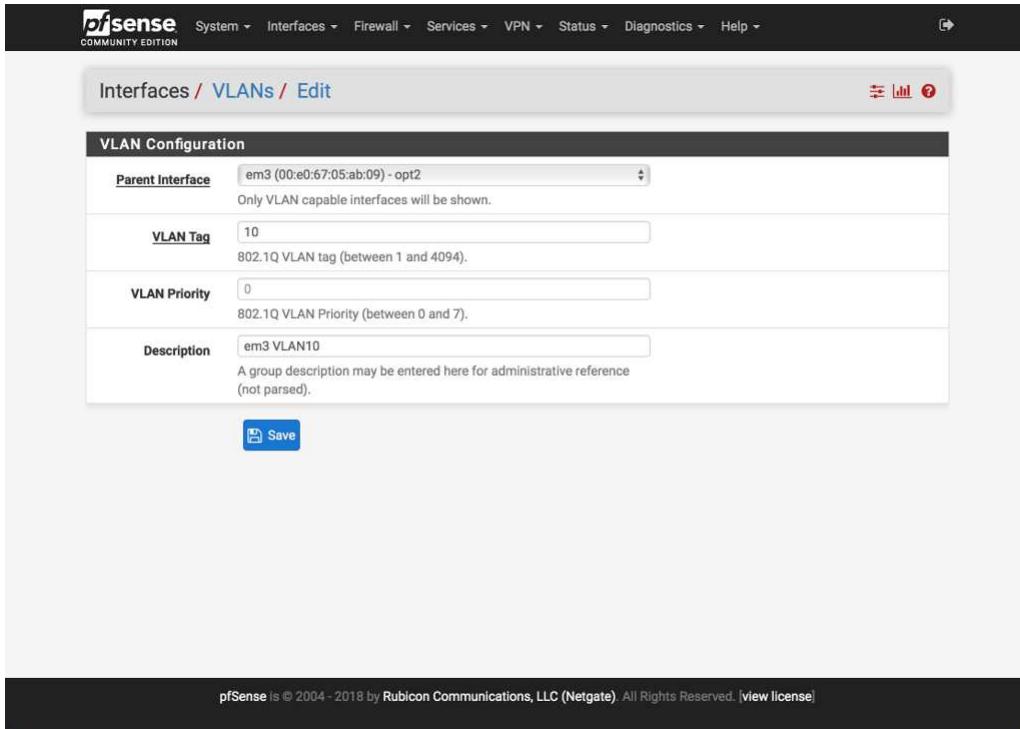
Click Save

Click Apply Changes

### Create VLANs via pfSense GUI

Interfaces -> Interface Assignments -> VLANs

Click Add  
 Parent Interface: em3  
 VLAN Tag: 10  
 VLAN Priority: <leave as is>  
 Description: vlan10



The screenshot shows the 'VLAN Configuration' page in the pfSense web interface. The 'Parent Interface' is set to 'em3 (00:e0:67:05:ab:09) - opt2'. The 'VLAN Tag' is set to '10'. The 'VLAN Priority' is set to '0'. The 'Description' is 'em3 VLAN10'. The 'Save' button is visible at the bottom.

