

MARS Lantech Switch Network Operations Manual

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Introduction

This writeup will serve as both an introduction to the new MARS Lantech switch network as well as a basic primer to networking in general. If ANYTHING in this writeup is unclear, or if there is any additional information/material needed, please don't hesitate to contact me.

MARS Network Introduction:

The MARS network is a switched network with the addition of a router to manage traffic. This type of network is commonly called a “router on a stick”. This is similar (but much smaller) than the MBARI network set up.

The routers used for the MARS and WNS networks are salvaged Cisco 3570s from the MARS backup locker. The switches are all Lantech branded with two surface IGS-5424 (only one on the WNS) and two node located IGS-5408 switches.

The MARS network is VLAN based and has Access Control Lists (ACL) in place to prevent one science team's instruments from talking to another team's. Additionally, there are ACLs in place that prevent any science team's gear from communicating with the Management VLANs (128 and 127). This security set up on the router as are all the VLAN configurations.

The MARS router login password and enable password are the same as those currently in use.

Since the configuration of the new network is different than the current network (there currently is a routing zone in the subsea node), some of the current IP Addresses in use have been changed. This addressing issue only effects the machines on the Management VLAN. The current names and addresses are:

MARS-router - 10.91.128.1 (as well as the first IP address for each VLAN)

MARS91-1 - 10.91.128.101

MARS91-2 - 10.91.128.102

MARS10-1 - 10.91.128.201

MARS10-2 - 10.91.128.202

WNS-router - 10.91.128.1 (as well as the first IP address for each VLAN)

WNS91-1 - 10.91.128.101

WNS10-1 - 10.91.128.201

WNS10-2 - 10.91.128.202

To all other network devices (PMACS, NPC, VLANs, etc) the transition from the Cisco based network to the Lantech network should be completely transparent.

Current Known Issues:

- 1) MARS10-1 will not reboot without hanging. In order to get this unit to boot, you need to cut power to it for several minutes. When you reapply power to the unit, it will usually boot into the last saved configuration. If not, repeat the power off steps again.
- 2) I recommend that MARS10-1 be replaced with WNS10-1. There should not be any need for a configuration change on WNS10-1.
- 3) There is currently a single source of failure in that there is only one router in the current setup, with one connection out of MARS, and one connection to the MARS Network. This should not be an issue since there is a hot spare in the WNS network. Additionally, MARS will have other 3750s ready to be programmed if needed.
- 4) The current copper SFPs do not work with Lantech IGS-5408s. Also, the Finisar MM SFPs do not work on the 5408s. However, both of these SFPs work on the 5424s. There is nothing that I can find in the Lantech documents or on their website that gives any list of compatible SFPs.
- 5) The WNS 5408s are not currently cross connected to WNS91-1.
- 6) I was unable to connect to the Console Ports on the Lantech Switches using a Serial Cable.
- 7) PTP may not be set up correctly. Since I didn't have a PTP time source I was not able to test this.
- 8) NAT Address Translation to the WNS Network MAY not be setup. I think that this is done on the WNS PIX, but I am not sure.

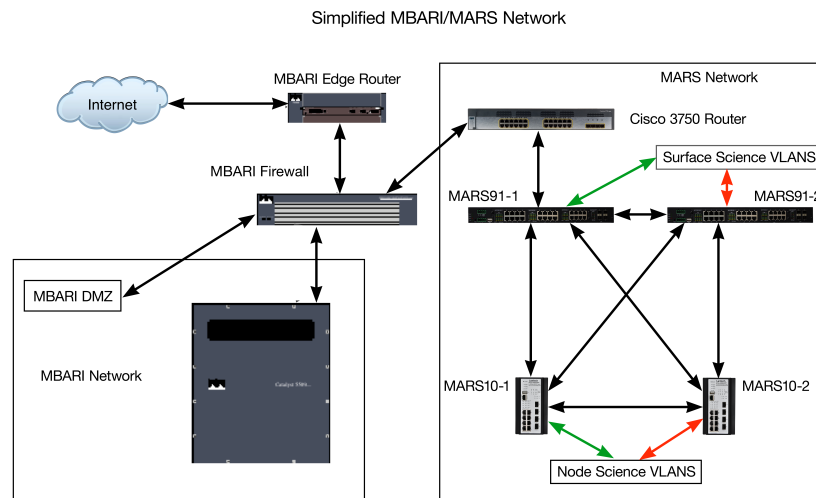
Network Operations Overview

The main part of MARS/WNS Networks are composed of four Lantech switches. Each of these switches have three trunk connections to every other switch in the network. Additionally each pair of switches (Surface and Node) have assigned ports for the relevant Science VLANs. The connection out of MARS and WNS, as well as all the routing between the MARS/WNS VLANs, is done by the Cisco 3750 attached to that switched network.

Address translation is done on the firewall that the 3750 is connected to. For MARS, this is MBARI's Paloalto firewall. For WNS, it is done by the WNS Cisco PIX. Address translation is needed to convert the non-routable IP space (the 10.0.0.0 network) of the system into IP Addresses that can be accessed for anyone else of network. See the tables at the end of this writeup to see the specific translations.

Global access to the MARS/WNS Network are restricted on the firewalls as well. These are the rules that grant access to specific hosts and VLANs from outside of the MARS network. Outbound traffic from MARS or WNS is not blocked in any way (although this is a possibility if needed). Access to and from the MARS/WNS Networks can be limited by individual IP Address, ranges of IP Addresses, or VLANs/subnets/Networks.

Putting all this together, you get a network that looks like the following:



The Trunk Ports are connected as follows:

Port Connections

Switch/Port 1	Switch/Port 2
MARS91-1/Port 25	MARS91-2/Port 25
MARS91-1/Port 27	MARS10-2/Port 11
MARS91-1/Port 28	MARS10-1/Port 12
MARS91-2/Port 27	MARS10-1/Port 11
MARS91-2/Port 28	MARS10-2/Port 12
MARS10-1/Port 9	MARS10-2/Port 9

Networking Concepts

Network

A Network is a defined group of IP Addresses that share a common default gateway and netmask. In the IPv4 address space (xxx.xxx.xxx.xxx where xxx is a number from 0 to 255), the smallest subnet has 4 addresses (2^2). The largest possible IPv4 network (a Class A network with yyy.xxx.xxx.xxx where yyy is a fixed number and each group of xxx is a number from 0 to 255) has 16777216 addresses (2^{24}).

The MARS Network is an un-routable, Class A network with the address space of 10.xxx.xxx.xxx. This network is then split into a series of Class C Sub Networks (subnets) 10.yyy.yyy.xxx that have 256 possible IP Addresses (of which only 254 are usable).

For the purpose of MARS, subnets and VLANs are interchangeable terms.

Routers and Switches

Routers route and switches switch. What that means is that routers are necessary to move traffic from one network to another. Switches switch. By this I mean that Switches can switch traffic between various ports on a single network. So, network to network versus port to port.

Routers find the route (the path that the traffic must flow on) from one network to another. Without a router, a host on one network would only be able to talk to another host same network. The default gateway in a device's network setup refers to an interface (virtual or physical) on a router. This is destination that all traffic from the network, that is not directed to a device on that network, is sent.

Through a series of broadcasts, hard wired configurations, and lookup tables, the Router determines the quickest route to get traffic to it's final destination. It then sends the traffic out the interface that is attached to the next device in that route map.

