Goal

Enable coexistence of a 3rd-party VPN / Firewall with an EdgeMarc appliance.

Describe characteristics and tradeoffs of different topologies.

Provide configuration information for the EdgeMarc.

Pre-Edgewater Configuration

Assume the following configuration prior to installing the EdgeMarc appliance:

Non-VLAN-capable Ethernet switch

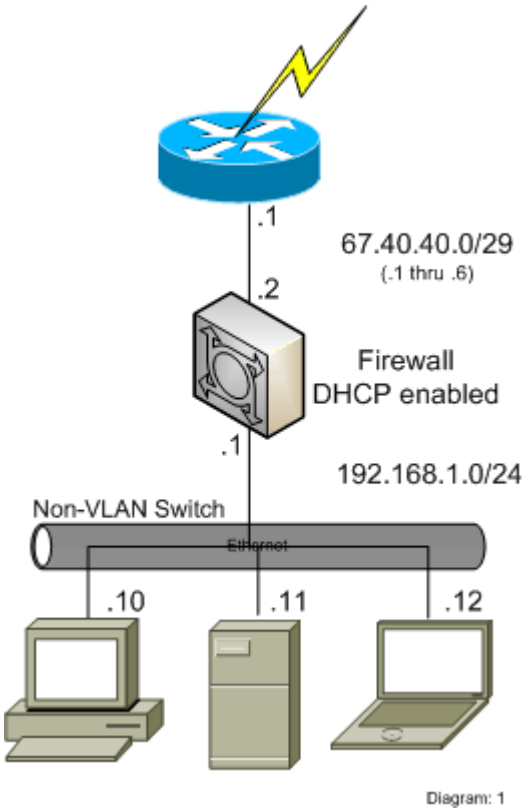


Diagram: 1

VLAN-capable Ethernet switch

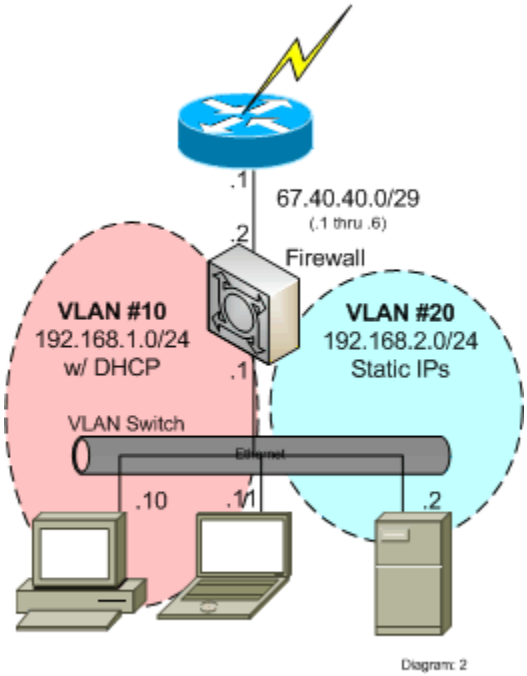


Diagram: 2

Solution

Note: The descriptions below assume VOS v5.1 or later. Those configurations that do not utilize Proxy ARP will also work for older versions of VOS.

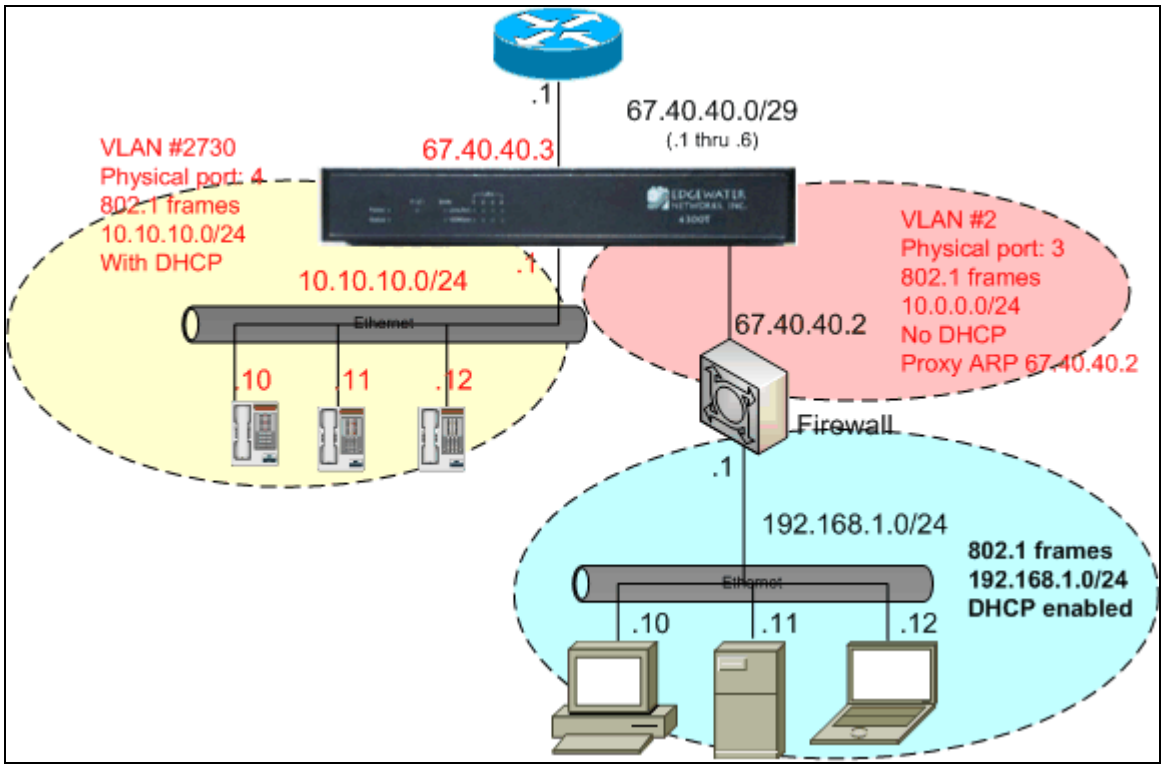
There are multiple ways to configure a VPN / firewall in conjunction with an EdgeMarc appliance. Each has various tradeoffs. The table below is a starting point to determine the appropriate configuration for your environment.

- EdgeMarc 200/250/4300/45XX/46XX/5300LF2
  - Non-VLAN-capable Ethernet switch
    - One public WAN IP range available.
      - Two Enet drops available per office/desk.
        See ***Sub-option A1: Split LAN Ethernets***, page 3.
        This offers full Plug 'n Dial for phones.
      - One Enet drop available per office/desk.
        See ***Sub-option A2: Single LAN Ethernet, using separate PC & Phone subnets***, page 8.
        Phones must be manually configured in this layout.
        See ***Sub-option A3: Single LAN Ethernet, using the same PC & Phone subnet***, page 9.
        Phones can share PCs' DHCP server
    - Two (or more) public IP ranges. Want one (or more) subnets routed through the EdgeMarc to its LAN interface.
      See ***Sub-option C1: VLAN-capable EdgeMarc***, page 14.
  - VLAN-capable Ethernet switch
    - One public WAN IP range available.
      See ***Sub-option D1: VLAN-capable EdgeMarc***, page 20.

- EdgeMarc 4200/5300/6400
  - Non-VLAN-capable Ethernet switch
    - One public WAN IP range available.
      - Two Enet drops available per office/desk.
        See ***Sub-option B1: Split LAN Ethernets***, page 11.
        This offers full Plug 'n Dial for phones.
      - One Enet drop available per office/desk.
        See ***Sub-option B2: One LAN Ethernet***, page 13
        This option isn't supported. See text for details.
    - Two (or more) public IP ranges. Want one (or more) subnets routed through the EdgeMarc to its LAN interface.
      - Two Enet drops available per office/desk.
        See ***Sub-option C2: Non-VLAN EdgeMarc***, page 18
        This configuration requires two Enet drops per office/desk.
      - One Enet drop available per office/desk.
        See ***Sub-option B2: One LAN Ethernet***, page 13.
        This option isn't supported. See text for details.
  - VLAN-capable Ethernet switch
    - One public WAN IP range available.
      See ***Sub-option D2: Non-VLAN EdgeMarc***, page 26

Option A: VLAN-capable Edgewater appliance, non-VLAN switches, one WAN subnet

Sub-option A1: Split LAN Ethernets



Characteristics

- EdgeMarc provides NAT, Firewall and DHCP Plug 'n Dial to phones
- 3rd-party firewall provides NAT, Firewall and DHCP to PCs
- WAN interface has one free IP address:
  - The EdgeMarc is assigned one IP address from the WAN subnet
  - Other address(es), including the one already being used by the 3rd-party Firewall/VPN device, are bridged through the EdgeMarc to its LAN interface.
- EdgeMarc LAN interface uses two VLANs
  - VLAN #2730 with private subnet for phones (associated with EM LAN port 4). This LAN uses standard 802.1 frames.
  - VLAN #2 with a public subnet for the 3rd-party VPN / Firewall device (associated with EM LAN port 3). This LAN uses standard 802.1 frames.

Limitations

- This configuration requires two drops per cube or office.
  - DHCP is used separately for PCs and Phones, requiring two broadcast domains. Two broadcast domains means two LANs.
- This configuration is only possible on Edgewater appliances that provide VLAN support (200/250/4300/4500/4600 Series EdgeMarcs).

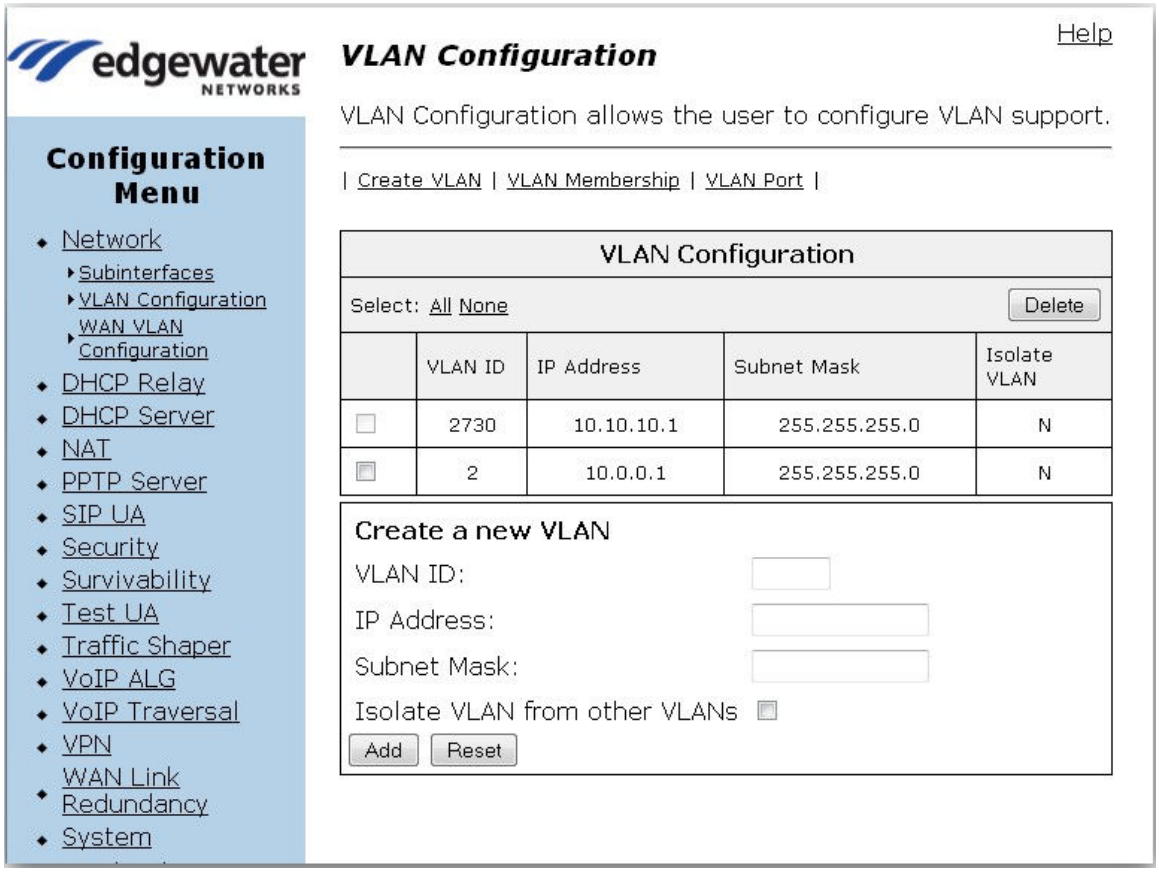
Implementation Steps

Utilizing the EdgeMarc GUI, follow the standard instructions (described in the user's guide) to enable the following on the EdgeMarc:

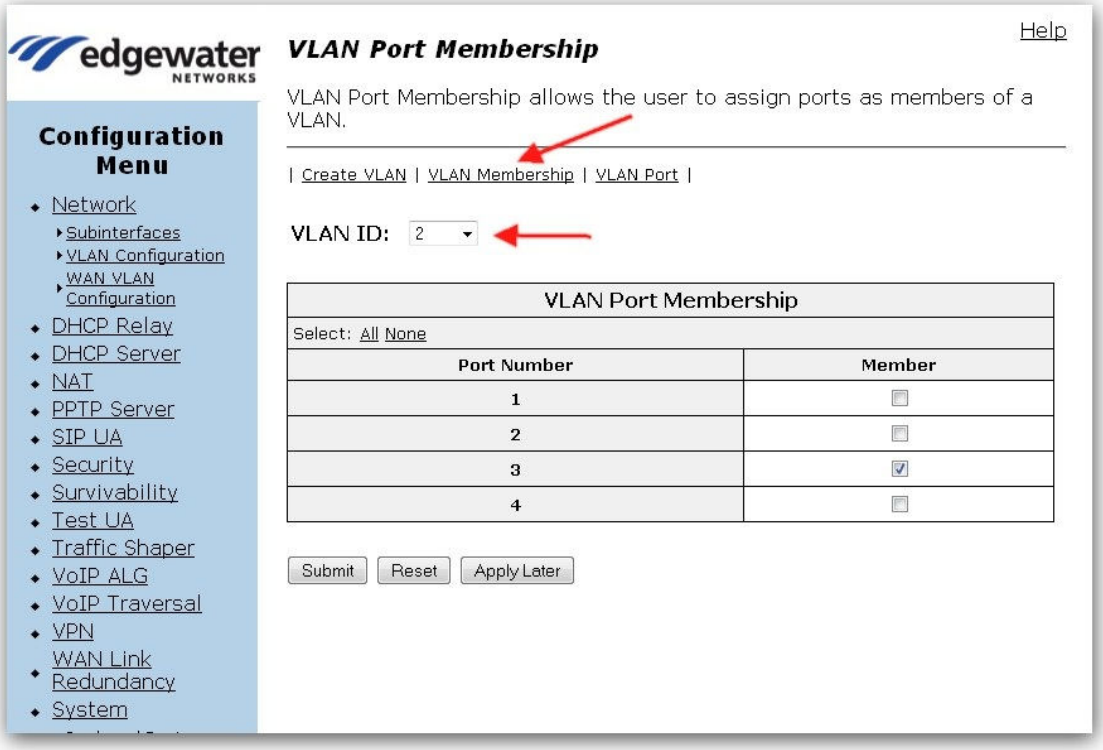
1. Enable Network with VLAN functionality
    - Set the four LAN ports to 802.1
    - Modify VLAN 2730 as:
      IP address: 10.10.10.1 with mask 255.255.255.0
      Physical ports: 1, 2 and 4
    - Add a VLAN with:
      ID: 2
      IP address: 10.0.0.1 with mask 255.255.255.0
    - Associate VLAN 2 with LAN port 3