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Click Save

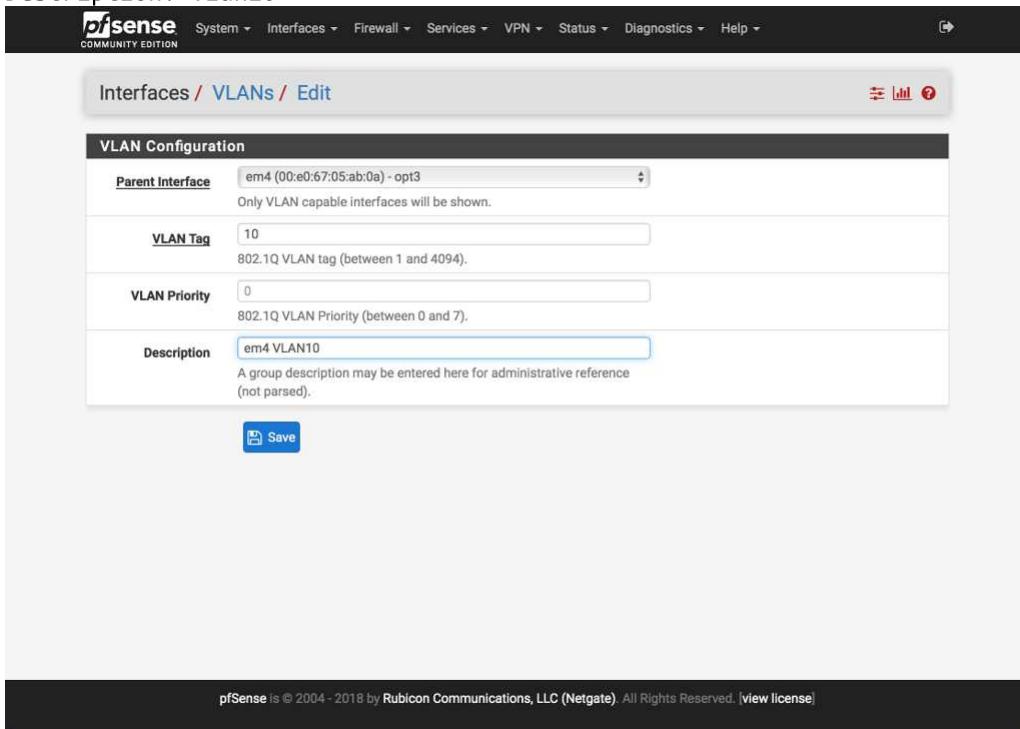
Click Add

Parent Interface: em4

VLAN Tag: 10

VLAN Priority: <leave as is>

Description: vlan10



The screenshot shows the 'VLAN Configuration' page in the pfSense web interface. The 'Parent Interface' is set to 'em4 (00:e0:67:05:ab:0a) - opt3'. The 'VLAN Tag' is set to '10'. The 'VLAN Priority' is set to '0'. The 'Description' is 'em4 VLAN10'. The 'Save' button is visible at the bottom.

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Click Save

Created VLANs

VLAN Interfaces

Interface	VLAN tag	Priority	Description	Actions
em3 (opt2)	10		em3 VLAN10	
em4 (opt3)	10		em4 VLAN10	

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### Interfaces -> Interface Assignments

Available network ports: From drop down box choose new em3 VLAN created (Assuming OPT5)

Interface Assignments

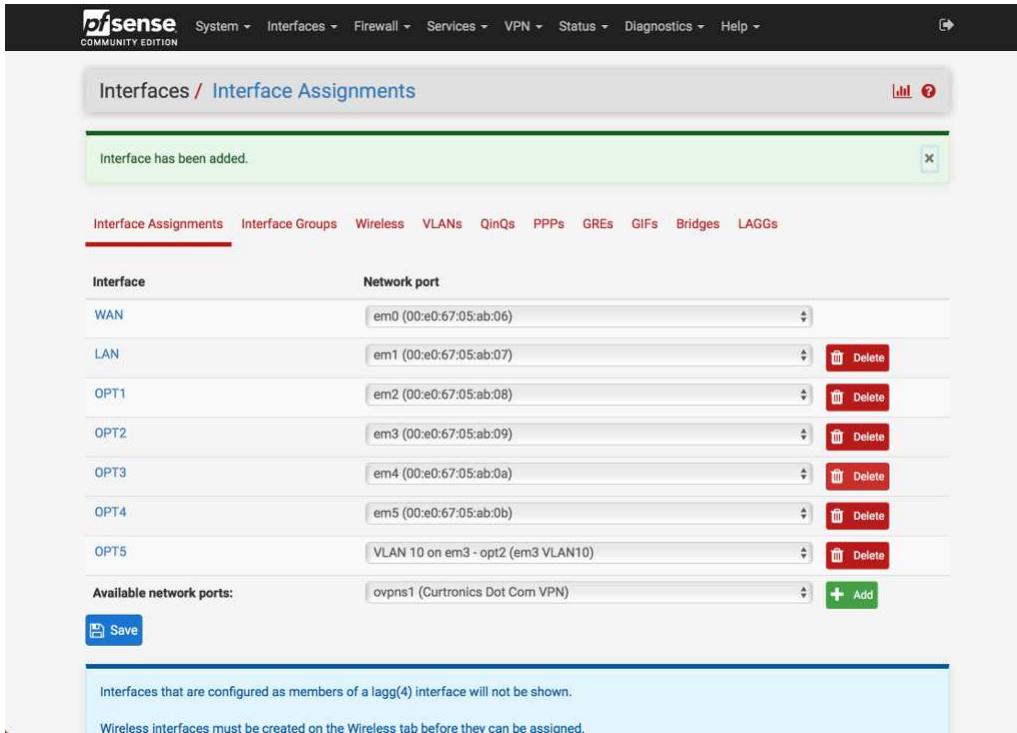
Interface	Network port
WAN	em0 (00:e0:67:05:ab:06)
LAN	em1 (00:e0:67:05:ab:07)
OPT1	em2 (00:e0:67:05:ab:08)
OPT2	em3 (00:e0:67:05:ab:09)
OPT3	em4 (00:e0:67:05:ab:0a)
OPT4	em5 (00:e0:67:05:ab:0b)

Available network ports:

Interfaces that are configured as members of a lagg(4) interface will not be shown.  
Wireless interfaces must be created on the Wireless tab before they can be assigned.