There are two types of switches: Managed and Unmanaged. An Unmanaged Switch does not require any configuration. It is designed to just plug and play and , therefore, can only service a single Network or Subnet. Think the small Lyksys switches here.

Managed Switches (which is what make up the MARS network) allow you to log onto them and configure various features. That includes configuring VLANs, Trunking, PTP, etc. all to the Port level. Newer switches can then switch traffic from port to port even if those ports are on different VLANs (after they get routing information from the Router). This is possible because VLANs are set up on the Router as both switched (Layer 2) assets and router (Layer 3) virtual interfaces.

VLANs

MARS uses Virtual Local Area Network (VLANs) to allow multiple Subnets on its switched network. Unlike Local Area Networks (LANs), you do not need to establish a physical network (Device->LAN Switch->Physical Router Port) for each Subnet.

Each MARS VLAN is configured as a Class C network (subnet). Each VLAN is also defined on the switched layer. Therefore, they are both Layer 2 (switched) and Layer 3 (routed).

VLANs allow you to pass multiple VLANs (via Trunk Lines) to each switch. You can then assign VLANs as needed to individual switch ports. The MARS VLANs are configured on the MARS router to ensure that traffic from one VLAN is able to route (communicate) with another VLAN.

A complete list of MARS VLANs are located at the end of this document.

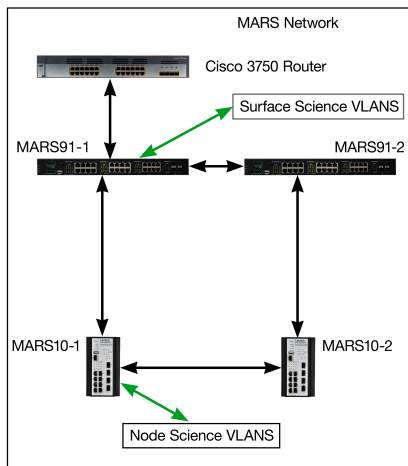
Trunking

Trunking allow you to send information for multiple VLANs across one connection. This is analogous to the old AT&T telephone Trunk Line that connected major population centers. (Side Note: As an excavator (ditch digger) in the early 80s, everyone knew to pay special care around the location of the New York - Boston trunk. Finding that line with a backhoe bucket would result in a 5 figure per minute fine.)

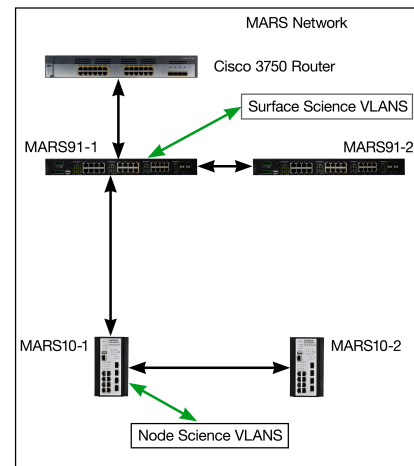
Back to the Trunk Lines at hand. All the Trunk Line are configured to pass every VLAN currently configured on the MARS router. Additionally, each Trunk Line is assigned a Port VLAN ID (PVID) which designates the VLAN that the port is assigned to. In MARS, every PVID is set to VLAN 128, the Management VLAN. This is CRITICAL. By setting the PVID on these Trunk Ports to 128 you are now allowed to configure the Switches remotely.

Multiple Spanning Tree Protocol (MSTP)

All the switch cross connects would (and has) caused this network to completely lock up. To get around this issue, the Spanning Tree Protocol has been implemented. Additionally, each Trunk connection on the switches are weighted so that the closest switch is given greatest weight. This followed by the those connections between switches with the same iteration names (eg MARS91-1 and MARS10-1). The lowest weight is given to connections between switches with the different iteration names.

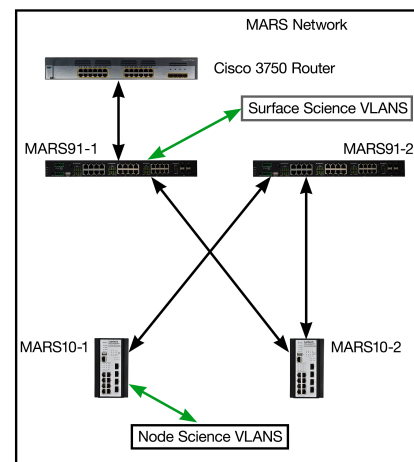


This would have the Network look like the the network map to the Left. This network has an obvious Switch Loop, so STP would drop one connection. This would make the Network look like the Map to the Right.



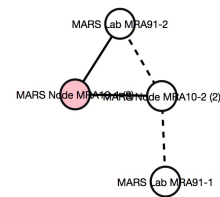
Remember, STP works **automatically**. The calculation on which port is dropped is based upon the weighting added manually, the speed of each connection, and the length of the actual connecting medium. Therefore, the test installation of MARS could actually have a connection map that looks like the Map to the Right.

This could be because the fibers of the "cross" could be a little shorter than those of trunk lines the switches with the same "iteration names".



But, the network might be connected in a different way in a few minutes. You see the system updating in real time using **Topology -> Status**.

To find out exactly what is going use the **LLDP->Neighbor Tool** for each switch. This will tell you the Local Port(s) (the Trunk Port(s)) that is active, which device that port is connected to, and the exact remote port on that device the media is connected to.



LLDP
Configuration
Neighbours
Statistics

LLDP Neighbor Information

Identification						
Local Port	Chassis ID	Port ID	Port Description	System Name	System Capability	Management Address
27	28:60:46:a0:33:30	11	Port 11	MRA10-2	Bridge(+)	10.91.128.202

LLDP Neighbor Information

Identification						
Local Port	Chassis ID	Port ID	Port Description	System Name	System Capability	Management Address
11	28:60:46:a0:3e:8b	27	Port 27	MRA91-1	Bridge(+)	10.91.128.101
12	28:60:46:a0:3e:88	28	Port 28	MRA91-2	Bridge(+)	10.91.128.102

Hardware

Cisco 3750 routers:



The 3750s were added to the new MARS network when it was discovered that the Lantech switches did not do Layer 3 Routing. These routers were taken from MARS ready storage and placed back into production. The MARS and WNS routers are configured exactly the same with the exception of their names. They can be moved from one system to the other with no configuration change.

The ONLY exception to this is IF the WNS Pix has a different IP Address than the Paloalto firewall's MARS interface. In that case, the gateway address on the router must be changed. I BELIVE they are the same, but I was not able to check.

Configuration is done through a Command Line Interface (CLI). The routers are reachable via telnet or through a Serial Console Port.

The 3750s are where the VLANs are defined and implemented. They are also where the Access Control Lists (ACLs) are defined and implemented. The ACLs restrict traffic from one subnet to the next based upon a series of rules. In this way, the routers are also like an internal firewall on the MARS Network.

All Ports on the 3750s are currently assigned to the Management VLAN (VLAN 128), Additionally, Ports 25 to 28 are set up as Trunk Ports. This allows all VLAN traffic and information to flow over those ports.

The Spanning Tree Protocol (STP) is also set on the router. This will be critical though if you decide to cross connect the router to both Topside Switches.

Lantech 5424 switches:



The Lantech 5424s are Layer 2 managed switches that allow port specific VLAN assignments, Trunking ports, supports PTP time protocol, supports Multi Spanning Tree Protocol (MSTP), and the Cisco Discovery Protocol (CDP) and other protocols. For the purposes of the MARS configuration, all of these have to be configured properly or the network will collapse.