    When done, the VLAN screens should look similar to the following:

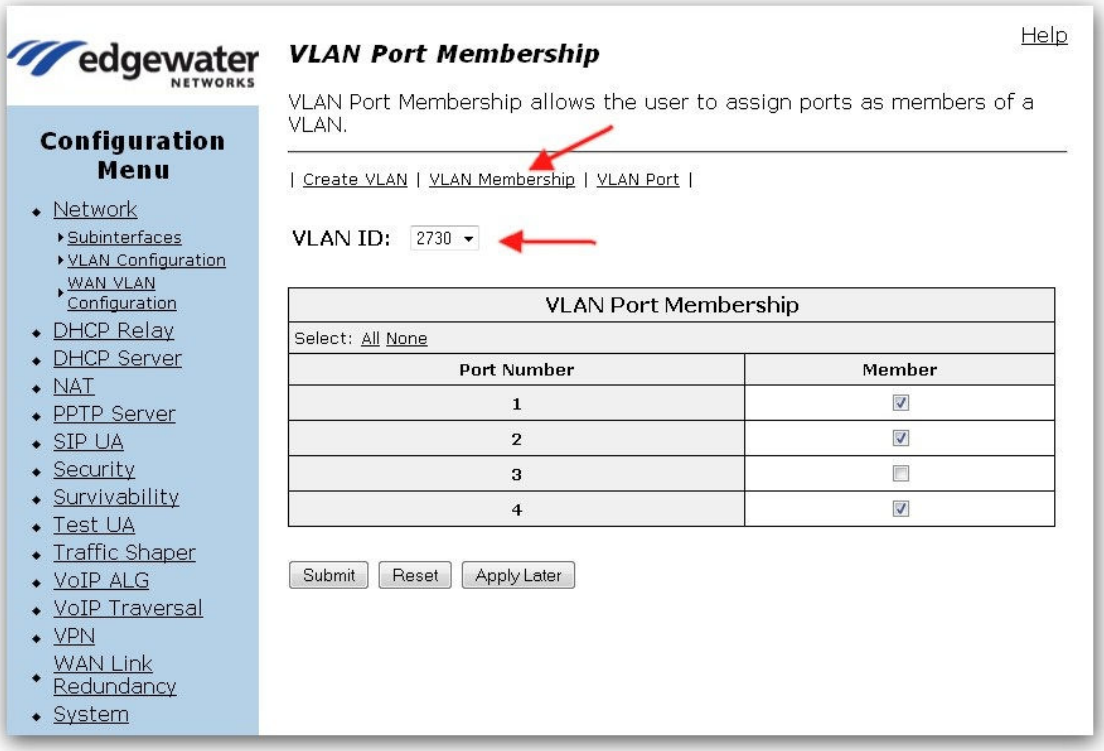
    VLAN Configuration Page:



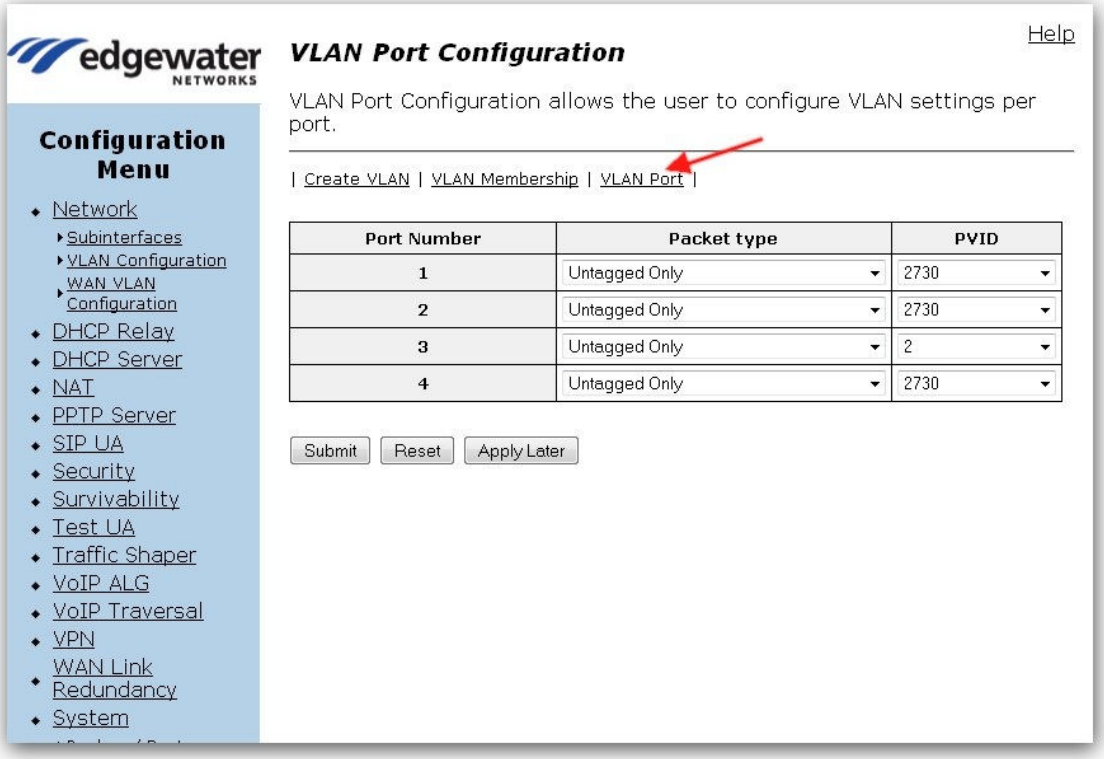
VLAN 2 Port Membership:



VLAN 2730 Port Membership:



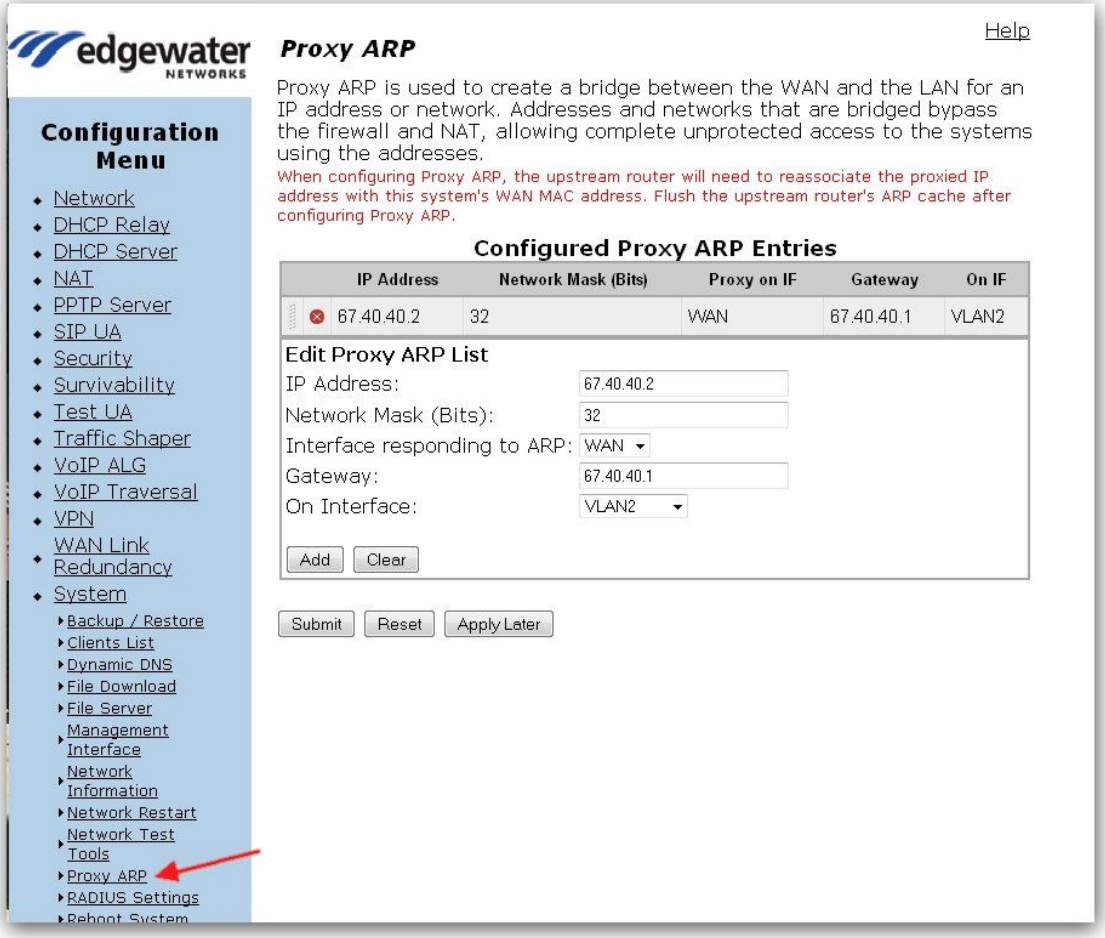
VLAN Port Configuration:



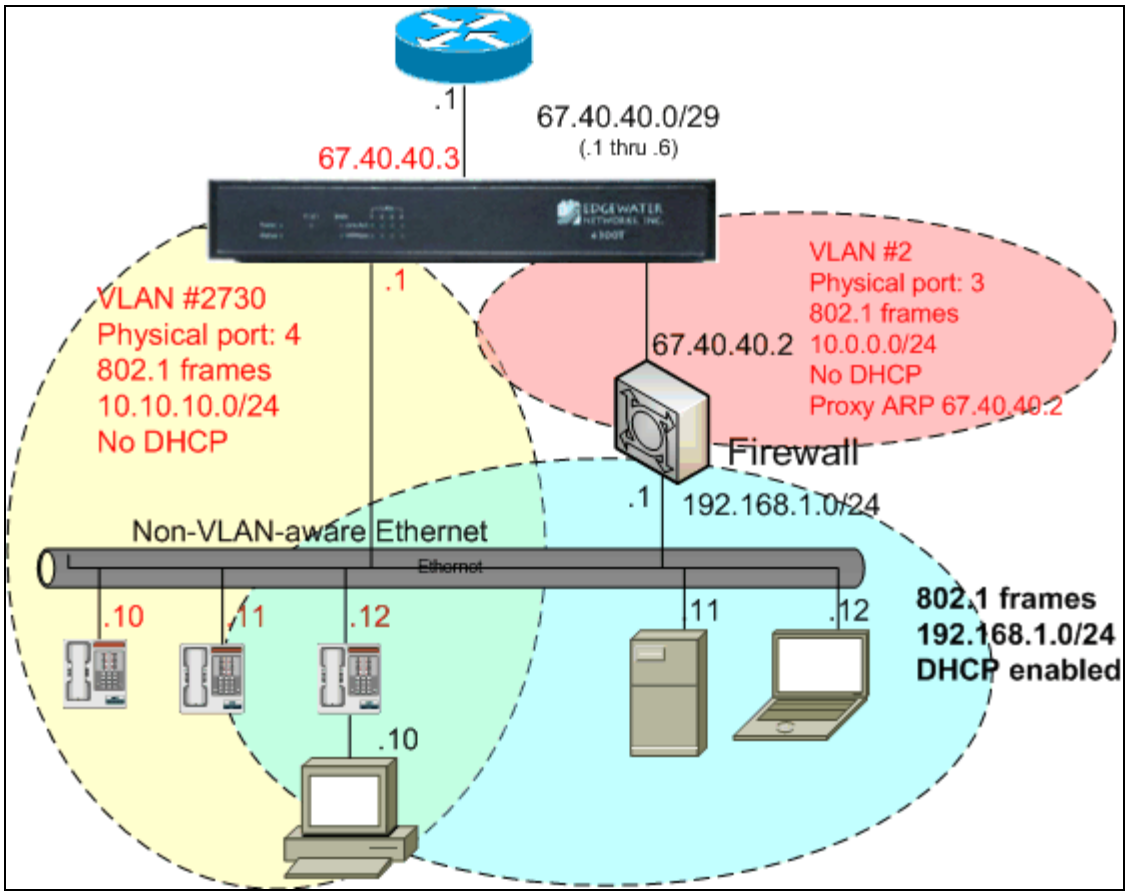
2. Enable NAT
3. Enable ALG functionality
    - Specify VLAN 2730 for the ALG
4. Enable Traffic Shaping
5. Enable DHCP on VLAN #2730
6. Enable Firewall
7. Enable System -> Proxy ARP
   Configure Proxy ARP so that the EdgeMarc bridges the external Firewall's IP address from the EM's WAN i/f to its LAN i/f.
    - VLAN 2 is associated with LAN Port 3
    - The IP address to be forwarded is 67.40.40.2/32
    - Bridge traffic back to the default gateway 67.40.40.1

When done, the Proxy ARP screen should look similar to the following:

PROXY ARP Page:



Sub-option A2: Single LAN Ethernet, using separate PC & Phone subnets



Characteristics

- EdgeMarc provides NAT and Firewall to phones
- 3rd-party firewall provides NAT, Firewall and DHCP to PCs
- WAN interface has one free IP address:
  - The EdgeMarc is assigned one IP address from the WAN subnet
  - Other address(es), including the one already being used by the 3rd-party Firewall/VPN device, are bridged through the EdgeMarc to its LAN interface.
- EdgeMarc LAN interface uses two VLANs
  - VLAN #2730 with private subnet for phones (associated with EM LAN port 4). This LAN uses standard 802.1 frames.
  - VLAN #2 with a public subnet for the 3rd-party VPN / Firewall device (associated with EM LAN port 3). This LAN uses standard 802.1 frames.