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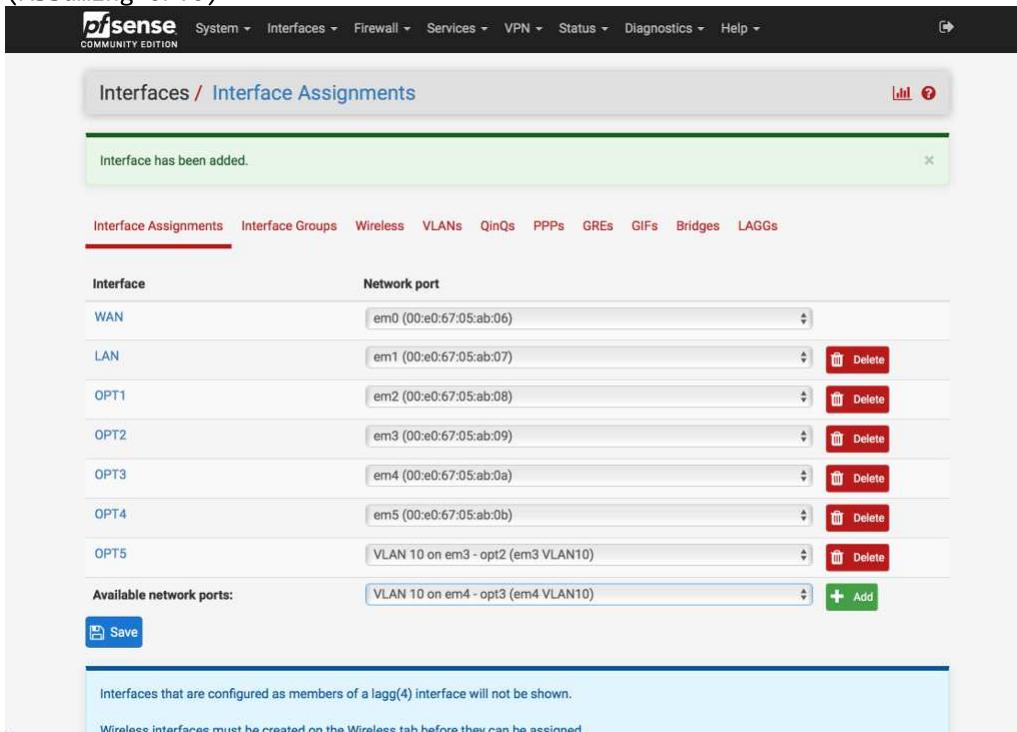
Click Add



The screenshot shows the pfSense 'Interface Assignments' page. At the top, a green message box says 'Interface has been added.' Below the header, there are tabs for 'Interface Assignments', 'Interface Groups', 'Wireless', 'VLANs', 'QinQs', 'PPPs', 'GREs', 'GIFs', 'Bridges', and 'LAGGs'. The 'Interface Assignments' tab is selected. The main table lists network interfaces and their assigned ports. A new entry 'VLAN 10 on em3 - opt2 (em3 VLAN10)' is added to the 'Available network ports' list. A 'Save' button is at the bottom left, and a note at the bottom right says 'Wireless interfaces must be created on the Wireless tab before they can be assigned.'

### Interfaces -> Interface Assignments

Available network ports: From drop down box choose new em4 VLAN created (Assuming OPT6)



The screenshot shows the pfSense 'Interface Assignments' page. The interface and port assignments are identical to the first screenshot, but the 'Available network ports' list now includes 'VLAN 10 on em4 - opt3 (em4 VLAN10)'. A note at the bottom right says 'Wireless interfaces must be created on the Wireless tab before they can be assigned.'

Click Add

Interface has been added.