Configuration is done mainly through a web interface on each switch. The switches are also reachable via telnet. All the commands on the web page can be executed in the CLI. The units are also supposed to be accessible via a Serial Console Port. However, I was not able to get this to work.

MARS91-1 and WNS91-1 are mirrors of each other. Therefore, they can be directly swapped between each network. If WNS91-1 needs to replace MARS91-2, the IP address is the only setting that needs to be changed.

The 5424s have the current port configurations:

- 1) Ports 1 - 8 are assigned to Surface Science VLANs 41 to 48
- 2) Ports 9 - 24 are assigned to Management VLAN 128
- 3) Ports 25 - 28 are Trunk ports to be used to connect to other network gear

MSTP is configured on all ports. The Trunk Ports are assigned different weightings so as to try and favor the trunks in the following order:

- 1) The connection between the 5424s have the highest weight (Port 25)
- 2) The connection to the 5408 with the same iteration name has the next highest weight (Port 28)
- 3) The connection to the 5408 with a different iteration name has the lowest priority (Port 27)

Lantech 5408 Switches:



The Lantech 5408s are Layer 2 managed switches that allow port specific VLAN assignments, Trunking ports, supports PTP time protocol, supports Multi Spanning Tree Protocol (MSTP), and the Cisco Discovery Protocol (CDP) and other protocols. For the purposes of the MARS configuration, all of these have to be configured properly or the network will collapse.

Configuration is done mainly through a web interface on each switch. The switches are also reachable via telnet. All the commands on the web page can be executed in the CLI.

The units are also supposed to be accessible via a Serial Console Port. However, I was not able to get this to work.

The WNS and MARS 5408s with the same iteration names (ie. MARS10-1 and WNS10-1) are mirrors of each other. Therefore, they can be directly swapped between each network. For WNS and MARS 5408s with the different iteration names (ie. MARS10-1 and WNS10-2) the IP address of the replacement 5408 would need to be changed.

The 5408s have the current port configurations:

- 1) Ports 1 - 8 are assigned to Subsea Science VLANs 11 to 18 (excepting port 2 on WNS)
- 2) Port 10 is assigned to the Subsea Management VLAN 127
- 3) Ports 9, 10 -12 are Trunk ports to be used to connect to other network gear

MSTP is configured on all ports. The Trunk Ports are assigned different weightings so as to try and favor the trunks in the following order:

- 1) The connection between the 5408s have the highest weight (Port 9)
- 2) The connection to the 5424 with the same iteration name has the next highest weight (Port 12)
- 3) The connection to the 5424 with a different iteration name has the lowest priority (Port 11)

Lantech Switch Configuration Examples:

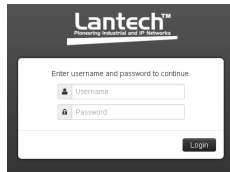
As stated earlier, the Lantech Switches are configured primarily through the web interface. A backup method of configuration is through telnet and a Command Line Interface (CLI). To log onto the systems Web UI, use the following addresses:

MRA91-1 & WNS91-1 - <https://10.91.128.101>

MRA91-2 (no WNS91-2) - <https://10.91.128.102>

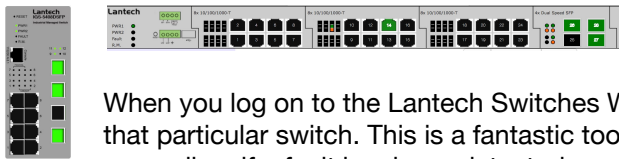
MRA10-1 & WNS10-1 - <https://10.91.128.201>

MRA10-2 & WNS10-2 - <https://10.91.128.202>



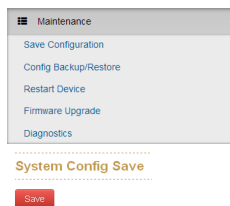
Enter the addresses of the Lantech switch you want to contact into your browser's address field. At the login prompt, login as admin (or marstech) to open the system's web configuration pager.

Switch Quick View



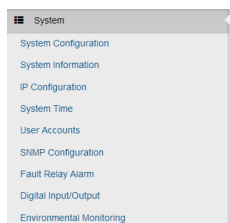
When you log on to the Lantech Switches Web UI, You will see a graphical representation of that particular switch. This is a fantastic tool to get a quick assessment of what power supplies are on line, if a fault has been detected, and what ports are active.

A Note on Saving



While there is an Apply button on most pages, this button will only apply setting changes to the current Running Configuration. To save this Running Configuration so that it will be used after a reboot/power rest, you need to navigate to the **Maintenance -> Save Configuration** menu item and click Save there.

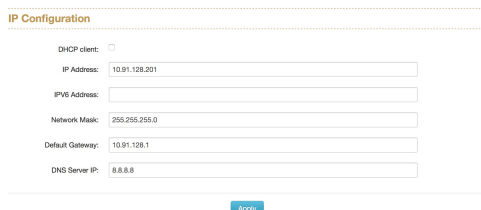
System Menu



The System IP Address, Netmask, and Default Gateway are set in the **System -> IP Configuration** menu item.

Ensure that the DHCP client box is unchecked.

The IP Address is one of the four IPs listed at the top of this page.



The Netmask will always be 255.255.255.0

The Default Gateway will always be 10.91.128.1

DNS Server IP can remain at 8.8.8.8 (Google DNS) or be changed to the IP of the MARS DNS Server.

After all information is entered, click the Apply button. If you changed the IP Address of the Switch, you will be automatically be redirected to the Web UI of the new IP Address. You will need to log in again.

System Identification Configuration

Name: MFA10-1

Description: 4 100/1000 SFP -B 10/100/1000TX L2+ Industrial Managed Switch

Location: MARS Node MFA10-1 (2)

Contact: dact@indiel.org

Auto Logout Time: 0 minutes
0 means disabling auto logout

Apply

The **System -> System Configuration** menu item allows you to configure a System Description, POC, Location, and Auto Logout Time (in minutes). Of these, only the Auto Logout Time has any real use. Auto Logout Time is currently set to 0 minutes (disabled) on all Switches.

To change the **System Name**, you have to use the CLI (as far as I can tell).

- 1) Logon to the Switch using telnet.
- 2) At the prompt, type “sys” to get you into the System Configuration menu
- 3) At the SYSTEM prompt, type “name newname” where newname is the name you want to use.
- 4) At the SYSTEM prompt, type “save” to save this configuration
- 5) Type “exit” to logoff of the Switch
- 6) Press the Return/Enter keyboard button at any time to get a listing of commands for the menu item that you are in.
- 7) The new name MAY not stick after a power cycle!

Device Time Configuration

Time Zone: Los Angeles

Clock Source: SNTP

Device Time: 4/4/2018, 12:28:08 PM

NTP Server: 10.91.128.65

Apply

The **System -> System Time** menu allows you to set Time, Time Zone, SNTP, and set the NTP server address. Set to SNTP and set the Server to the MARS NTP server.

Only account allows a user to only observe information on the Switch. A Read-Write account is a full on Admin account that will allow the user to change ANY setting on the Switch.

The remaining items in this menu (that are implemented) will be discussed in the Switch Diagnostics Section.