Limitations

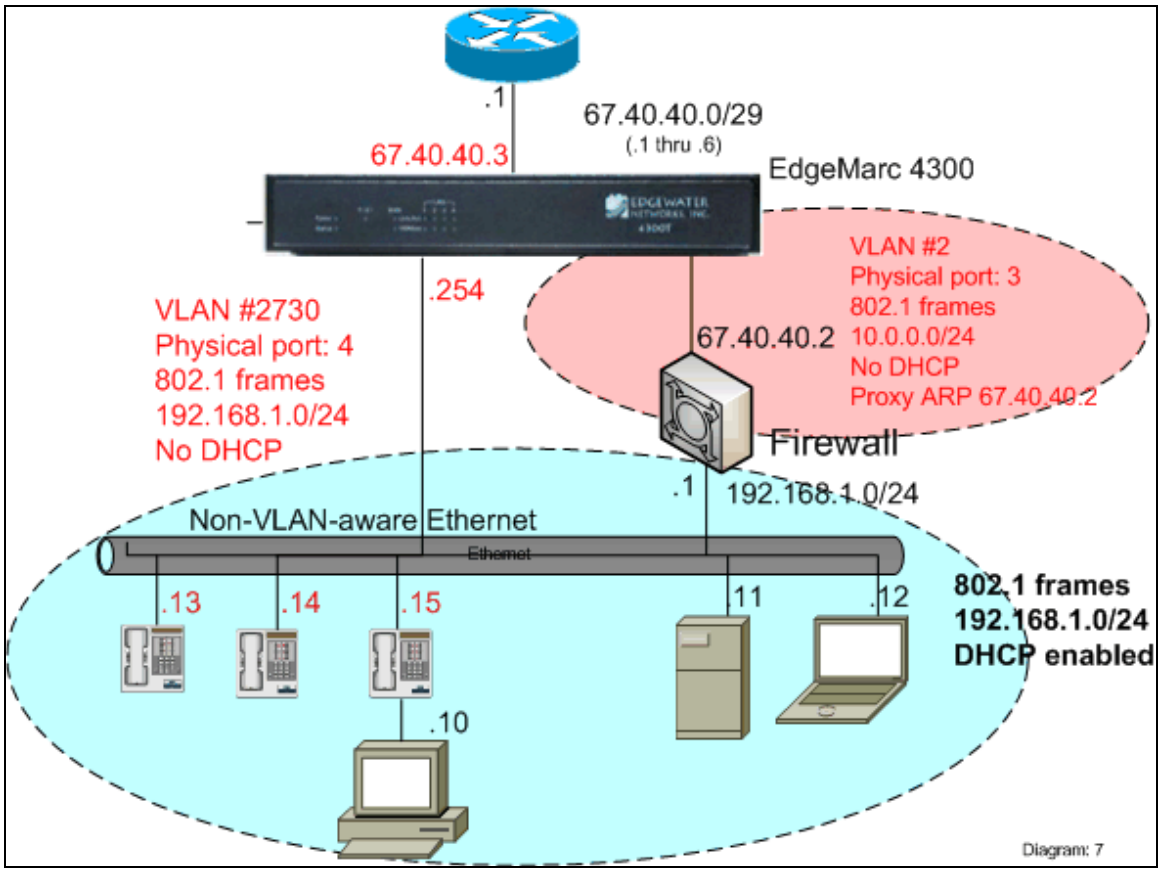
- DHCP and Plug ‘n Dial not available for Phones
  - Phones must be manually configured with IP addresses in the 10.10.10.0 subnet and a SIP Proxy or MGCP Control Server address of the EdgeMarc.
- This configuration is only possible on Edgewater appliances that provide VLAN support, (200/250/4300/4500/4600 Series EdgeMarcs).

Implementation Steps

Follow all the steps in Sub-option A1: Split LAN Ethernets, above, ***except:***

- Skip step 5. Enable DHCP on VLAN #2730

Sub-option A3: Single LAN Ethernet, using the same PC & Phone subnet



Characteristics

- EdgeMarc provides ALG functionality to phones
- 3rd-party firewall provides NAT, Firewall and DHCP to PCs and phones
  - Phones receive IP addresses from the same pool as PCs.
  - Default router for PC and phones is 3rd-party firewall
  - EdgeMarc is SIP Proxy or MGCP Control Server to phones
- WAN interface has one free IP address:
  - The EdgeMarc is assigned one IP address from the WAN subnet
  - Other address(es), including the one already being used by the 3rd-party Firewall/VPN device, are bridged through the EdgeMarc to its LAN interface.
- EdgeMarc LAN interface uses two VLANs
  - VLAN #2730 with private subnet for phones, and shared by PCs (associated with EM LAN port 4). This LAN uses standard 802.1 frames.
  - VLAN #2 with a public subnet for the 3rd-party VPN / Firewall device (associated with EM LAN port 3). This LAN uses standard 802.1 frames.

Limitations

- This configuration is only possible on Edgewater appliances that provide VLAN support, (200/250/4300/4500/4600 Series EdgeMarcs).

Implementation Steps

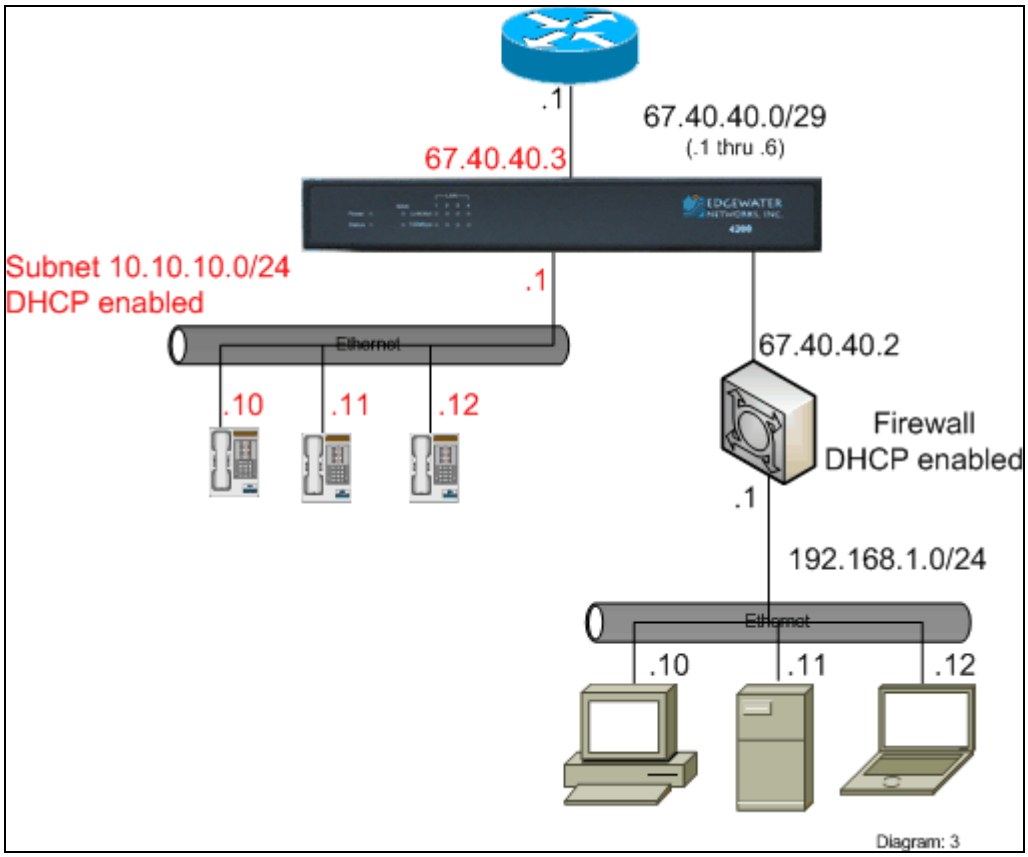
Follow all the steps in Sub-option A1: Split LAN Ethernets, above, ***except:***

- In step 1, VLAN #2730 uses subnet 192.168.1.0/24 and the EM is 192.168.1.254 in that subnet.
- Skip step 5, Enable DHCP on VLAN #2730.
  OR
  Follow step 5, but disable DHCP on the 3rd-party firewall.

  Note that phones expect a combination of DHCP Options 66, 150 and 151 for VoIP parameters. See Edgewater knowledgebase article: *90562 : DHCP parameters supported by EdgeMarc*.

Option B: Non-VLAN Edgewater appliance, non-VLAN switches, one WAN subnet

Sub-option B1: Split LAN Ethernets



Charocteristics

- EdgeMarc provides NAT, Firewall and DHCP Plug ‘n Dial to phones
- 3rd-party firewall provides NAT, Firewall and DHCP to PCs
- WAN interface has one free IP address:
  - The EdgeMarc is assigned one IP address from the WAN subnet
  - Other address(es), including the one already being used by the 3rd-party Firewall/VPN device, are bridged through the EdgeMarc to its LAN interface.

Limitations

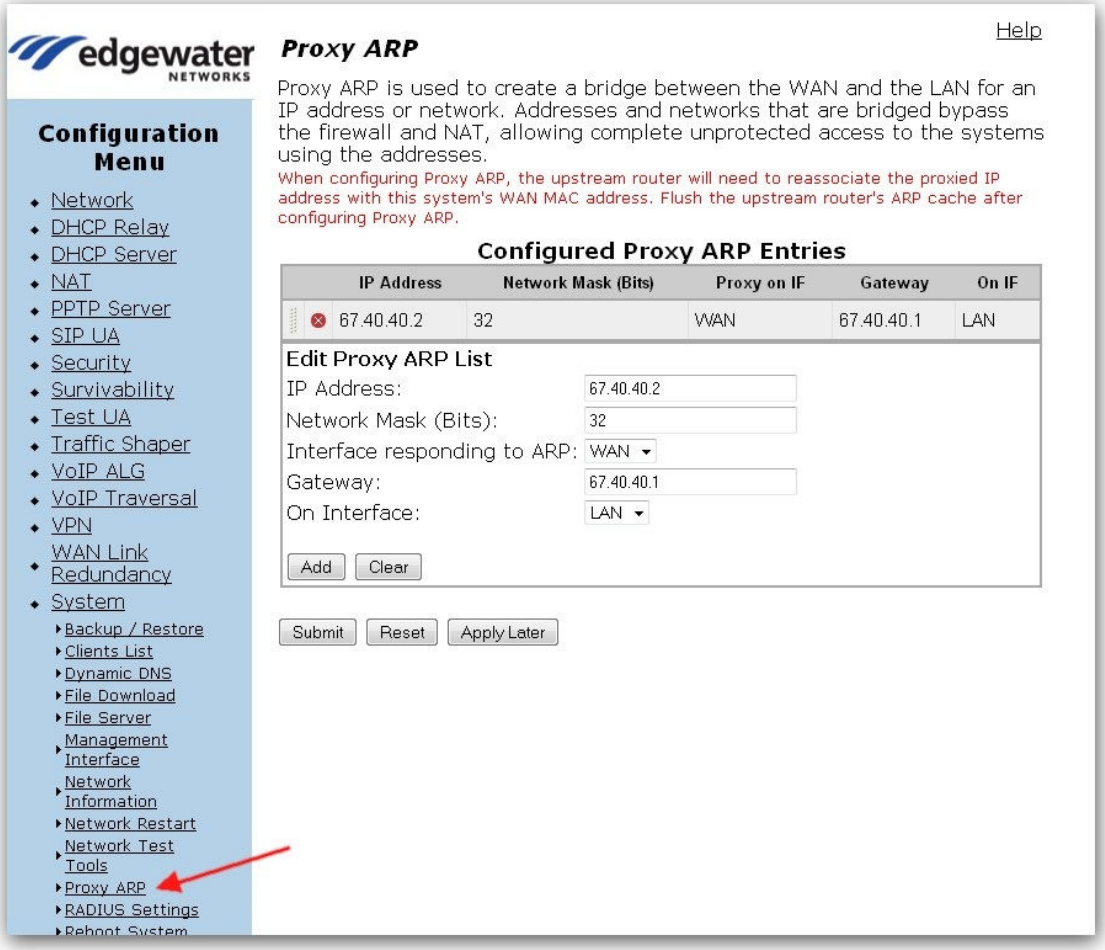
- This configuration requires two drops per cube or office.
  - DHCP is used separately for PCs and Phones, requiring two broadcast domains. Two broadcast domains means two LANs.

Implementation Steps

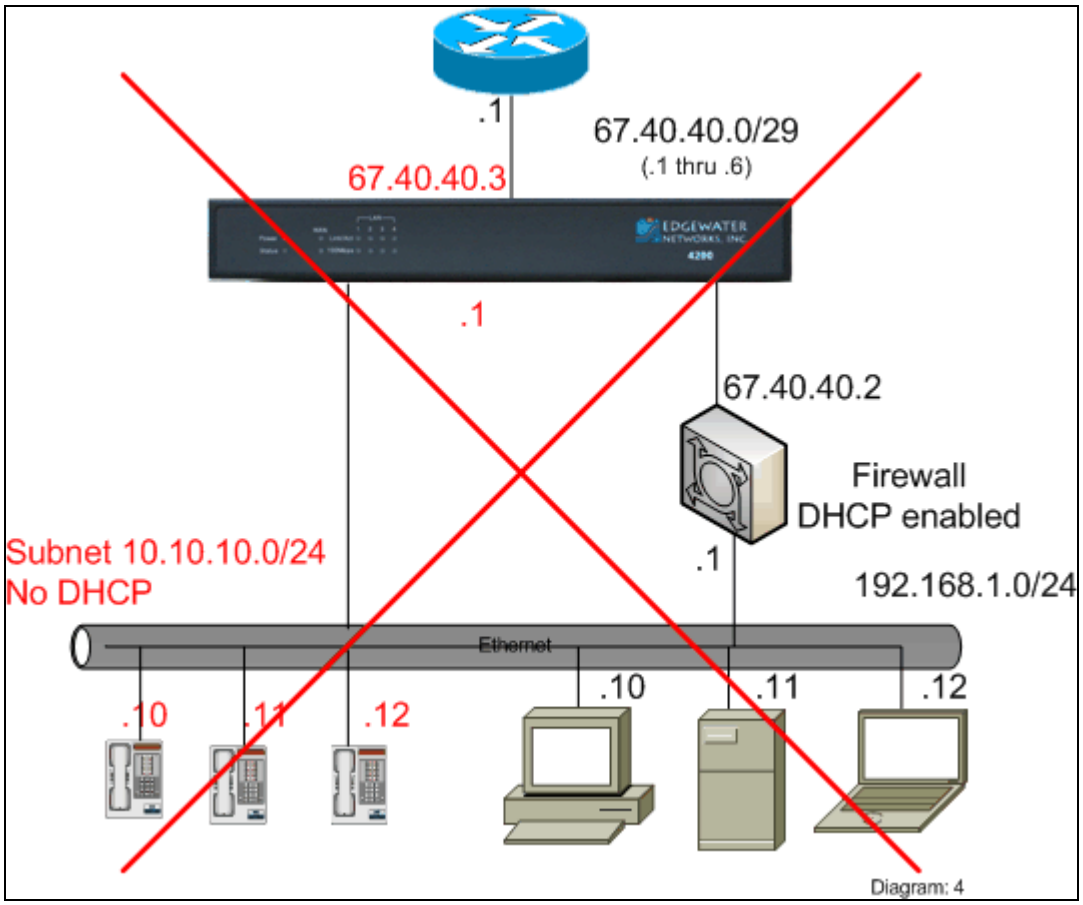
Utilizing the EdgeMarc GUI, follow the standard instructions (described in the user's guide) to enable the following on the EdgeMarc:

1. Enable Network
   - WAN IP address 67.40.40.3
   - LAN IP address 10.10.10.1
2. Enable NAT
3. Enable ALG functionality
4. Enable Traffic Shaping
5. Enable DHCP
6. Enable Firewall
7. Enable System -> Proxy ARP
   Configure Proxy ARP so that the EdgeMarc bridges the external Firewall's IP address from the EM's WAN i/f to its LAN i/f.
   - The IP address to be forwarded is 67.40.40.2/32
   - Bridge traffic back to the default gateway 67.40.40.1

   When done, the Proxy ARP screen should look similar to the following:



Sub-option B2: One LAN Ethernet

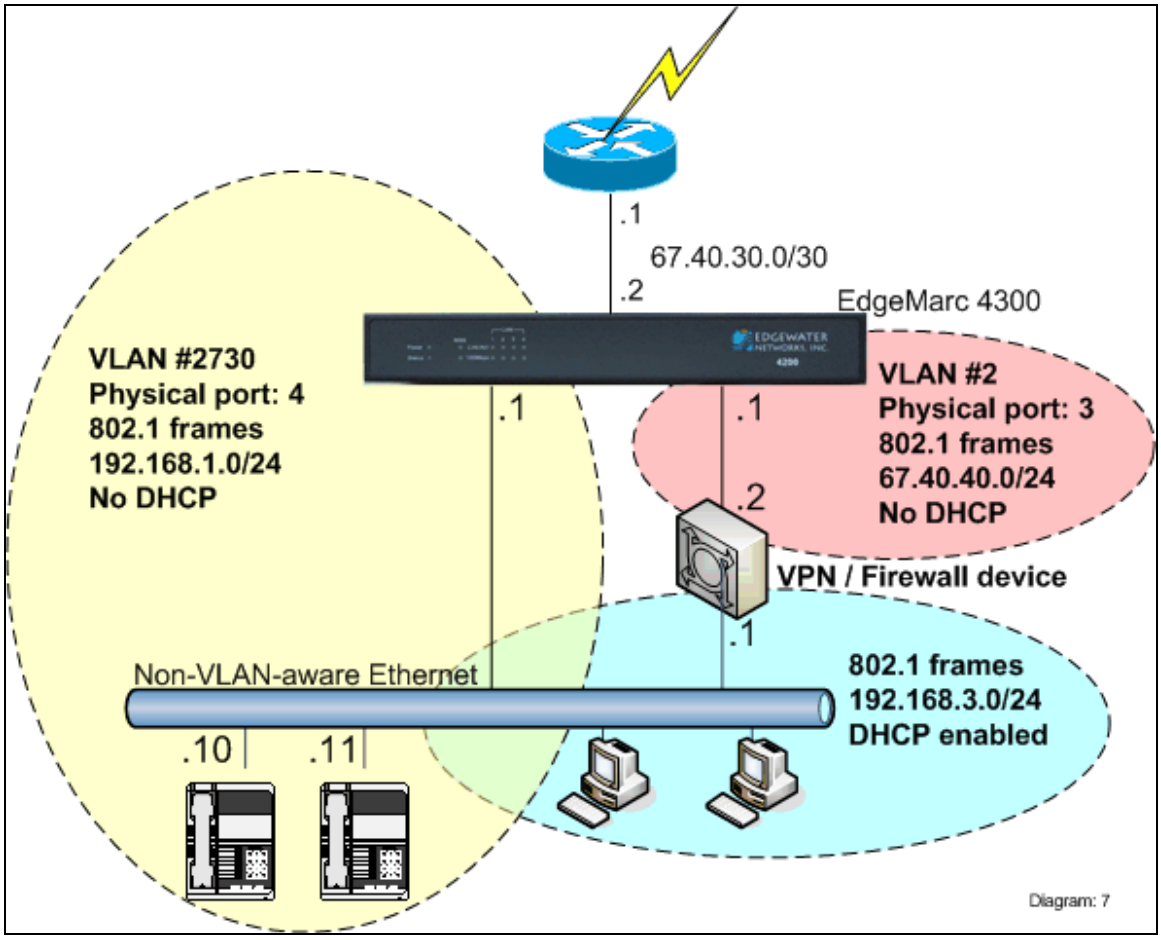


Edgewater does not recommend this design. With one LAN Ethernet and only one LAN on the EdgeMarc, broadcasts (such as ARPs) issued by the VPN/Firewall device on one of its interfaces will loop around and be heard on its other interface. Additionally, some models of firewalls will actually rebroadcast a message from one interface to the other, causing a packet storm.

Certain VPN/Firewall devices, such as the PIX, can handle this topology, but such devices are the exception.

Option C: VLAN or Non-VLAN Edgewater appliance, non-VLAN switches, two WAN subnets

Sub-option C1: VLAN-capable EdgeMarc



Characteristics

- Create two LAN-side VLANs:
  - One VLAN with a public subnet for the 3rd-party VPN / Firewall device (associated with EM LAN port 3)
  - One VLAN with private subnet for phones (associated with EM LAN port 1)
- VPN / Firewall device provides DHCP, Firewall and NAT to PCs and servers
  - The VPN creates a third subnet (192.168.3.0, above), but it is ignored by the EdgeMarc and only used by the VPN and associated PCs.
- EdgeMarc provides Firewall and NAT to phones

Limitations

- Plug ‘n Dial not available for Phones
  - Phones must be manually configured with SIP Proxy or MGCP Control Server address.
- This configuration is only possible on Edgewater appliances that provide VLAN support (200/250/4300/4500/4600 Series EdgeMarcs).

Implementation Steps for the example

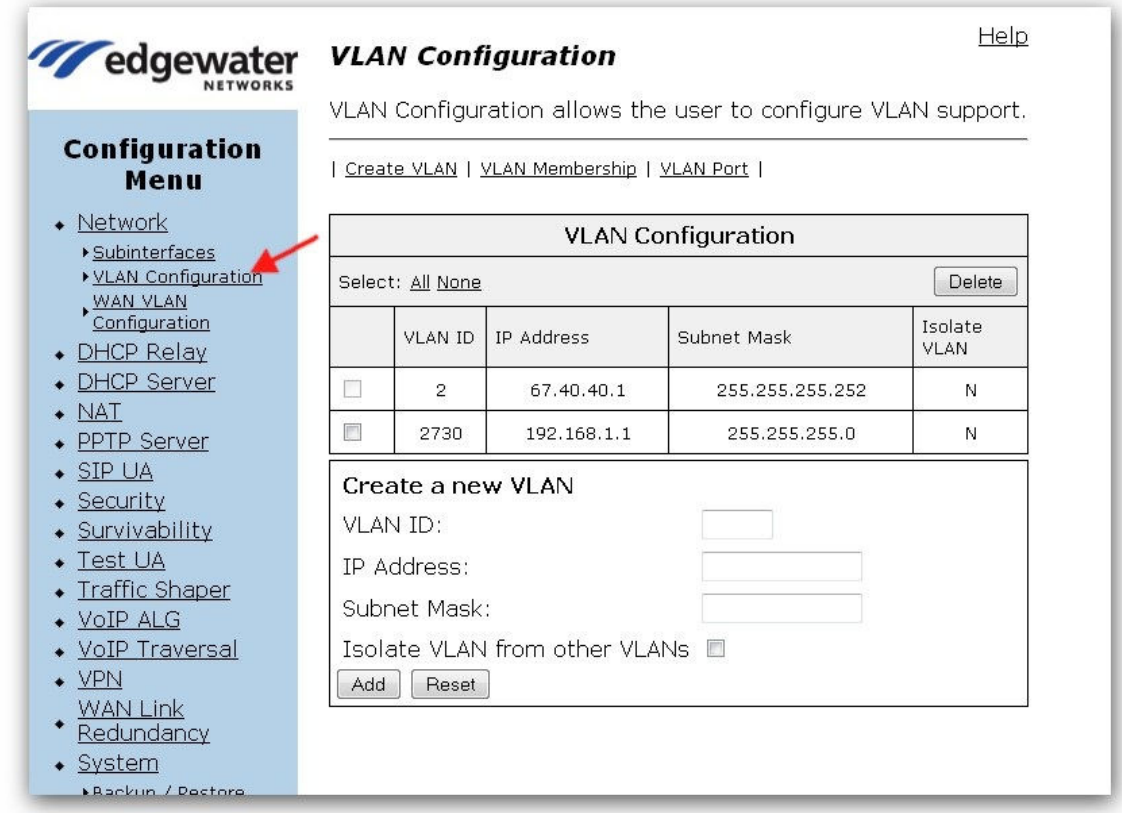
Step 1

Utilizing the EdgeMarc GUI, follow the standard instructions (described in the user's guide) to enable the following on the EdgeMarc:

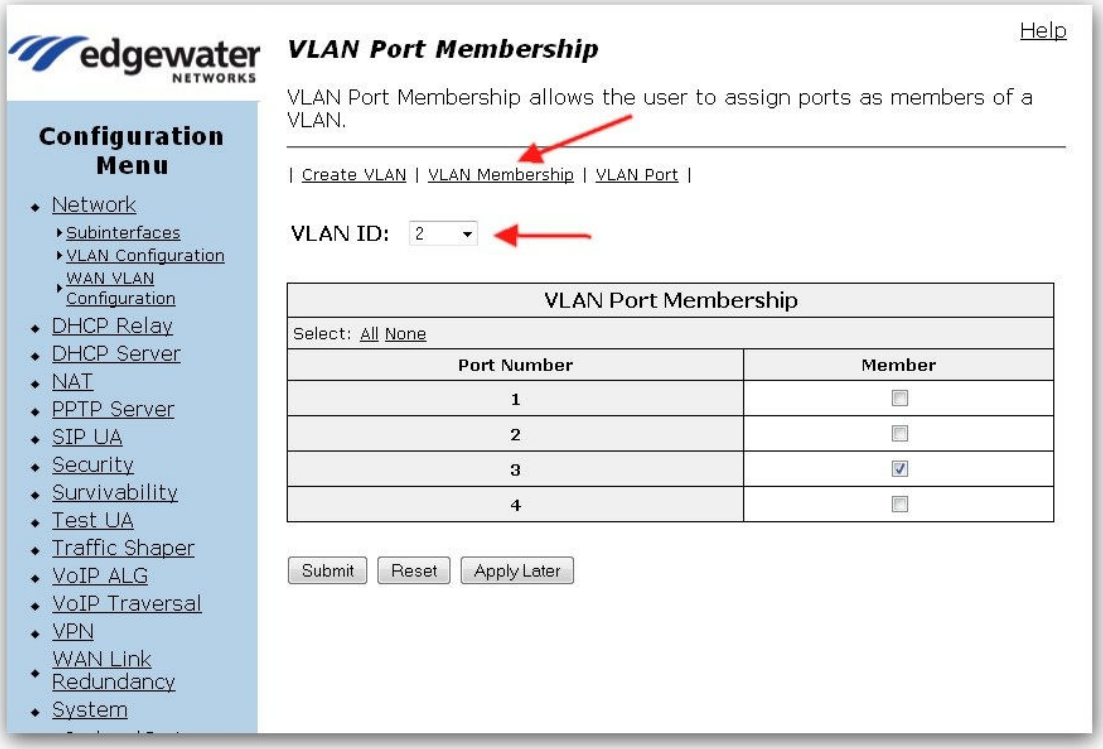
8. Enable Network with VLAN functionality
    - Set the four LAN ports to 802.1 (assuming the LAN Ethernet switch is not VLAN capable)
    - Modify VLAN 2730 as:
      IP address: 192.168.1.1 with mask 255.255.255.0
      Physical ports: 1, 2 and 4
    - Add a VLAN with:
      ID: 2
      IP address: 67.40.40.1 with mask 255.255.255.252
    - Associate VLAN 2 with LAN port 3

    When done, the VLAN screen should look similar to the following:

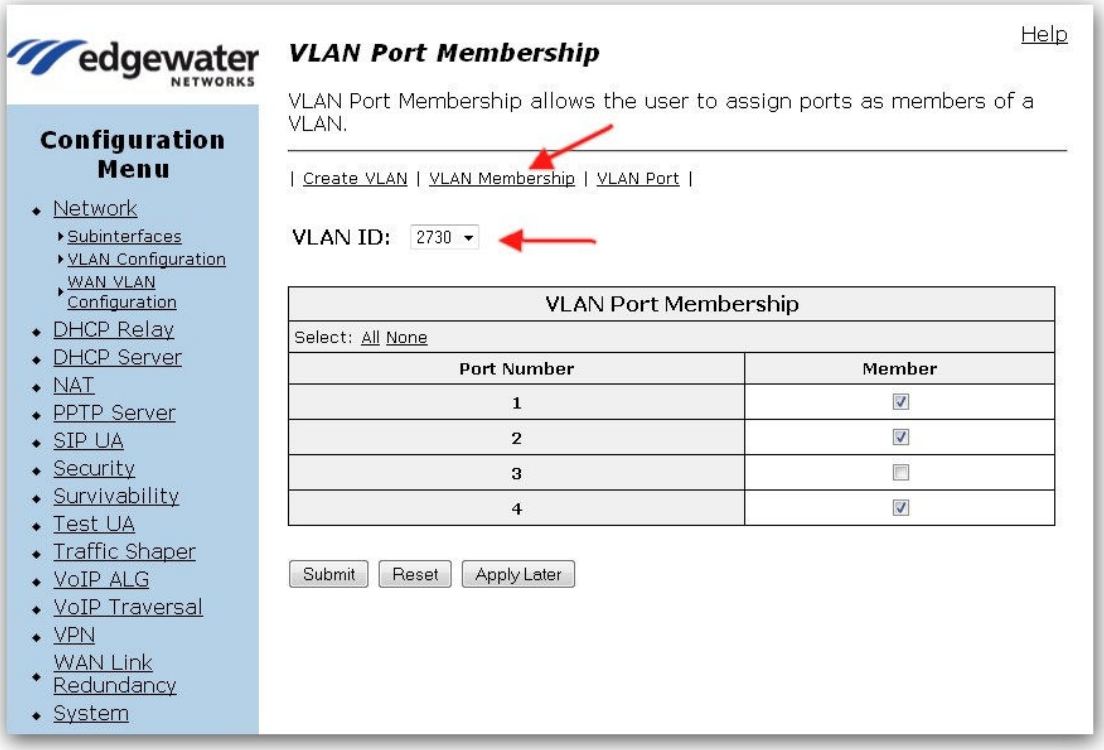
    VLAN Configuration Page:



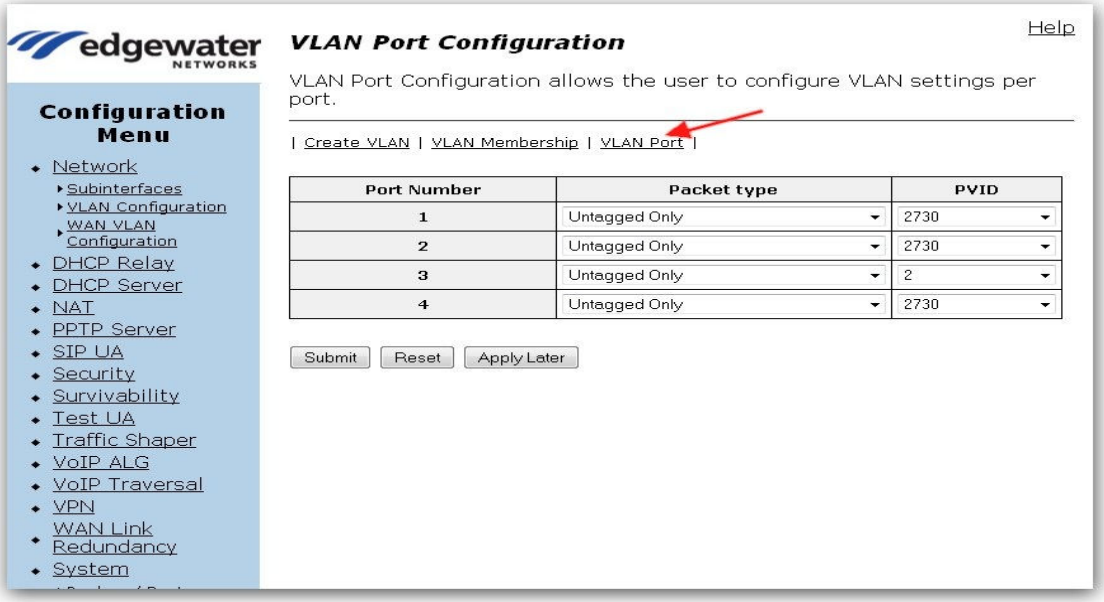
VLAN 2 Port Membership:



VLAN 2730 Port Membership:



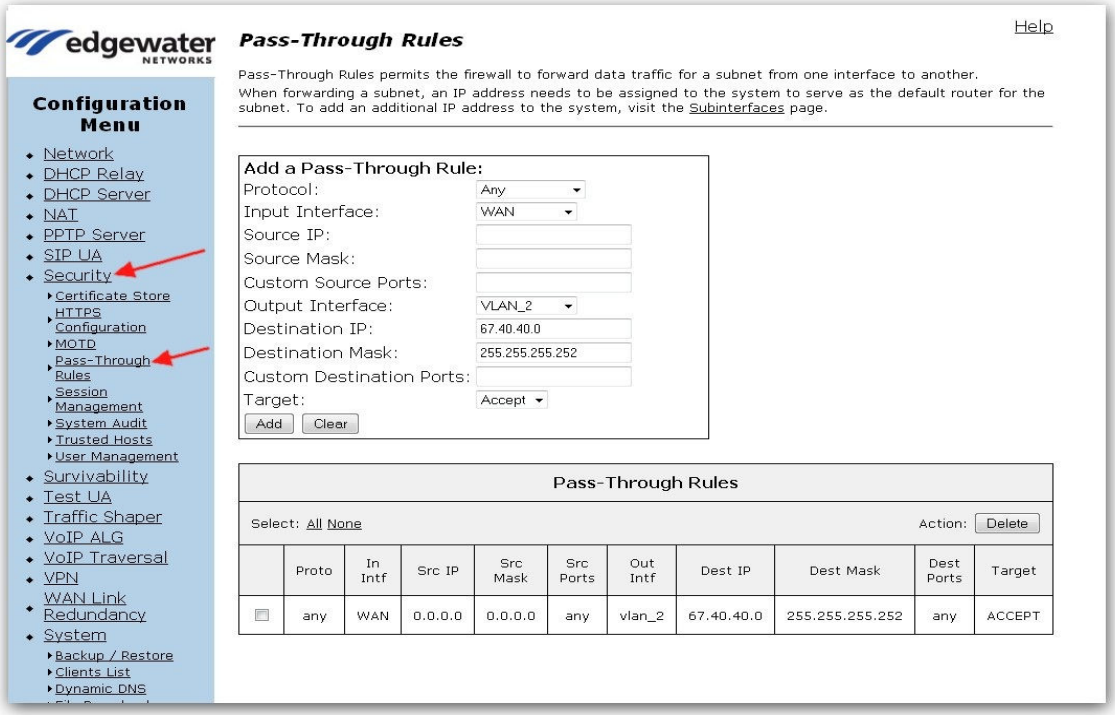
VLAN Port Configuration:



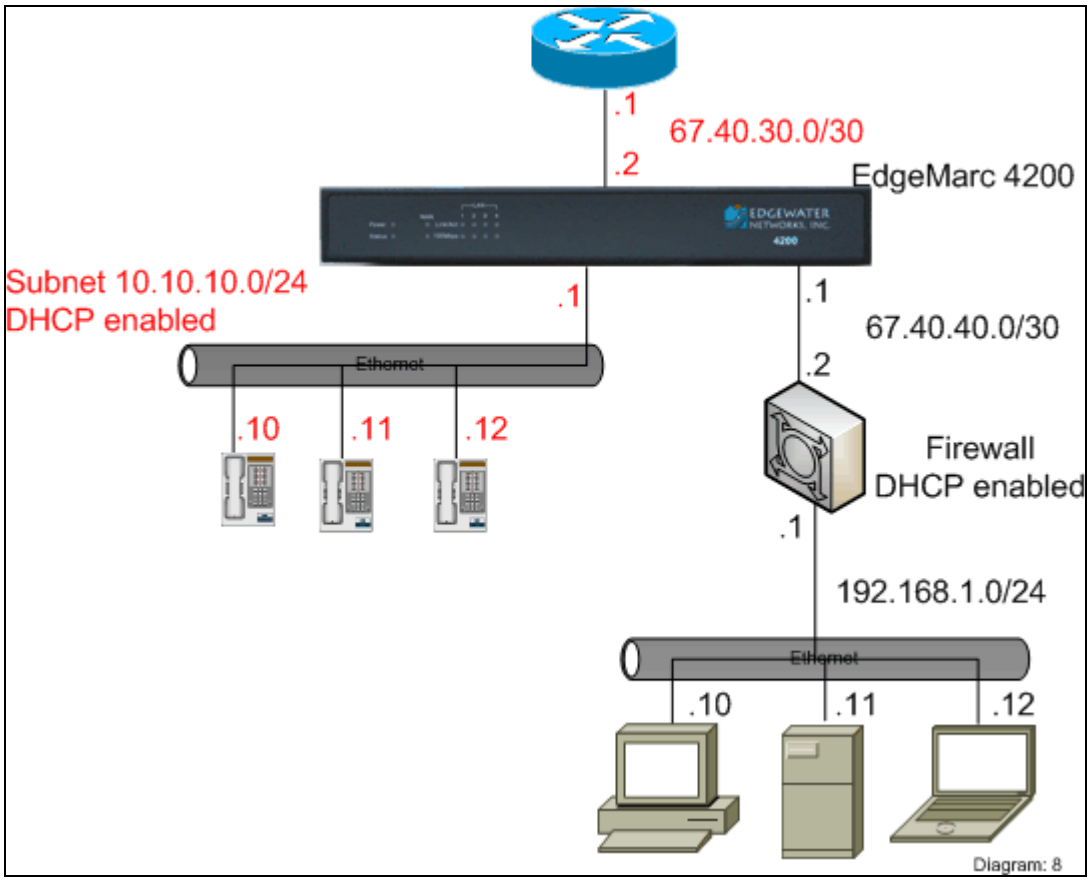
9. Enable NAT
10. Enable ALG functionality
    - Specify VLAN 2730 for the ALG
11. Enable Traffic Shaping
12. **Disable** DHCP on both VLANs #2 and #2730
13. Enable Firewall

Step 2 Cofigure Pass-Through Rules for Public DMZ.

Pass-Through Rules Page:



Sub-option C2: Non-VLAN EdgeMarc



Characteristics

- EdgeMarc provides DHCP, Firewall and NAT to phones
- VPN / Firewall provides DHCP, Firewall and NAT to PCs and servers

Limitations

- This configuration requires two Ethernet drops to each desk

Implementation Steps for the example

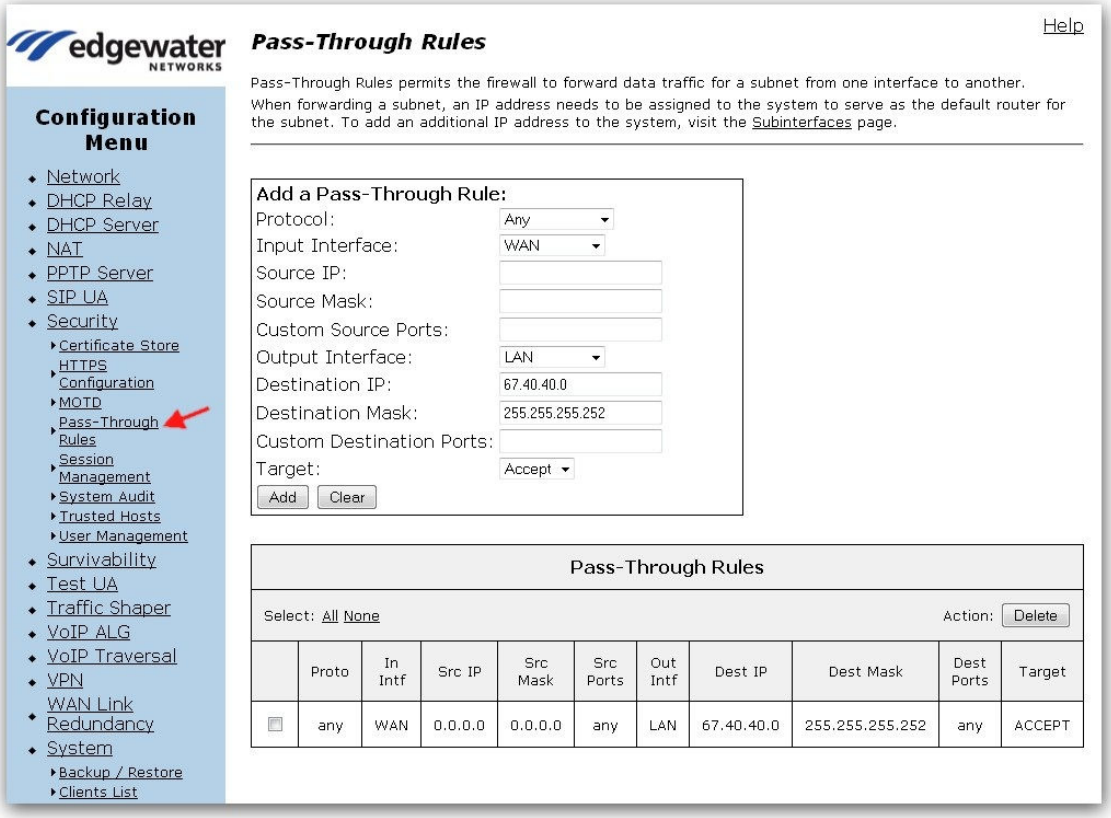
Step 1

Follow the standard instructions (described in the user's guide) to enable the following on the EdgeMarc:

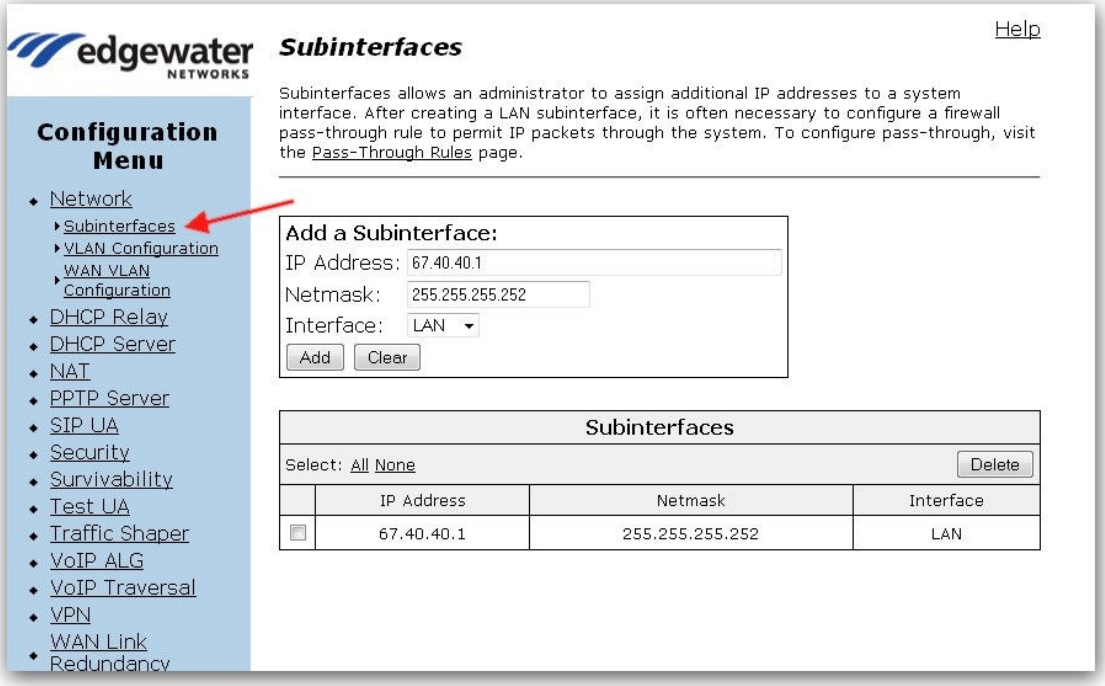
- Enable NAT
- Enable ALG functionality
- Enable Traffic Shaping
- Enable DHCP
- Enable Firewall

Step 2 Configure Pass-Through Rules for Public DMZ.