Interface	Network port
WAN	em0 (00:e0:67:05:ab:06)
LAN	em1 (00:e0:67:05:ab:07)
OPT1	em2 (00:e0:67:05:ab:08)
OPT2	em3 (00:e0:67:05:ab:09)
OPT3	em4 (00:e0:67:05:ab:0a)
OPT4	em5 (00:e0:67:05:ab:0b)
OPT5	VLAN 10 on em3 - opt2 (em3 VLAN10)
OPT6	VLAN 10 on em4 - opt3 (em4 VLAN10)
Available network ports:	ovpn1 (Curtronics Dot Com VPN)

**Save**

Interface that are configured as members of a **trunked** interface will not be shown

Click on Interface associated with em3 VLAN (Assuming OPT5)

**General Configuration**

Enable	<input checked="" type="checkbox"/> Enable interface
Description	OPT5 Enter a description (name) for the interface here.
IPv4 Configuration Type	None
IPv6 Configuration Type	None
MAC Address	xx:xx:xx:xx:xx:xx This field can be used to modify ("spoof") the MAC address of this interface. Enter a MAC address in the following format: xx:xx:xx:xx:xx:xx or leave blank.
MTU	<input type="text"/> If this field is blank, the adapter's default MTU will be used. This is typically 1500 bytes but can vary in some circumstances.
MSS	<input type="text"/> If a value is entered in this field, then MSS clamping for TCP connections to the value entered above minus 40 (TCP/IP header size) will be in effect.
Speed and Duplex	Default (no preference, typically autoselect) Explicitly set speed and duplex mode for this interface. WARNING: MUST be set to autoselect (automatically negotiate speed) unless the port this interface connects to has its speed and duplex forced.

**Reserved Networks**

Check Enable interface

Change Description: OPT5 to em310

Interfaces / OPT5

**General Configuration**

Enable  Enable interface

Description  Enter a description (name) for the interface here.

IPv4 Configuration Type

IPv6 Configuration Type

MAC Address  This field can be used to modify ("spoof") the MAC address of this interface. Enter a MAC address in the following format: xx:xxxx:xxxx:xx or leave blank.

MTU  If this field is blank, the adapter's default MTU will be used. This is typically 1500 bytes but can vary in some circumstances.

MSS  If a value is entered in this field, then MSS clamping for TCP connections to the value entered above minus 40 (TCP/IP header size) will be in effect.

Speed and Duplex  Explicitly set speed and duplex mode for this interface. **WARNING: MUST be set to autoselect (automatically negotiate speed) unless the port this interface connects to has its speed and duplex forced.**

**Reserved Networks**

Click Save

Interfaces / EM310

The EM310 configuration has been changed.  
The changes must be applied to take effect.  
Don't forget to adjust the DHCP Server range if needed after applying.

Apply Changes

**General Configuration**

Enable  Enable interface

Description  Enter a description (name) for the interface here.

IPv4 Configuration Type

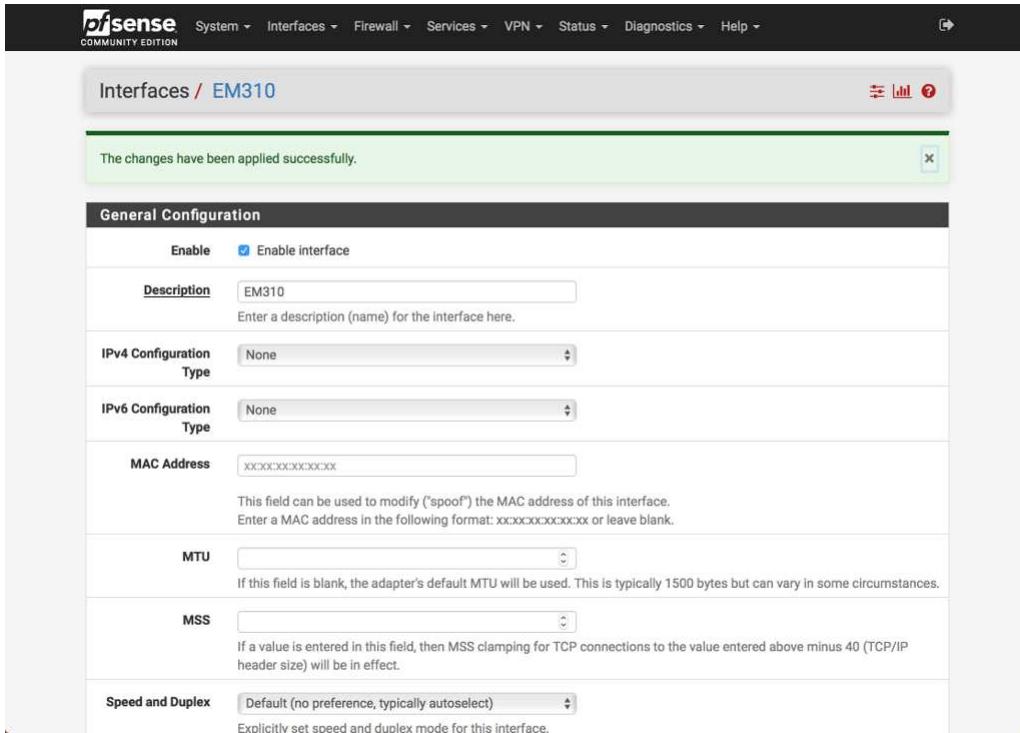
IPv6 Configuration Type

MAC Address  This field can be used to modify ("spoof") the MAC address of this interface. Enter a MAC address in the following format: xx:xxxx:xxxx:xx or leave blank.