User Accounts

ID	Password	Permission	Enabled
admin	*****	Read-Write	☒
user	*****	Read-Only	☐
mantech	*****	Read-Write	☐

Apply

Ports Menu

Ports

- Configuration
- Status
- Statistics
- IEC Packet Statistics
- Mirroring
- Rate Limiting
- Loop Protection

The only configuration item used on this menu is **Ports -> Configuration**. The Trunk Ports (Ports 9, 11-12 on the 5408s and Ports 25-28 on the 5424s) need to have Flow Control enabled.

Without this checked, the ports will either 1) not handle traffic efficiently (Copper and Multi-mode) or 2) will not even create a link (Long Haul Single-mode) between the Switches.

Click Apply after you have changed the configuration.

Device Settings

Port No.	Type	Description	Enabled	Flow Control	Speed
1	1GTX	Port 1	☒	☐	Auto
2	1GTX	Port 2	☒	☐	Auto
3	1GTX	Port 3	☒	☐	Auto
4	1GTX	Port 4	☒	☐	Auto
5	1GTX	Port 5	☒	☐	Auto
6	1GTX	Port 6	☒	☐	Auto
7	1GTX	Port 7	☒	☐	Auto
8	1GTX	Port 8	☒	☐	Auto
9	DSFP	Port 9	☒	☒	Auto
10	DSFP	Port 10	☒	☐	Auto
11	DSFP	Port 11	☒	☒	Auto
12	DSFP	Port 12	☒	☒	Auto

Apply

VLAN Menu

VLAN

- Configuration
- Status

The VLAN menu is deceptively short, but horribly potent. There are three groups of items that must be configured correctly here.

VLAN Config

Operation Mode: 802.1Q VLAN

802.1Q VLAN Config

Management VLAN ID: 128

Port No.	Link Type	PVID	Tagged VLANs
1	Access	11	
2	Access	12	
3	Access	13	
4	Access	14	
5	Access	15	
6	Access	16	
7	Access	17	
8	Access	18	
9	Trunk	128	1,3,4,11,12,13,14,15,16,17,18
10	Access	127	
11	Trunk	128	1,3,4,11,12,13,14,15,16,17,18
12	Trunk	128	1,3,4,11,12,13,14,15,16,17,18

Apply

1) The Operation Mode needs to be set to 802.1Q VLAN and the Management VLAN ID must be set to 128. This is the ID for the Management VLAN (VLAN 128). By setting this to 128 you ensure that communication to the router will be established since each Switch's IP Addresses are part of the VLAN defined by the **Interface VLAN 128** command on the router. Additionally, it will allow you to access and configure the Switch over the network because ...

2) All Trunk Ports (Ports 9, 11-12 on the 5408s and Ports 25-28 on the 5424s) need to be assigned to the Management VLAN 128. To do this, set the Link Type to Trunk and the PVID to 128. The Tagged VLANs for each Trunk Port are a listing of every VLAN ID on the MARS Network separated by commas. That would look like:
1,3,4,11,12,13,14,15,16,17,18,41,42,43,44,45,46,47,48,127,128

3) All the other ports should be set up as regular Access (switched) Ports. Set the Link Type to Access for these ports. The PVID should be set to the VLAN that you want assigned to this port.

- 1) Ports 1-8 on each switch are assigned to the appropriate Science VLAN for that switch (11,12,..., 18 for the Subsea Switches and 41,42,...,48 for the Shore Station Switches).
- 2) Port 10 on the Subsea Switches is set to VLAN 127 to allow communication with the Node Power Controller
- 3) All other Ports on the 5424s should be set to VLAN 128
- 4) NOTE: The **only** Ports assigned to VLAN 128 on the 5408s are the Trunk Ports!

MSTP Menu

MSTP

- Global Configuration
- CIST Settings
- MSTI Settings
- Bridge Status
- Port Status

The Multiple Spanning Tree Protocol is set up by configuring just the Common and Internal Spanning Tree (CIST) settings. Multiple Spanning Tree Instances (MSTI) are not used in the MARS Network (since there is no need to set up multiple spanning-trees).

MSTP -> Global Configuration Select the MSTP Mode. The default name (REGION1) is used as the MSTP name.

MSTP -> CIST Settings is the menu item where MSTP is actually enabled. Enable MSTP by checking the Enable STP box. (If there is an x in Enable STP box, STP is NOT enabled. You need to see a check mark (✓) to know that STP is enabled.) This will enable MSTP on all Ports. It will also set each Port with the following criteria:

- 1) Path Cost of 0 (Lower numbers are given greater weight)
- 2) Priority of 128 (Lower numbers are given greater weight)
- 3) Edge mode of Auto

By moving the mouse to the Right Side of of a port information row, a small Pencil Icon will pop up. Click on that icon to edit the properties for that individual Port.

Important: You must click the Save button located on this pop-up window for your configurations to be to be saved for that Port. This Save button may sometimes be offscreen! (You'll need to scroll down to see it.) You then need to click the Apply Button to apply this new configuration. Then, like for all setting changes, you will need to click Save on the **Maintenance -> Save Configuration** menu item.

CIST Settings

Bridge Configuration

VLANs: Unmapped VLANs are mapped to the CIST tree

Priority: 200

Port Configuration

Port ID	Enable STP	Path Cost	Priority	Edge Mode	PSP Mode
1	YES	0	128	Auto	Force Enabled
2	YES	0	128	Auto	Force Enabled
3	YES	0	128	Auto	Force Enabled
4	YES	0	128	Auto	Force Enabled
5	YES	0	128	Auto	Force Enabled
6	YES	0	128	Auto	Force Enabled
7	YES	0	128	Auto	Force Enabled
8	YES	0	128	Auto	Force Enabled
9	YES	0	1	Auto	Force Enabled
10	YES	0	128	Auto	Force Enabled
11	YES	0	100	Auto	Force Enabled
12	YES	0	10	Auto	Force Enabled

The Trunk Ports are given the following settings to try to force MSTP Port selection as follows:

1) Trunk Ports between Switches in the same location (ie. MARS91-1 to MARS91-2) are given the greatest weight. These are ports 25 on the MARS91 switches, ports 9 on MARS10 and WNS10 switches.

- Priority is set to 1 for these ports

2) Trunk Ports between switches in different locations but with the same iteration number (ie. MARS91-1 to MAR10-1) are given the next highest weight. (Port 28 on the 5424s and Port 12 on the 5804s)

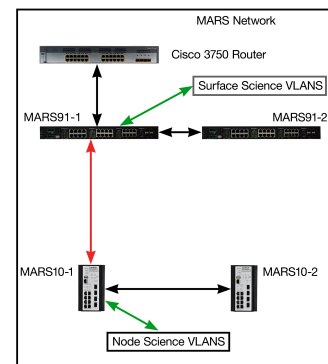
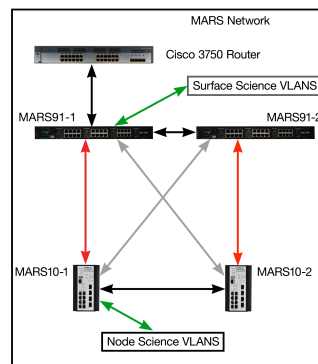
- Priority is set to 10 for these ports

3) The final set of connections (switches in different locations with different iteration number (like MARS91-1 and MAR10-2) are given the lowest weight. (Port 27 on the 5424s and Port 11 on the 5808s)

- Priority is set to 100 for these ports

In the wiring diagram (near right), trunk connections with the highest weights are drawn in Black. The next highest weighted connections are drawn in Red. The lowest weighted connections are drawn in Grey. Access (host) connections are drawn in Green.