Pass-Through Rules Page:

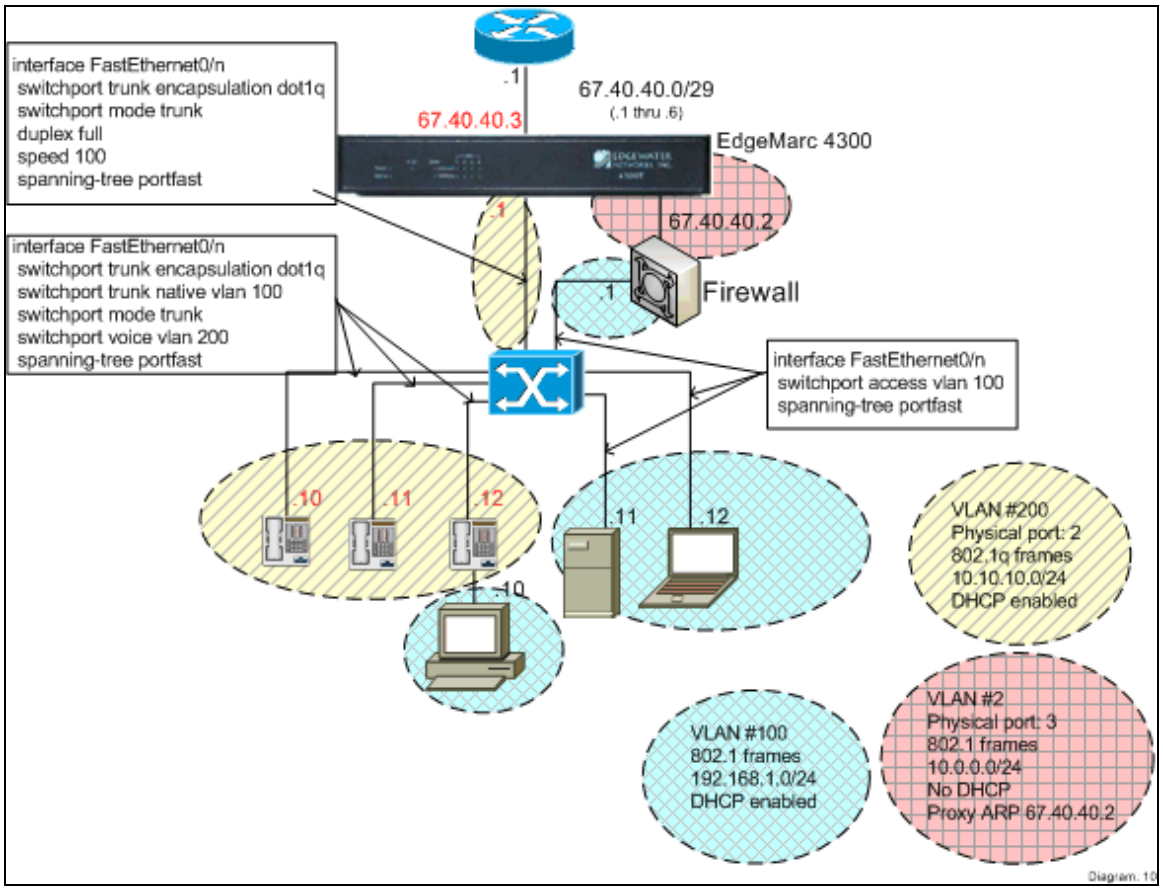


LAN sub-interface:



Option D: VLAN-capable Ethernet switch, VLAN or Non-VLAN Edgewater appliance

Sub-option D1: VLAN-capable EdgeMarc



Characteristics

- EdgeMarc provides NAT, Firewall and DHCP Plug 'n Dial to phones
- 3rd-party firewall provides NAT, Firewall and DHCP to PCs
- WAN interface has at least one free IP address:
  - The EdgeMarc is assigned one IP address from the WAN subnet
  - Other address(es), including the one already being used by the 3rd-party Firewall/VPN device, are bridged through the EdgeMarc to its LAN interface.
- EdgeMarc LAN interface uses two VLANs
  - VLAN #200 with private subnet for phones (associated with EM LAN port 2). This LAN uses 802.1q frames.
  - VLAN #2 with a public subnet for the 3rd-party VPN / Firewall device (associated with EM LAN port 3). This LAN uses standard 802.1 frames.

Limitations

- Requires VLAN-capable and CDP-capable Ethernet switch and phones.

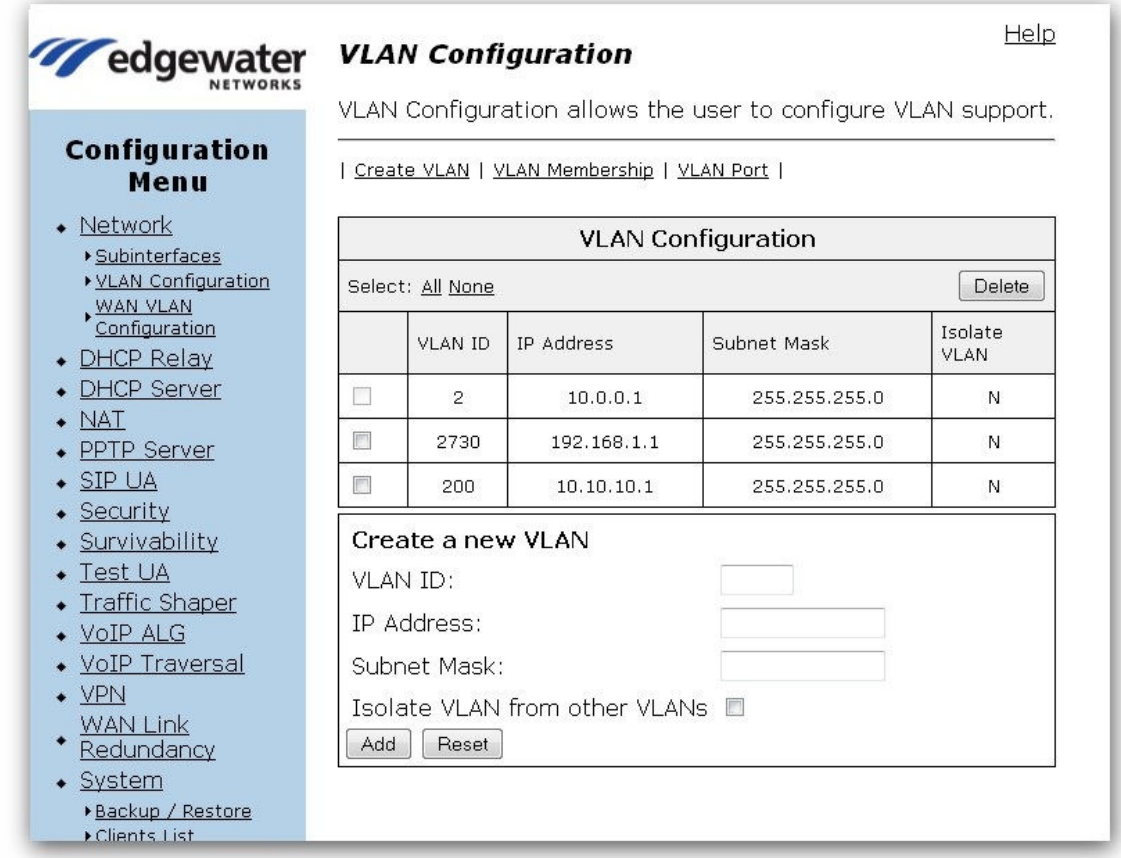
Implementation Steps

Utilizing the EdgeMarc GUI, follow the standard instructions (described in the user's guide) to enable the following on the EdgeMarc:

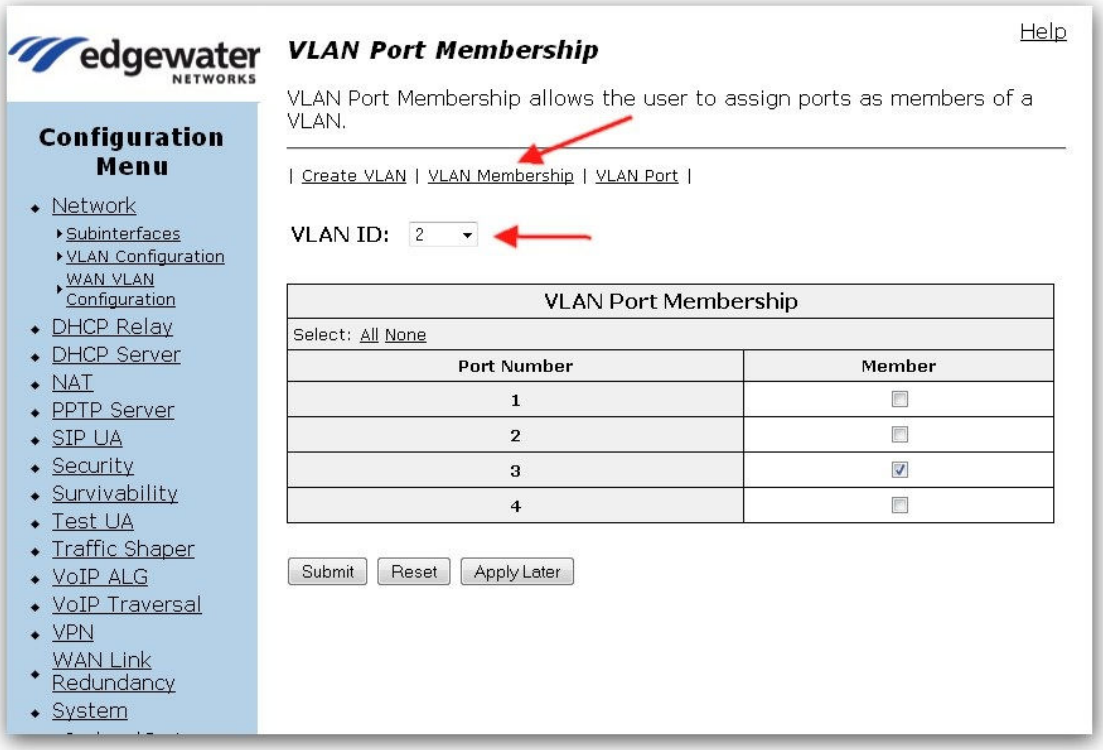
1. Enable Network with VLAN functionality
    - Set LAN Port 2 to 802.1q framing.
      Set LAN Ports 1, 3 and 4 to 802.1 framing.
    - Leave VLAN 2730 as management port:
      IP Address: 192.168.1.1 with mask 255.255.255.0
    - Add a VLAN with:
      ID: 200
      IP address: 10.10.10.1 with mask 255.255.255.0
    - Add a VLAN with:
      ID: 2
      IP address: 10.0.0.1 with mask 255.255.255.0
    - Associate VLAN 2730 with LAN ports 1 and 4
    - Associate VLAN 200 with LAN port 2
    - Associate VLAN 2 with LAN port 3

    When done, the VLAN screen should look similar to the following:

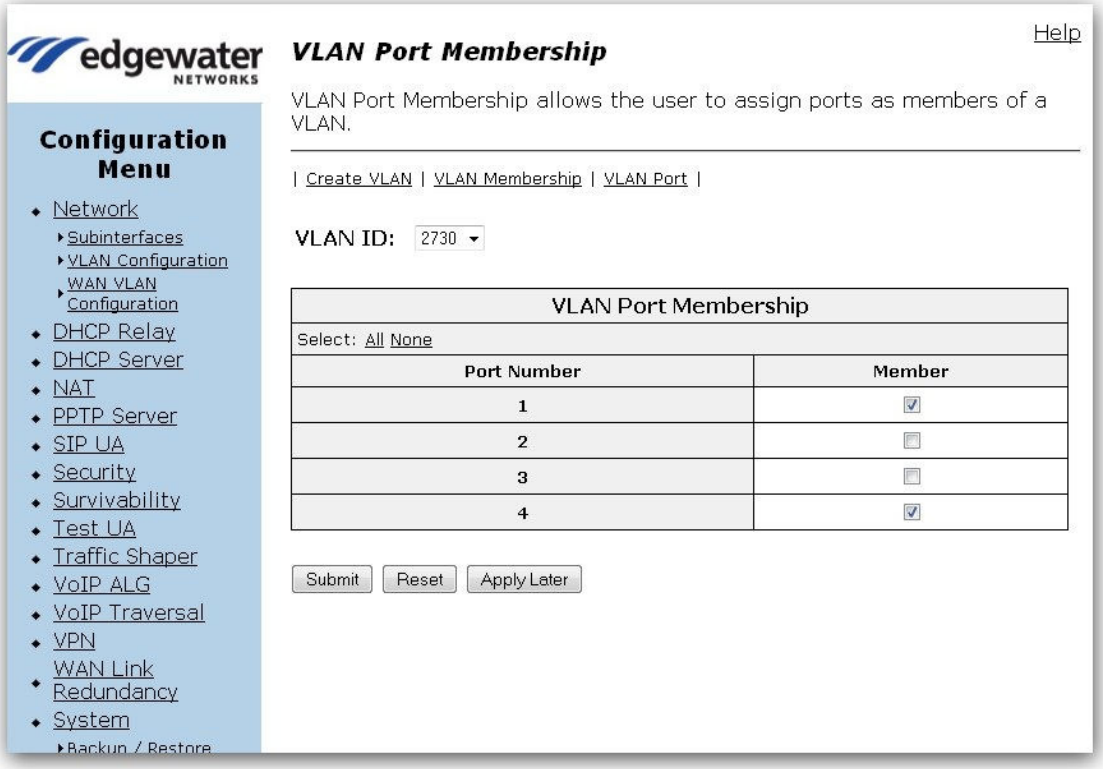
    VLAN Configuration Page:



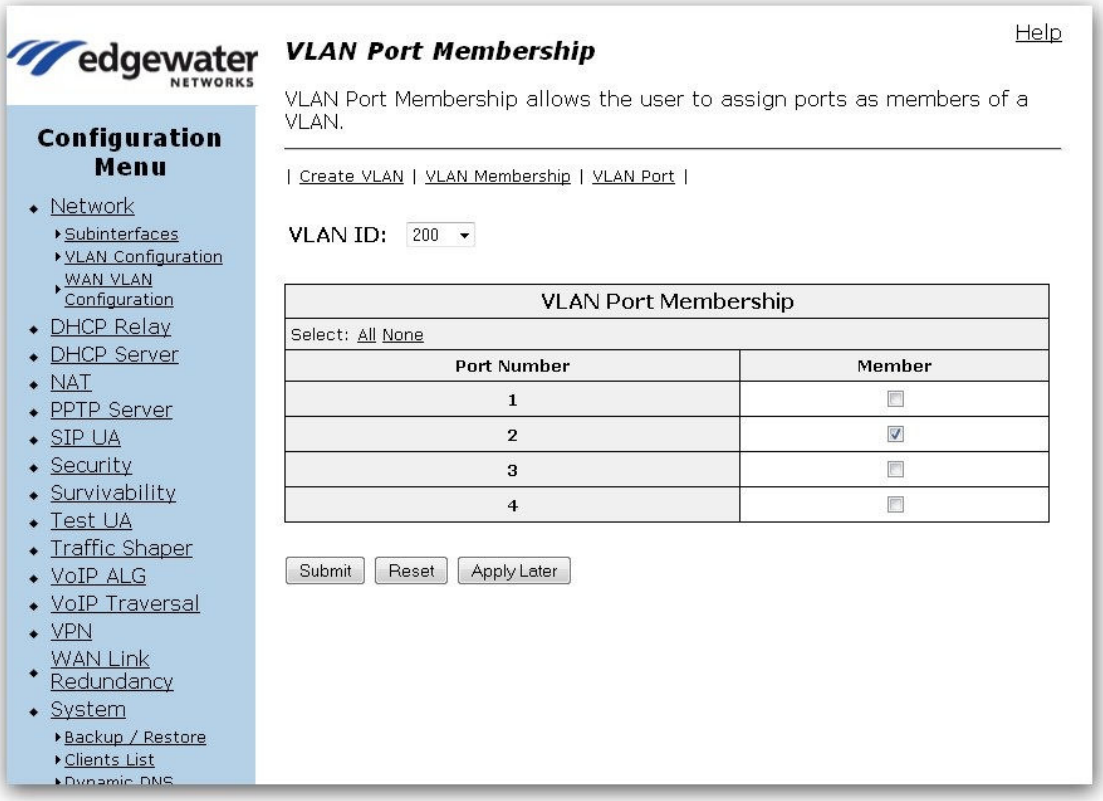
VLAN 2 Port Membership:



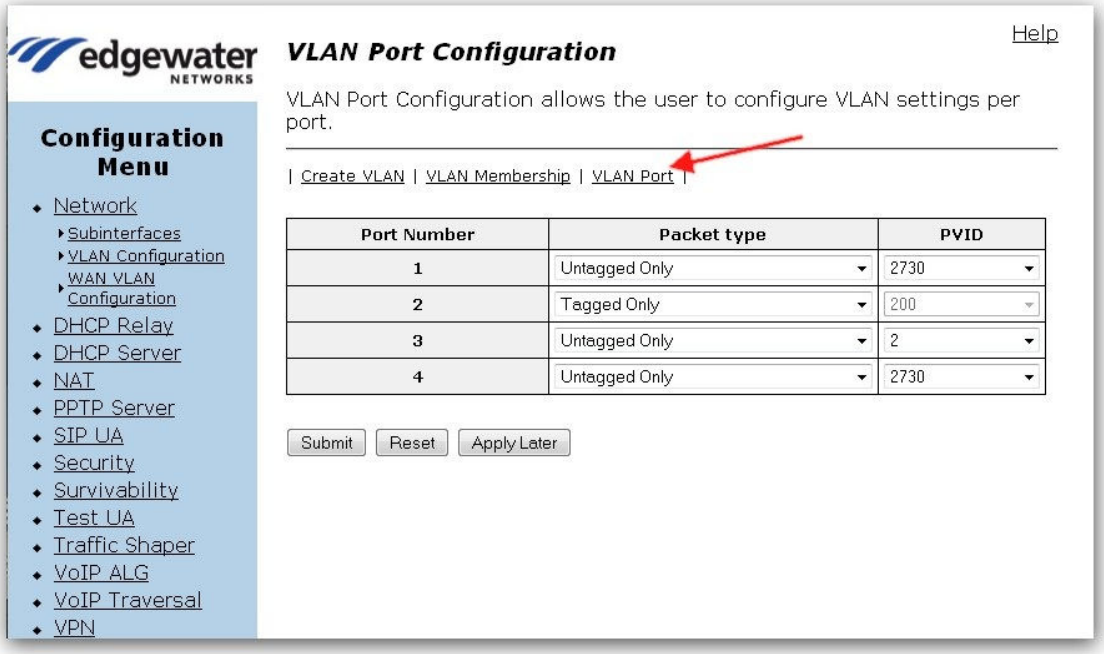
VLAN 2730 Port Membership:



VLAN 200 Port Membership:



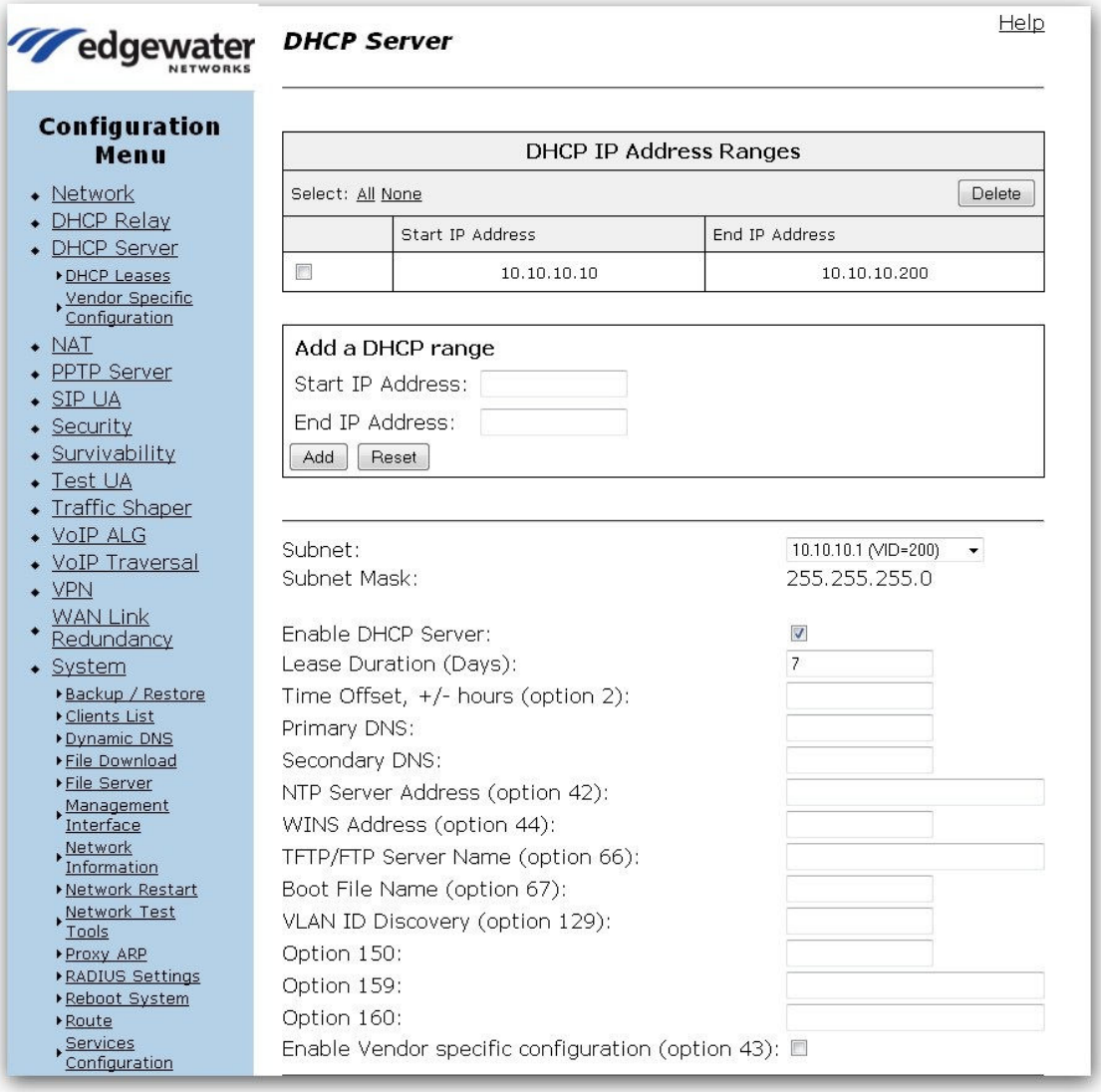
VLAN Port Configuration:



2. Enable NAT
3. Enable ALG functionality
    - Specify VLAN 200 for the ALG
4. Enable Traffic Shaping

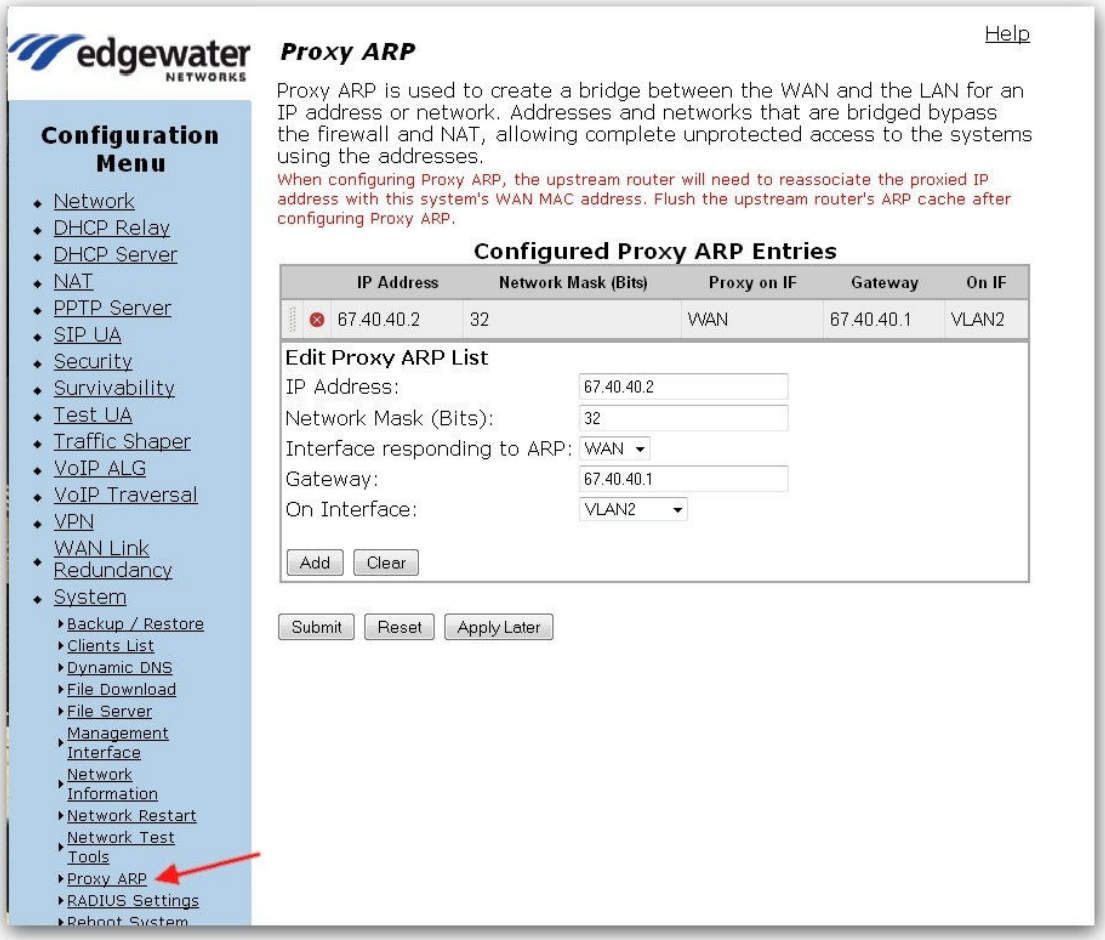
5. Enable DHCP on VLAN #200

When done, the DHCP page should look similar to the following:

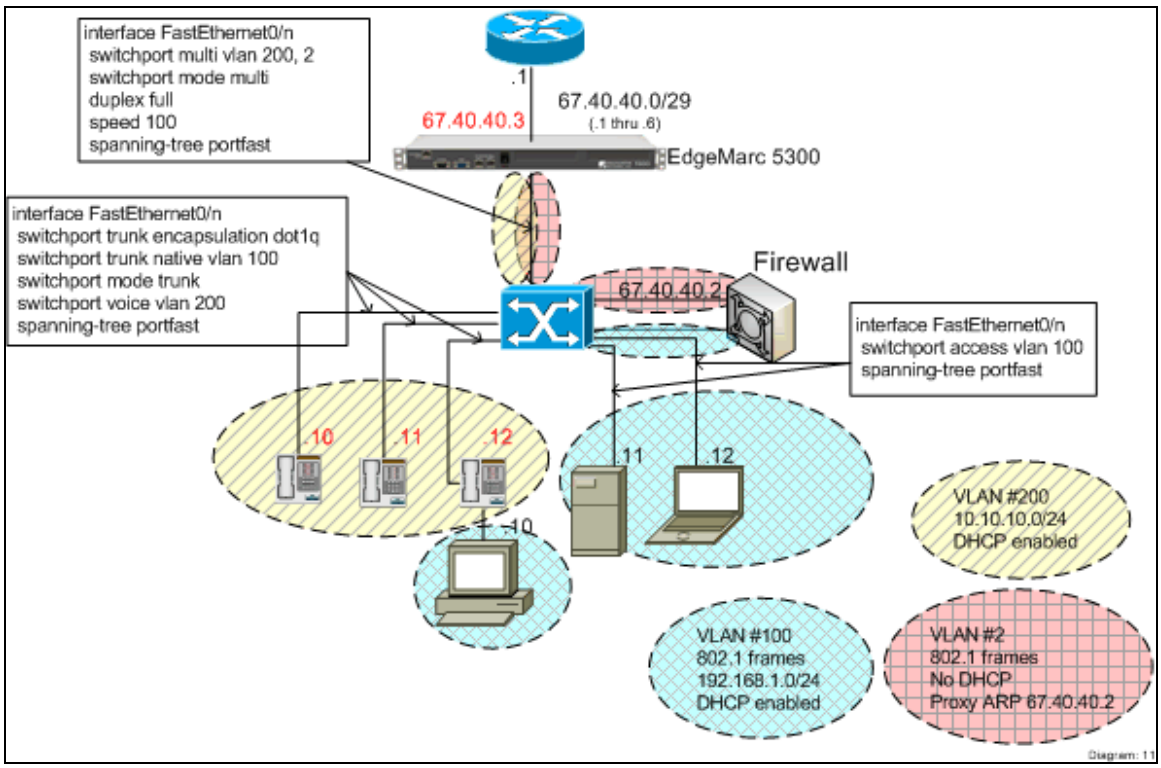


6. Enable Firewall
7. System -> Proxy ARP
   Configure Proxy ARP so that the EdgeMarc bridges the external Firewall's IP address from the EM's WAN i/f to its LAN i/f.
   - VLAN 2 is associated with LAN Port 3
   - The IP address to be forwarded is 67.40.40.2/32
   - Bridge traffic back to the default gateway 67.40.40.1

When done, the Proxy ARP screen should look similar to the following:



Sub-option D2: Non-VLAN EdgeMarc



Characteristics

- EdgeMarc provides NAT, Firewall and DHCP Plug 'n Dial to phones
- 3rd-party firewall provides NAT, Firewall and DHCP to PCs
- WAN interface has at least one free IP address:
  - The EdgeMarc is assigned one IP address from the WAN subnet
  - Other address(es), including the one already being used by the 3rd-party Firewall/VPN device, are bridged through the EdgeMarc to its LAN interface.
- EdgeMarc LAN interface uses two Subnets (over one LAN segment)
  - Subnet 10.10.10.0/24 for phones (VLAN #200 within switch)
  - Proxy ARP subnet 67.40.40.2/32 for the 3rd-party VPN / Firewall device (VLAN #2 within switch).