MTU  If this field is blank, the adapter's default MTU will be used. This is typically 1500 bytes but can vary in some circumstances.

MSS  If a value is entered in this field, then MSS clamping for TCP connections to the value entered above minus 40 (TCP/IP header size) will be in effect.

Click Apply Changes

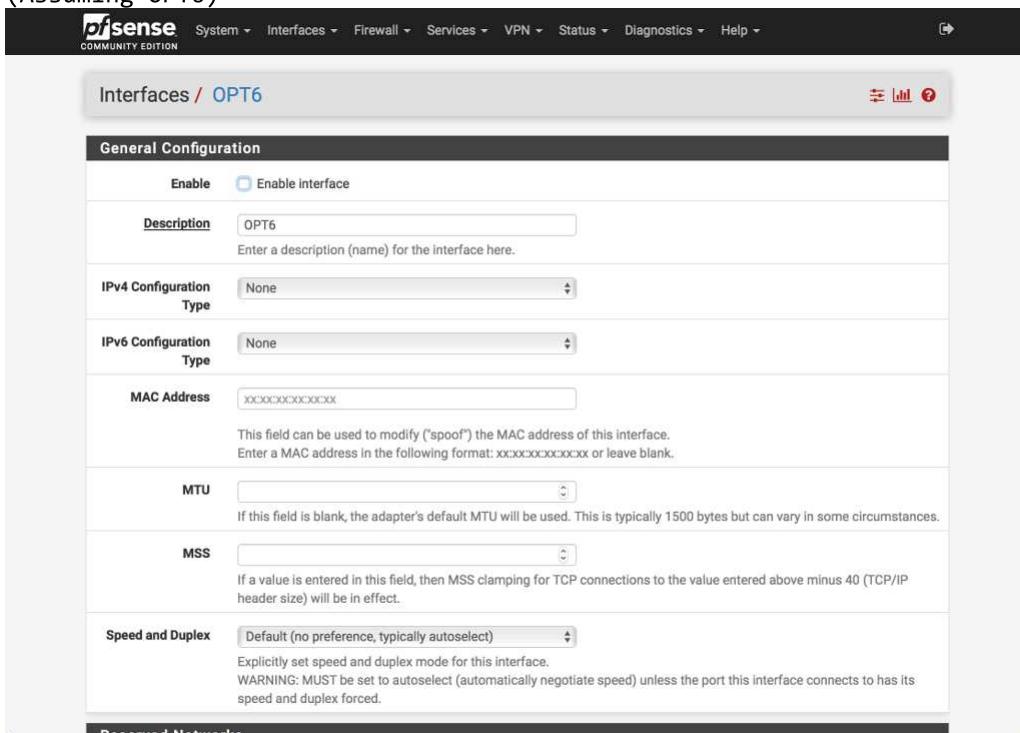


The changes have been applied successfully.

**General Configuration**

Enable	<input checked="" type="checkbox"/> Enable interface
Description	EM310
IPv4 Configuration Type	None
IPv6 Configuration Type	None
MAC Address	XX:XX:XX:XX:XX:XX
This field can be used to modify ("spoof") the MAC address of this interface. Enter a MAC address in the following format: xx:xx:xx:xx:xx:xx or leave blank.	
MTU	1500
If this field is blank, the adapter's default MTU will be used. This is typically 1500 bytes but can vary in some circumstances.	
MSS	1460
If a value is entered in this field, then MSS clamping for TCP connections to the value entered above minus 40 (TCP/IP header size) will be in effect.	
Speed and Duplex	Default (no preference, typically autoselect)
Explicitly set speed and duplex mode for this interface.	

Click on Interface associated with em4 VLAN  
(Assuming OPT6)



The changes have been applied successfully.