With weighting implemented as described, the MSTP protocol should result in an actual connection map as shown far right.



Diagnostic Setup

To ensure that all diagnostic information is being collected and saved, several features must be enabled.

Logs

Log In ☒ Boot ☒ DDM ☒ DVM ☒ Link Changes ☒ POE ☒ Power ☒ Ring ☒ Clear Log Setup ☒

Actions

Local Log Action

Save to Local

Local Log Action

Apply

To enable logging, first ensure that all the items in the menu **Event & Log -> Logs** are checked.

Then, in the **Event and Log -> Actions** menu, on the Local Log Action Tab, click Save to Local and Apply the setting.

Actions

Local Log Action

Email Action

Email Alert

Subject: Event Log

Cloud SMTP

Receivers: [email] [email]

Please enter at least one receiver

Apply

To set up Email and Text (SMS) notifications, alerting must be enabled on the Email Action and SMS Action tabs. Obviously, a valid email (or phone number) must also be entered on these Tabs.

There are no actual **Actions** configured by default. Use the Event and **Log -> Event Action Map** to set up your alert criteria. Each Actions can be defined to sent event info to Logs, Email, SMS, etc.

Event Action Map

Event Actions: Choose an Event to Add

Power 1 off: [Byting]

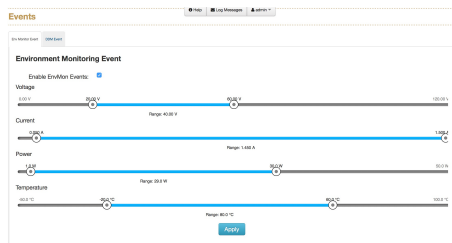
Power 2 off: [Byting]

DDM: [Byting]

Event Actions for Link Change: Choose a port to Add

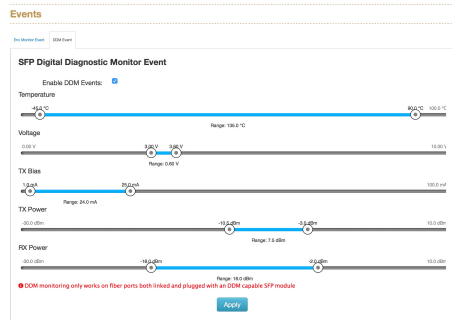
Port 9 down: [Byting]

Apply



Environmental (only available on the 5424s!) and SFP Digital Diagnostic Monitor (DDM) events must be enabled on the **Event and Log -> Events** Menu. These services are enabled using the Enable xxx Events button on the respective tab.

A nice feature of these setting panels is that you can specify the range of “good” values by moving the various “low” and “high” value slider for each item on these pages.



The Environment Events Tab allows you to set the lowest and highest acceptable values for system Voltage, Current, Power and Temperature for the 5424 Switches.

The SFP DDM Events Tab allows you to set these values for Temperature, Voltage, TX (Transmit) Bias, TX Power, and RX (Receive) Power.

Finally, **LLDP** and **CDP** must be enabled so that information on neighboring switches can be gathered. Just click the Enable button on the **LLDP -> LLDP Configuration** and **CDP -> CDP Configuration** menus. Use the default values for these.

PTP Transparent Clock Configuration

Mode:

Enable on:

Apply

NOTE: PTP is **not** currently set up on these switches!

I **THINK** that you just need to add all the switch ports to the Enable on field, but, without a PTP source, I was not able to confirm this. Rather than guess, I left these un-configured.

Lantech Switch Diagnostics:

There are many ways to see of the Switch's current configuration, current status, and current network. Additionally there are tools that can be used to diagnose connection issues both actively or by deduction.

As stated above, use the Switch Quick Look graphics right when you log in to make sure that the Ports that you think should be up are up, that Ports that you think are down are actually down, and that no fault lights are lit. After that, take a look at the following menu items.

System -> System Information gives you the the system's name, location, etc

IP Configuration

DHCP client: ☐

IP Address:

IPv6 Address:

Network Mask:

Default Gateway:

DNS Server IP:

If you actually were able to log into the switch your IP Address is probably correct.

However, if packets are having an issue getting on or off the switch, your Netmask, Default Gateway, and/or DNS might be off. **System -> IP Address** shows you the system's IP Address, Netmask, and Default Gateway

Logs		
	Boot	Link Change
	DDM	PDE
	DN	Ping
	Apr 04, 12:23:14	Link Change
	Apr 04, 12:23:14	PhyPort0.linkChg: up
	Apr 04, 12:23:14	Link Change
	Apr 04, 12:23:14	PhyPort0.linkChg: down
	Apr 04, 12:23:04	Link Change
	Apr 04, 12:23:04	PhyPort0.linkChg: up
	Apr 04, 12:23:04	Link Change
	Apr 04, 12:23:04	PhyPort0.linkChg: down
	Apr 04, 12:23:04	Link Change
	Apr 04, 12:23:04	PhyPort0.linkChg: up
	Apr 04, 12:23:04	Link Change
	Apr 04, 12:23:04	PhyPort0.linkChg: down
	Apr 04, 12:22:40	Link Change
	Apr 04, 12:22:40	PhyPort0.linkChg: up
	Apr 04, 12:22:40	Link Change
	Apr 04, 12:22:40	PhyPort0.linkChg: down
	Apr 04, 12:22:40	Link Change
	Apr 04, 12:22:31	Link Change
	Apr 04, 12:22:31	PhyPort0.linkChg: up
	Apr 04, 12:21:59	Link Change
	Apr 04, 12:21:59	PhyPort0.linkChg: down
	Apr 04, 12:18:40	Link Change
	Apr 04, 12:18:40	PhyPort0.linkChg: up
	Apr 04, 12:18:40	Link Change
	Apr 04, 12:18:40	PhyPort0.linkChg: down
	Apr 04, 12:18:31	Link Change
	Apr 04, 12:18:31	PhyPort0.linkChg: up
	Apr 04, 12:18:31	Link Change
	Apr 04, 12:18:31	PhyPort0.linkChg: down
	Apr 04, 12:18:30	Link Change
	Apr 04, 12:18:30	PhyPort0.linkChg: up
	Apr 04, 12:18:30	Link Change
	Apr 04, 12:18:30	PhyPort0.linkChg: down

Provided that you enabled Logging (as explained above), **Event & Log -> View Logs** shows you the current Log. This Log should also include Actions, that you set up in the Actions Map, when Syslog is included as a recipient.

Environmental (5424s only) and SFP event monitoring is actually not displayed under the

Event & Log menu. This information is accessed in **System -> System Condition Monitoring**. (I think. I went to double check this in the manual, but this feature is not listed there.)