Limitations

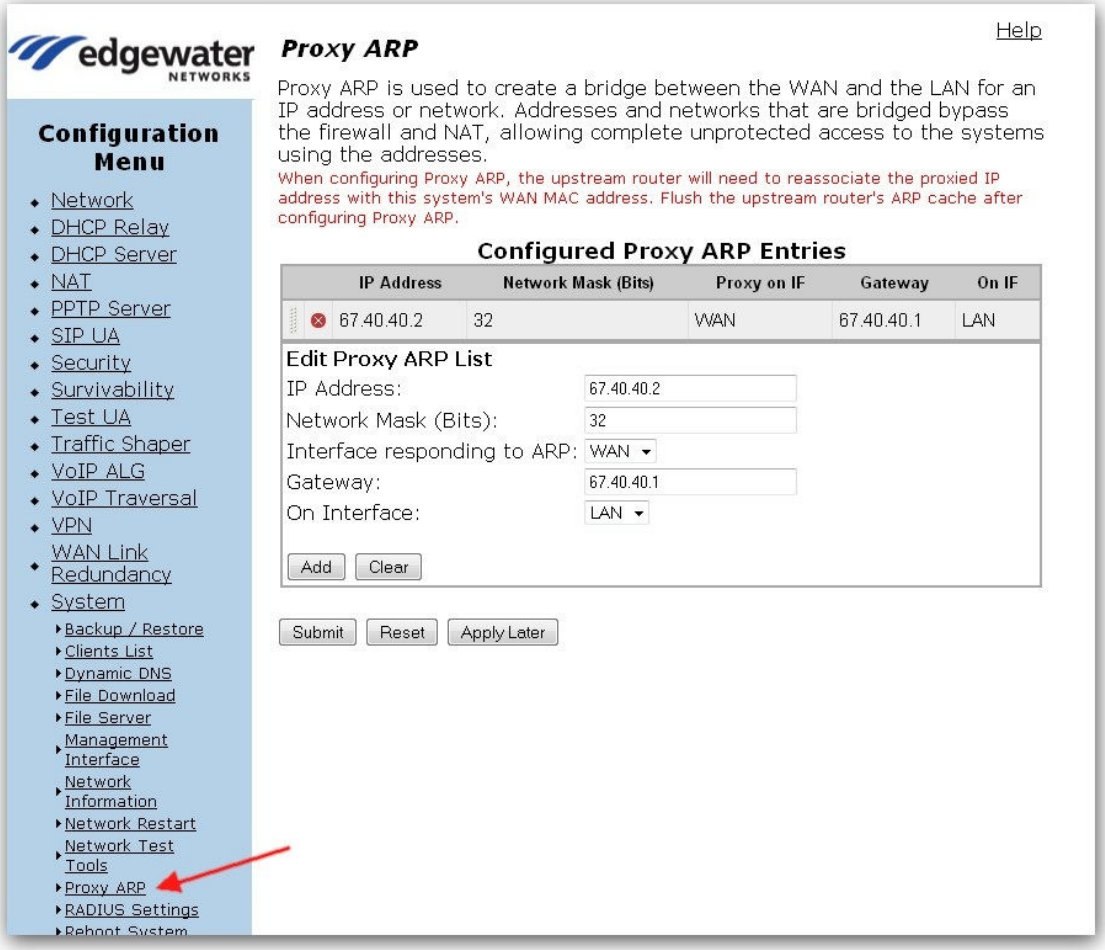
- Requires VLAN-capable and CDP-capable Ethernet switch and phones.
- VLANs #2 and #200 share Ethernet segment at EdgeMarc

Implementation Steps

Utilizing the EdgeMarc GUI, follow the standard instructions (described in the user's guide) to enable the following on the EdgeMarc:

1. Enable Network
   - WAN IP address 67.40.40.3
   - LAN IP address 10.10.10.1
2. Enable NAT
3. Enable ALG functionality
4. Enable Traffic Shaping
5. Enable DHCP
6. Enable Firewall
7. System -> Proxy ARP
   Configure Proxy ARP so that the EdgeMarc bridges the external Firewall's IP address from the EM's WAN i/f to its LAN i/f.
   - The IP address to be forwarded is 67.40.40.2/32
   - Bridge traffic back to the default gateway 67.40.40.1

   When done, the Proxy ARP screen should look similar to the following:



Option E – 3rd-party Firewall in front of Edgewater appliance

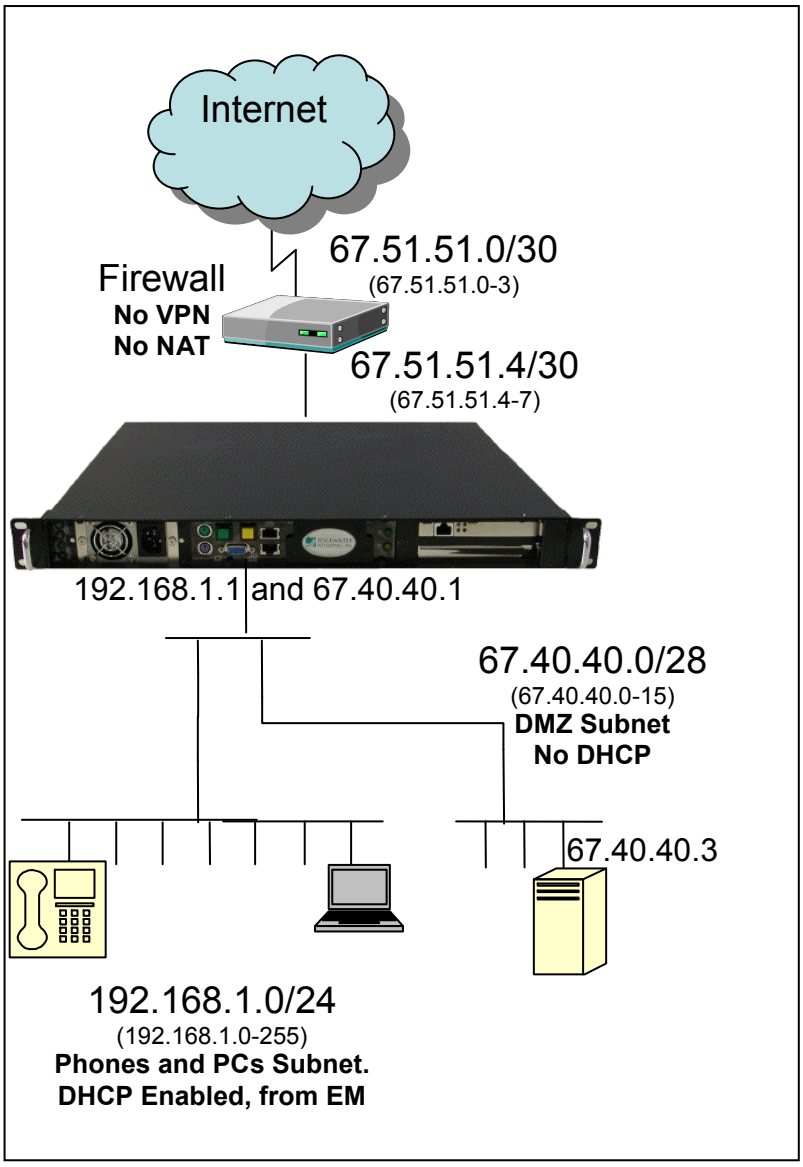
Characteristics

- External device provides port firewalling
- EdgeMarc provides Traffic Shaping (by having the servers, PCs and phones behind the EdgeMarc)
- EdgeMarc provides DHCP and NAT to PCs and phones
- EdgeMarc provides IP address passthrough from firewall to servers

Limitations

- This scenario is more complex than the above in that it requires the firewall to open ports necessary for VoIP protocol.

Diagram



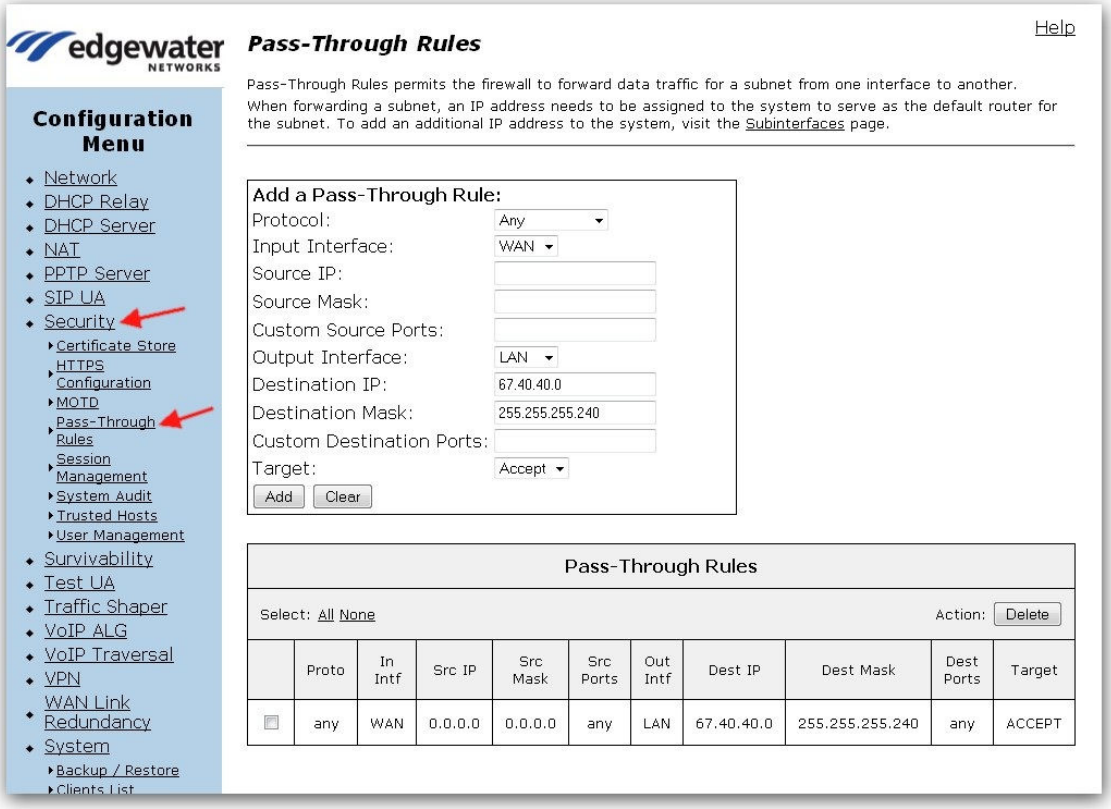
Step 1

Follow the standard instructions (described in user's guide) to enable the following on the EdgeMarc:

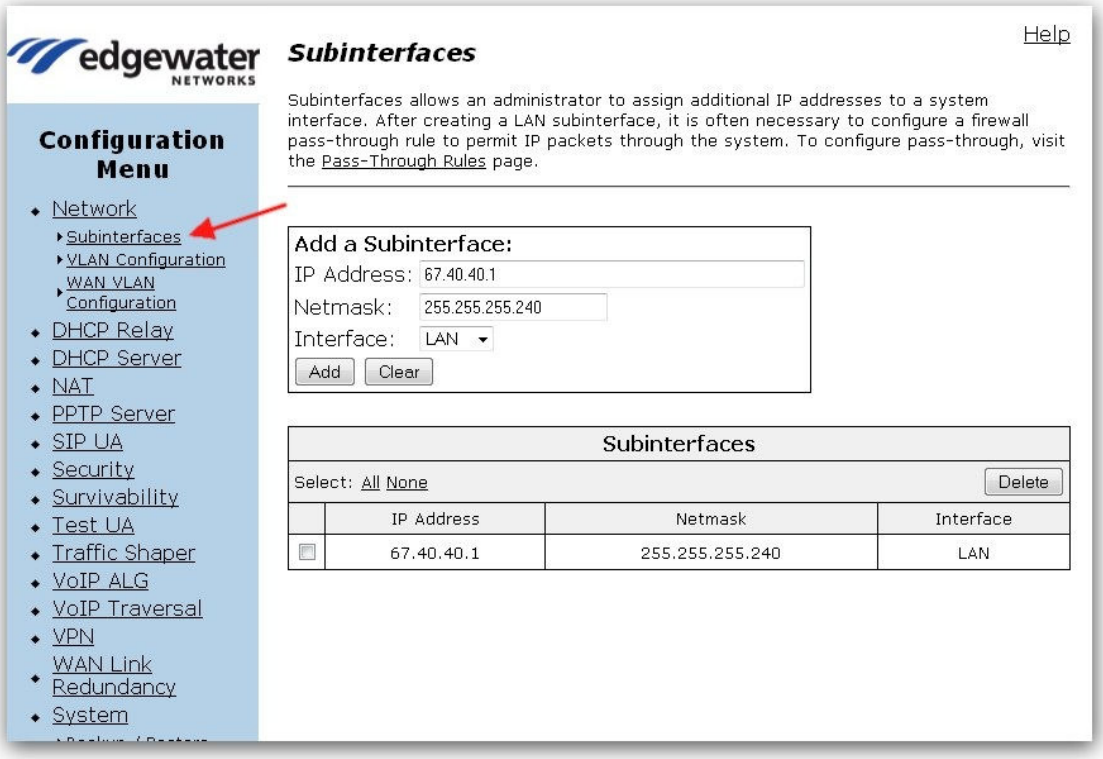
8. Enable NAT (all configs)
9. Enable ALG functionality (all configs)
10. Enable Traffic Shaping
11. Enable DHCP (all configs EXCEPT configuration B)
12. Enable Firewalling (all configs)

Step 2 Configure Pass-Through Rules for Public DMZ.

Pass-Through Rules Page:



LAN sub-interface Configuration:



Step 3

The Firewall ***must*** be configured to pass through VoIP protocols to the EdgeMarc. The firewall ***can not*** perform NAT, if it does it will break VoIP protocol.

Since the EdgeMarc is a VoIP proxy, all VoIP packets will have a source or destination IP address of the EdgeMarc's WAN interface. This can be used to help set up appropriately tight rules on the Firewall.

The Firewall must be opened for the following ports (to and from the EdgeMarc):

In all cases		
FTP	TCP	21
HTTP	TCP	80
RTP	UDP	16386:21785*
SNMP	UDP	161
SSH	TCP	22
Telnet	TCP	23
TFTP	UDP	69
SNTP	TCP	123
MGCP phones		
MGCP	UDP	2427, 2429, 2432, 2727
SIP phones		
SIP	UDP	5060

		plus any addl. ports specified on the VoIP ALG page
SIP, Media Server	TCP	16386:16985
H.323 phones		
Q.931	TCP	1720
RAS	UDP	1719
H.245	TCP	14085:14385
Skinny (SCCP) phones		
Skinny	TCP	2000

*For EdgeMarc boxes supporting up to 300 simultaneous calls.