**General Configuration**

Enable	<input checked="" type="checkbox"/> Enable interface
Description	OPT6
IPv4 Configuration Type	None
IPv6 Configuration Type	None
MAC Address	XX:XX:XX:XX:XX:XX
This field can be used to modify ("spoof") the MAC address of this interface. Enter a MAC address in the following format: xx:xx:xx:xx:xx:xx or leave blank.	
MTU	1500
If this field is blank, the adapter's default MTU will be used. This is typically 1500 bytes but can vary in some circumstances.	
MSS	1460
If a value is entered in this field, then MSS clamping for TCP connections to the value entered above minus 40 (TCP/IP header size) will be in effect.	
Speed and Duplex	Default (no preference, typically autoselect)
Explicitly set speed and duplex mode for this interface. WARNING: MUST be set to autoselect (automatically negotiate speed) unless the port this interface connects to has its speed and duplex forced.	

**Reserved Networks**

Check Enable interface  
Change Description: OPT5 to em410

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Interfaces / OPT6

**General Configuration**

Enable	<input checked="" type="checkbox"/> Enable interface
Description	EM410 Enter a description (name) for the interface here.
IPv4 Configuration Type	None
IPv6 Configuration Type	None
MAC Address	XX:XX:XX:XX:XX:XX This field can be used to modify ("spoof") the MAC address of this interface. Enter a MAC address in the following format: xx:xx:xx:xx:xx:xx or leave blank.
MTU	0 If this field is blank, the adapter's default MTU will be used. This is typically 1500 bytes but can vary in some circumstances.
MSS	0 If a value is entered in this field, then MSS clamping for TCP connections to the value entered above minus 40 (TCP/IP header size) will be in effect.
Speed and Duplex	Default (no preference, typically autoselect) Explicitly set speed and duplex mode for this interface. WARNING: MUST be set to autoselect (automatically negotiate speed) unless the port this interface connects to has its speed and duplex forced.

**Reserved Networks**

Click Save

pfSense  
COMMUNITY EDITION

Interfaces / EM410

The EM410 configuration has been changed.  
The changes must be applied to take effect.  
Don't forget to adjust the DHCP Server range if needed after applying.

**General Configuration**

Enable	<input checked="" type="checkbox"/> Enable interface
Description	EM410 Enter a description (name) for the interface here.
IPv4 Configuration Type	None
IPv6 Configuration Type	None
MAC Address	XX:XX:XX:XX:XX:XX This field can be used to modify ("spoof") the MAC address of this interface. Enter a MAC address in the following format: xx:xx:xx:xx:xx:xx or leave blank.
MTU	0 If this field is blank, the adapter's default MTU will be used. This is typically 1500 bytes but can vary in some circumstances.
MSS	0 If a value is entered in this field, then MSS clamping for TCP connections to the value entered above minus 40 (TCP/IP header size) will be in effect.

Click Apply Changes

The changes have been applied successfully.

**General Configuration**

Enable  Enable interface

Description  Enter a description (name) for the interface here.

IPv4 Configuration Type

IPv6 Configuration Type

MAC Address  This field can be used to modify ("spoof") the MAC address of this interface. Enter a MAC address in the following format: xx:xxxx:xxxx:xx or leave blank.

MTU  If this field is blank, the adapter's default MTU will be used. This is typically 1500 bytes but can vary in some circumstances.

MSS  If a value is entered in this field, then MSS clamping for TCP connections to the value entered above minus 40 (TCP/IP header size) will be in effect.

Speed and Duplex  Explicitly set speed and duplex mode for this interface.

### Create Bridge via pfSense GUI

Interfaces -> Interface Assignments -> Bridges  
Add

Interfaces / Bridges / Edit

**Bridge Configuration**

Member Interfaces  Interfaces participating in the bridge.

Description

Advanced Options  Display Advanced

Member Interface: OPT1, em310, em410  
Click Save

Note name of bridge created

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### Interfaces -> Interface Assignments

Available network ports: From drop down box choose new bridge created (Assuming BRIDGE0)

Available network ports: BRIDGE0

Interfaces that are configured as members of a lagg(4) interface will not be shown.  
Wireless interfaces must be created on the Wireless tab before they can be assigned.

Click Add

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Interfaces / Interface Assignments

Interface has been added.

Interface Assignments Interface Groups Wireless VLANs QinQs PPPs GREs GIFs Bridges LAGGs

Interface	Network port	Actions
WAN	em0 (00:e0:67:05:ab:06)	<input type="button" value="Delete"/>
LAN	em1 (00:e0:67:05:ab:07)	<input type="button" value="Delete"/>
OPT1	em2 (00:e0:67:05:ab:08)	<input type="button" value="Delete"/>
OPT2	em3 (00:e0:67:05:ab:09)	<input type="button" value="Delete"/>
OPT3	em4 (00:e0:67:05:ab:0a)	<input type="button" value="Delete"/>
OPT4	em5 (00:e0:67:05:ab:0b)	<input type="button" value="Delete"/>
EM310	VLAN 10 on em3 - opt2 (em3 VLAN10)	<input type="button" value="Delete"/>
EM410	VLAN 10 on em4 - opt3 (em4 VLAN10)	<input type="button" value="Delete"/>
OPT7	BRIDGE0	<input type="button" value="Delete"/>
Available network ports:	ovpns1 (Curtronics Dot Com VPN)	<input type="button" value="Add"/>