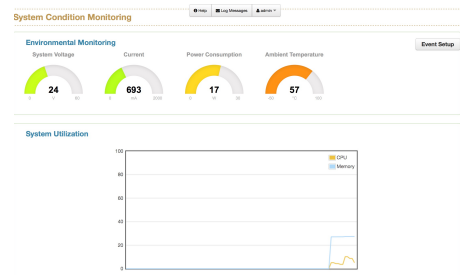
Port No.	Type	Link	Status	Speed	Flow Control
1	1GTX	down	Enable	N/A	N/A
2	1GTX	down	Enable	N/A	N/A
3	1GTX	down	Enable	N/A	N/A
4	1GTX	down	Enable	N/A	N/A
5	1GTX	down	Enable	N/A	N/A
6	1GTX	down	Enable	N/A	N/A
7	1GTX	down	Enable	N/A	N/A
8	1GTX	down	Enable	N/A	N/A
9	DSFP	up	Enable	1G Full	Enable
10	DSFP	down	Enable	N/A	N/A
11	DSFP	up	Enable	1G Full	Enable
12	DSFP	up	Enable	1G Full	Enable

Ports -> Status shows each Port's link type, whether it is enabled and up, and speed.

Ports -> Staistics will also shows wether or not a Port is enabled and up. It also lists, for each Port, how many packets were received and transmitted, how many collisions, etc.

Port	Type	Link	State	Tx Desc	Tx Desc	Rx Desc	Rx Desc	Collision	Drop	Rx Bcast	Rx Bcast	Tx Bcast
1	10GT	Down	Enable	271	0	97	0	0	0	85	2	271
2	10GT	Down	Enable	3382	0	816	0	0	0	814	2	3196
3	10GT	Down	Enable	0	0	0	0	0	0	0	0	0
4	10GT	Down	Enable	0	0	0	0	0	0	0	0	0
5	10GT	Down	Enable	0	0	0	0	0	0	0	0	0
6	10GT	Down	Enable	0	0	0	0	0	0	0	0	0
7	10GT	Down	Enable	0	0	0	0	0	0	0	0	0
8	10GT	Down	Enable	0	0	0	0	0	0	0	0	0
9	D9P	Up	Enable	1424534	0	1080061	0	0	0	385	1085584	886467
10	D9P	Up	Enable	221341	0	0	0	0	0	0	0	0
11	D9P	Up	Enable	2390005	0	67108	0	0	0	172	58442	1839263
12	D9P	Up	Enable	1306166	0	1163982	0	0	0	541078	608307	1298930

System Information	
III Identification	
Name	MRA10-1
Description	4 100/1000 SFP +8 10/100/1000TX L2+ Industrial Managed Switch
Location	MARIS Node MRA10-1 (2)
Contact	dao@mbair.org
III Information	
Device Type	4/4/2018, 12:25:58 PM
Up Time	5 days, 20 hours, 22 minutes
Software Version	V3.4350
MAC Address	28:60:46:a0:33:28
Hardware Model	IGS-548RDSFP
Hardware Description	4 100/1000 SFP +8 10/100/1000TX L2+ Industrial Managed Switch



This menu item is a great place to find out if information is actually flowing in and out of a port (to a subnet say). Click the Clear Button at the bottom of the page to zero out all information here. The traffic counters will then start to tick up as packets flow through the ports. If you are expecting to see traffic flowing in AND out of a port, and you don't see traffic in both directions, then, you have a problem.

Topology Status

Nodes		
MAC Address	IP	
28.60.48.a0.33.30	10.91.128.202	
28.60.48.a0.33.88	10.91.128.102	
28.60.48.a0.33.28	10.91.128.201	
28.60.48.a0.33.8c	10.91.128.101	

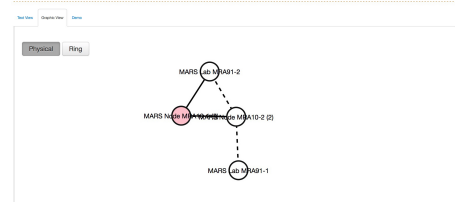
Links			
From	To	Port	
28.60.48.a0.33.30	28.60.48.a0.33.8c	Blocking	
28.60.48.a0.33.30	28.60.48.a0.33.88	Blocking	
28.60.48.a0.33.30	28.60.48.a0.33.28	Linking	
28.60.48.a0.33.88	28.60.48.a0.33.28	Linking	

Rings			
-------	--	--	--

Topology -> Status has a couple of different tabs that show you different information.

The Text View Tab lists the other Switches in the MSTP zone along with their MAC addresses. It will also show the Trunk Links (that the Switch is aware of) and whether they are Linking (up) or Blocked (MSTP down).

Topology Status



The next view is the Graphic View. This shows how the Switches are connected at any given instant. This view will refresh every few seconds as information on link status is updated in spanning-tree.

802.1Q VLAN Status

VLAN ID	Port Members			
1	Port 1	Port 2	Port 3	Port 4
3	Port 1	Port 2	Port 3	Port 4
4	Port 1	Port 2	Port 3	Port 4
11	Port 9	Port 11	Port 12	Port 13
12	Port 9	Port 11	Port 12	Port 13
13	Port 9	Port 11	Port 12	Port 13
14	Port 9	Port 11	Port 12	Port 13
15	Port 9	Port 11	Port 12	Port 13
16	Port 9	Port 11	Port 12	Port 13
17	Port 9	Port 11	Port 12	Port 13
18	Port 9	Port 11	Port 12	Port 13
41	Port 9	Port 11	Port 12	Port 13
42	Port 9	Port 11	Port 12	Port 13
43	Port 9	Port 11	Port 12	Port 13
44	Port 9	Port 11	Port 12	Port 13
45	Port 9	Port 11	Port 12	Port 13
46	Port 9	Port 11	Port 12	Port 13
47	Port 9	Port 11	Port 12	Port 13
48	Port 9	Port 11	Port 12	Port 13
127	Port 9	Port 11	Port 12	Port 13
128	Port 9	Port 11	Port 12	Port 13

VLAN -> Status shows each VLAN configured on the switch and which Ports they are active on.

If a VLAN is listed as Untagged on a port, that means that that port is an Access Port for that VLAN. So, if VLAN 11 is listed as Untagged on Port 1 then that means that Port 1 is an Access (switch) Port for VLAN 11. You'll also notice that Port 1 is ONLY a Port Member on VLAN 11 and is not listed on any other VLAN.

Tagged VLANs are secondary VLANs for a Port. Basically, this means that they are the VLANs that “ride” in the Trunk Port “pipes”. In this example you can see that every VLAN is listed as a Tagged VLAN for Ports 9, 11, and 12. These are the Trunk Ports for this 5408 Switch.

LLDP Neighbor Information

Identification						
Local Port	Neighbor ID	Port ID	Port Description	System Name	System Capability	Management Address
11	28.60.48.a0.33.88	27	Port 27	MRA1-2	Bridge(-)	10.91.128.102
9	28.60.48.a0.33.30	9	Port 9	IGS-5408CSP	Bridge(-)	10.91.128.202

LLDP -> Neighbor Information lists each Local Port that is attached to a another Layer 2 device. It will also show you the exact port on that remote device that the Local Port is connected to, the System's name, and its IP Address. Use this menu item to ensure that your connections are strung like you think they are.

CDP Status

Statistics	
Total Packets Output	Total Packets Input
101184	10882
Clear	

CDP -> CDP Status is similar to the LLDP Neighbor information menu item. The biggest difference is that it will also list Routers that are connected to the Switch.

Neighbors						
Local Port ID	CDP Name	Agent TTL	Device ID	Platform	Software Version	Address
12	2	175	MRA1-1	MRA1-1	V3.43X52	[10.91.128.101]

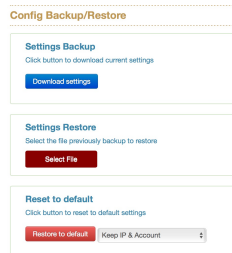
MSTP -> Bridge Status gives you information on what Ports are designated as Bridge (Trunk) Ports.