Click on Interface associated with bridge  
(Assuming OPT7)

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Interfaces / OPT7

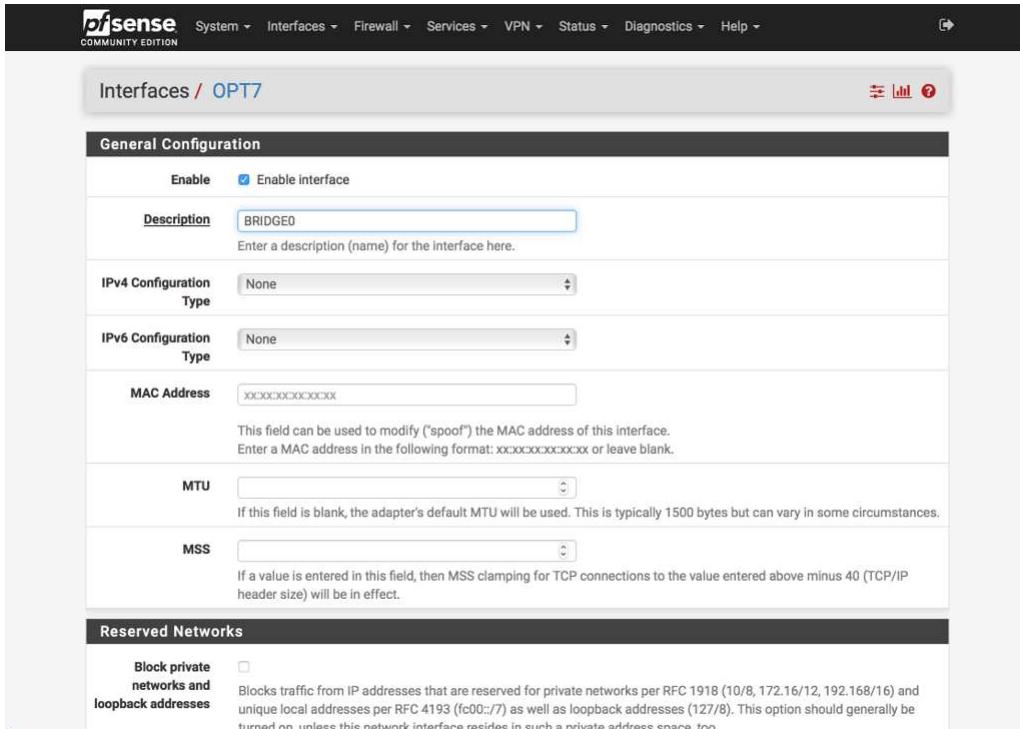
General Configuration

Enable	<input checked="" type="checkbox"/> Enable interface
Description	OPT7 Enter a description (name) for the interface here.
IPv4 Configuration Type	None
IPv6 Configuration Type	None
MAC Address	XX:XX:XX:XX:XX:XX This field can be used to modify ("spoof") the MAC address of this interface. Enter a MAC address in the following format: xx:xx:xx:xx:xx:xx or leave blank.
MTU	<input type="text"/>
MSS	<input type="text"/>

Reserved Networks

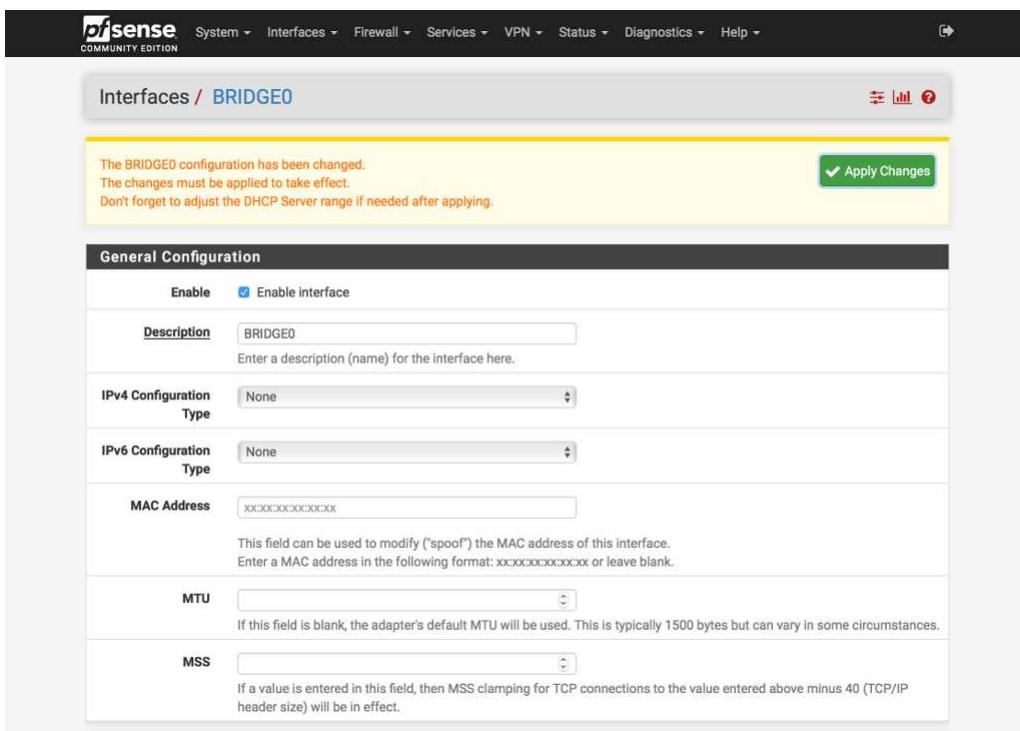
Block private networks and loopback addresses	<input checked="" type="checkbox"/>	Blocks traffic from IP addresses that are reserved for private networks per RFC 1918 (10/8, 172.16/12, 192.168/16) and unique local addresses per RFC 4193 (fc00::/7) as well as loopback addresses (127/8). This option should generally be turned on, unless this network interface resides in such a private address space, too.
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Check Enable interface  
Change Description: OPT5 to BRIDGE0



The screenshot shows the 'General Configuration' section for the 'BRIDGE0' interface. The 'Enable' checkbox is checked. The 'Description' field is set to 'BRIDGE0'. The 'IPv4 Configuration Type' and 'IPv6 Configuration Type' dropdowns are both set to 'None'. The 'MAC Address' field contains 'XX:XXXX:XXXX:XX'. The 'MTU' and 'MSS' fields are empty. In the 'Reserved Networks' section, the 'Block private networks and loopback addresses' checkbox is unchecked. A note explains that this option blocks traffic from IP addresses reserved for private networks and loopback addresses, and should generally be turned on unless the interface resides in a private address space.

Click Save



The screenshot shows the 'General Configuration' section for the 'BRIDGE0' interface. The 'Enable' checkbox is checked. The 'Description' field is set to 'BRIDGE0'. The 'IPv4 Configuration Type' and 'IPv6 Configuration Type' dropdowns are both set to 'None'. The 'MAC Address' field contains 'XX:XXXX:XXXX:XX'. The 'MTU' and 'MSS' fields are empty. A message at the top of the page states: 'The BRIDGE0 configuration has been changed. The changes must be applied to take effect. Don't forget to adjust the DHCP Server range if needed after applying.' A green 'Apply Changes' button is visible.

Click Apply Changes

The changes have been applied successfully.

**General Configuration**

Enable  Enable interface

Description: BRIDGE0  
Enter a description (name) for the interface here.

IPv4 Configuration Type: None

IPv6 Configuration Type: None

MAC Address: XX:XX:XX:XX:XX:XX  
This field can be used to modify ("spoof") the MAC address of this interface. Enter a MAC address in the following format: xx:xx:xx:xx:xx:xx or leave blank.

MTU:   
If this field is blank, the adapter's default MTU will be used. This is typically 1500 bytes but can vary in some circumstances.

MSS:   
If a value is entered in this field, then MSS clamping for TCP connections to the value entered above minus 40 (TCP/IP header size) will be in effect.

**Reserved Networks**

VLAN and Bridge setup complete

#### Add firewall rules for BRIDGE0 via pfSense GUI

Firewall -> Rules  
Add  
Save  
Apply Changes  
(As needed)

That's it. Assuming your switches are set up and connected.

#### Switch interfaces configuration:

switch connected to em2: Access, VLAN10 untagged  
switch connected to em3: Trunk, VLAN10 tagged, VLAN20 untagged  
switch connected to em4: Trunk, VLAN10 tagged, VLAN30 untagged

These are 3 separate independent switches, do not connect these 3 interfaces to the same switch or any combination of 2 of these interfaces to the same switch.

If anything was missed or there are questions, errors, or discrepancies please email me at:  
pfs (at) curtronics (dot) com