Bridge status of all ports

Port 1 as Disabled/BLOCKING in CIST	Port 2 as Disabled/BLOCKING in CIST	Port 3 as Disabled/BLOCKING in CIST
Port 4 as Disabled/BLOCKING in CIST	Port 5 as Disabled/BLOCKING in CIST	Port 6 as Disabled/BLOCKING in CIST
Port 7 as Disabled/BLOCKING in CIST	Port 8 as Disabled/BLOCKING in CIST	Port 9 as Designated/FORWARDING in CIST
Port 10 as Disabled/BLOCKING in CIST	Port 11 as Designated/FORWARDING in CIST	Port 12 as Designated/FORWARDING in CIST

MSTP -> Port Status lists every Port on the Switch and whether or not it is Disabled/Blocking, Forwarding/Enabled, as well as many other iterations. **Remember:** this is describing spanning-tree traffic. Port 1 is not Disabled. There just is no spanning-tree packets flowing in or out of it. Therefore, MSTP traffic is blocked from going out it.

Finally, we get to the Maintenance Menu and the functions that you can find there. As noted at the beginning of this document, **Maintenance -> Save** should be used at regular intervals when you are making configuration changes. If not, a reboot of the system will wipe away all of your hard work.

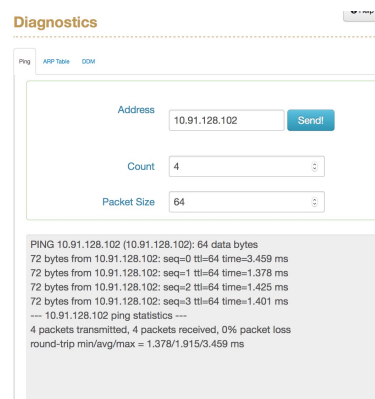


The screenshot shows the 'Config Backup/Restore' menu with three sections: 'Settings Backup' with a 'Download settings' button, 'Settings Restore' with a 'Select File' button, and 'Reset to default' with a 'Restore to default' button and a 'Keep IP & Account' dropdown menu.

The **Maintenance -> Config Backup/Restore** menu item will allow you to Backup all Settings to a file on your computer, do a Setting Restore from this back upped file, or do a hard Reset to Default conditions. Please, don't choose the last option here unless you have **physical access** to the Switch that you're working on.

Maintenance -> Restart Device is self explanatory.

Maintenance -> Firmware Upgrade allows you to upload a new firmware file that you have on the computer that you logged on with.



The screenshot shows the 'Diagnostics' menu with three tabs: 'Ping', 'ARP Table', and 'DDoS'. The 'Ping' tab is active, showing a form with 'Address' (10.91.128.102), 'Count' (4), and 'Packet Size' (64). Below the form is a 'Send' button and a text area displaying the results of a ping test to 10.91.128.102, including statistics like 4 packets transmitted, 4 packets received, 0% packet loss, and a round-trip time of 1.378/1.915/3.459 ms.

Maintenance -> Diagnostics allows you to do a quick ping test from the actual Switch that you are logged on to. Having even a bit insight for how the network is behaving from a remote location is often crucial in solving connection issues. If you are not able to get to a system from your local machine but **are** able to get to it from the Switch it is attached to, you might have a routing problem.

Also available, on a different tab, is a listing of the ARP Table for the switch. The ARP Table is a listing of MAC Addresses, and their corresponding IP Addresses, for every IP Address that the Switch has requested a lookup for.

In closing, I was truly impressed with the ease of the Configuration Backup and Restore function as well as that of the Firmware Upgrade function.

Router Configuration Examples:

General Information:

To change any configuration on the 3750 Router, you must connect to it by Telnet or Serial connection. Log in with the Password.

You then need to get into Enable Mode to see any useful information on the Router. Type “enable” (or just “en”) at the router prompt and hit return. You will now be asked for the Enable Password.

To make a change on the Router, you must then enter Configuration Mode. Type “conf t” at the Enable prompt. You can then execute the commands shown below.

To save the changes, you must first return to the Enable Mode (by typing “exit” at the Configuration Mode prompt). At the Enable Mode prompt, type “write mem”.

If **ANY** of the above is new information to you, **please** ask for help from IS (or Pete Braccio) before making changes.

Port setup:

Switchport example

interface GigabitEthernet1/0/2	- The port name and number
switchport access vlan 128	- Assigns the Port to VLAN 128
switchport mode access	- Sets Access Mode (regular switch port)

Trunk Example:

interface GigabitEthernet1/0/25	- The port name and number
switchport trunk encapsulation dot1q	- The Trunk port protocol for passing info
switchport trunk native vlan 128	- The Trunk port's native VLAN
switchport mode trunk	- Sets the Port as a Trunk Port

VLAN Example:

This is the Layer 3 (router) configuration of the VLAN. All MARS networks are Class C subnets

Interface VLAN128	- Creates the VLAN as an interface on the router
description MANAGEMENT VLAN	- VLAN name
ip address 10.91.128.1 255.255.255.0	- Defines the Subnet and sets the IP Address
ip access-group 199 in	- Assigns ACL 199 to the input side of the router
ip pim sparse-dense-mode	- Allows the port to pass Multicast

VLAN Switch Example:

This is the Layer 2 (switch) configuration of the VLAN. In order to make the interface VLAN active, you also have to create it on the switch layer. The following command will do this. These are the **only** configuration commands that are that are **not** listed in the router config file.

VLAN 128	- Defines the switch VLAN
no shut	- Activates the VLAN

Routing setup:

ip routing	- Enables routing
router ospf 10	- Enables OSPF routing
network 10.0.0.0 0.0.0.255 area 0	- Defines the network to route
router rip	- Enables RIP routing
network 10.0.0.0	- Defines the network to route
ip route 0.0.0.0 0.0.0.0 10.91.128.12	- Defines the default route

Access List Example:

This is the ACL for the Subsea Science VLAN (VLAN 18)

access-list 118 permit tcp any any established	- Established connections can continue
access-list 118 permit icmp any any echo-reply	- Allows ping replies to anywhere
access-list 118 permit ip any host 10.91.128.55	- Allows all connections from PMACS
access-list 118 permit tcp any host 10.91.128.15 eq 123	- Allows NTP from 10.91.128.15
access-list 118 permit udp any host 10.91.128.15 eq ntp	- Allows NTP from 10.91.128.15
access-list 118 permit tcp any host 10.91.128.61 eq domain	- Allows DNS from 10.91.128.61
access-list 118 permit tcp any host 10.91.128.62 eq domain	- Allows DNS from 10.91.128.62
access-list 118 permit udp any host 10.91.128.61 eq domain	- Allows DNS from 10.91.128.61
access-list 118 permit udp any host 10.91.128.62 eq domain	- Allows DNS from 10.91.128.62
access-list 118 permit ip any 10.91.48.0 0.0.0.255	- Allows traffic from associate Surface VLAN
access-list 118 deny ip any 10.1.0.0 0.0.255.255	- Denys all IP traffic to the Node Mgmt. VLAN
access-list 118 deny ip any 10.91.0.0 0.0.255.255	- Denys all IP traffic to the Surface Mgmt. VLAN
access-list 118 deny ip any 10.91.253.0 0.0.0.255	- Denys all traffic to the 10.91.253.0 subnet
access-list 118 deny icmp any 10.1.0.0 0.0.255.255	- Denys all ICMP to the Node Mgmt. VLAN
access-list 118 deny icmp any 10.91.128.0 0.0.0.255	- Denys all ICMP to the Surface Mgmt. VLAN
access-list 118 permit ip any any	- Permit all other IP traffic
access-list 118 permit icmp any any	- Permit all other ICMP traffic

The complete router config is attached

MARS VLANS

VLAN	Description	IP Address
VLAN 1	This is the default management VLAN on switch/routers. Not used on MARS, but enabled in case a device reverts to its factory default setting.	None
VLAN 3	External VLAN (to firewall/INTERNET)	10.91.3.1
VLAN 4	Shorestation Science Hosting VLAN	10.91.4.1
VLAN 11	Subsea Science VLAN 1	10.1.11.1
VLAN 12	Subsea Science VLAN 2	10.1.12.1
VLAN 13	Subsea Science VLAN 3	10.1.13.1
VLAN 14	Subsea Science VLAN 4	10.1.14.1
VLAN 15	Subsea Science VLAN 5	10.1.15.1
VLAN 16	Subsea Science VLAN 6	10.1.16.1
VLAN 17	Subsea Science VLAN 7	10.1.17.1
VLAN 18	Subsea Science VLAN 8	10.1.18.1
VLAN 41	Shorestation Science VLAN 1	10.91.41.1
VLAN 42	Shorestation Science VLAN 2	10.91.42.1
VLAN 43	Shorestation Science VLAN 3	10.91.43.1
VLAN 44	Shorestation Science VLAN 4	10.91.44.1
VLAN 45	Shorestation Science VLAN 5	10.91.45.1
VLAN 46	Shorestation Science VLAN 6	10.91.46.1
VLAN 47	Shorestation Science VLAN 7	10.91.47.1
VLAN 48	Shorestation Science VLAN 8	10.91.48.1
VLAN 127	Subsea Management LAN	10.1.128.1
VLAN 128	Management VLAN	10.91.128.1
VLAN 911	? (Legacy VLAN)	None

Current NAT Translation Tables (4/5/2018)

Node Name	Global IP	MARS IP
science-1.2.mars	10.1.11.2	134.89.42.112
science-1.3.mars	10.1.11.3	134.89.42.113
science-1.5.mars	10.1.11.5	134.89.42.115
science-1.8.mars	10.1.11.8	134.89.42.118
science-1.9.mars	10.1.11.9	134.89.42.119
science-1.0.mars	10.1.11.10	134.89.42.110
science-1.1.mars	10.1.11.11	134.89.42.111
science-1.4.mars	10.1.11.130	134.89.42.114
science-2.2.mars	10.1.12.2	134.89.42.122
science-2.4.mars	10.1.12.4	134.89.42.124
science-2.5.mars	10.1.12.5	134.89.42.125
science-2.6.mars	10.1.12.6	134.89.42.126
science-2.7.mars	10.1.12.7	134.89.42.127
science-2.8.mars	10.1.12.8	134.89.42.128
science-2.9.mars	10.1.12.9	134.89.42.129
science-2.0.mars	10.1.12.10	134.89.42.120
science-2.1.mars	10.1.12.11	134.89.42.121
science-3.2.mars	10.1.13.2	134.89.42.132
science-3.3.mars	10.1.13.3	134.89.42.133
science-3.4.mars	10.1.13.4	134.89.42.134
science-3.5.mars	10.1.13.5	134.89.42.135
science-3.6.mars	10.1.13.6	134.89.42.136
science-3.7.mars	10.1.13.7	134.89.42.137
science-3.8.mars	10.1.13.8	134.89.42.138
science-3.9.mars	10.1.13.9	134.89.42.139
science-3.0.mars	10.1.13.10	134.89.42.130
science-3.1.mars	10.1.13.11	134.89.42.131
science-4.2.mars	10.1.14.2	134.89.42.142
science-4.3.mars	10.1.14.3	134.89.42.143
science-4.4.mars	10.1.14.4	134.89.42.144
science-4.6.mars	10.1.14.6	134.89.42.146
science-4.8.mars	10.1.14.8	134.89.42.148
science-4.9.mars	10.1.14.9	134.89.42.149

Node Name	Global IP	MARS IP
science-4.0.mars	10.1.14.10	134.89.42.140
science-4.1.mars	10.1.14.11	134.89.42.141
science-5.2.mars	10.1.15.2	134.89.42.152
science-5.3.mars	10.1.15.3	134.89.42.153
science-5.4.mars	10.1.15.4	134.89.42.154
science-5.5.mars	10.1.15.5	134.89.42.155
science-5.6.mars	10.1.15.6	134.89.42.156
science-5.7.mars	10.1.15.7	134.89.42.157
science-5.8.mars	10.1.15.8	134.89.42.158
science-5.9.mars	10.1.15.9	134.89.42.159
science-5.0.mars	10.1.15.10	134.89.42.150
science-5.1.mars	10.1.15.11	134.89.42.151
science-8.2.mars	10.1.18.2	134.89.42.182
science-8.4.mars	10.1.18.4	134.89.42.184
science-8.5.mars	10.1.18.5	134.89.42.185
science-8.6.mars	10.1.18.6	134.89.42.186
science-8.7.mars	10.1.18.7	134.89.42.187
science-8.8.mars	10.1.18.8	134.89.42.188
science-8.9.mars	10.1.18.9	134.89.42.189
science-8.0.mars	10.1.18.10	134.89.42.180
science-8.1.mars	10.1.18.11	134.89.42.181
topside.mars	10.1.128.1	134.89.42.3
sciencrouter.mars	10.91.4.13	134.89.42.5
science-1.6.mars	10.91.41.2	134.89.42.116
science-1.7.mars	10.91.41.3	134.89.42.117
science-2.3.mars	10.91.42.3	134.89.42.123
science-4.5.mars	10.91.44.5	134.89.42.145
science-4.7.mars	10.91.44.7	134.89.42.147
science-8.3.mars	10.91.48.3	134.89.42.183
noderouter.mars	10.91.128.1	134.89.42.4
marsswitch.mars	10.91.128.24	134.89.42.7

Node Name	MARS IP	Global IP
topside.shore	134.89.42.3	10.1.128.1
noderouter.shore	134.89.42.4	10.91.128.1
sciencerouter.shore	134.89.42.5	10.91.4.13
marsswitch.shore	134.89.42.7	10.91.128.24
science-1.0.shore	134.89.42.110	10.1.11.10
science-1.1.shore	134.89.42.111	10.1.11.11
science-1.2.shore	134.89.42.112	10.1.11.2
science-1.3.shore	134.89.42.113	10.1.11.3
science-1.4.shore	134.89.42.114	10.1.11.130
science-1.5.shore	134.89.42.115	10.1.11.5
science-1.6.shore	134.89.42.116	10.91.41.2
science-1.7.shore	134.89.42.117	10.91.41.3
science-1.8.shore	134.89.42.118	10.1.11.8
science-1.9.shore	134.89.42.119	10.1.11.9
science-2.0.shore	134.89.42.120	10.1.12.10
science-2.1.shore	134.89.42.121	10.1.12.11
science-2.2.shore	134.89.42.122	10.1.12.2
science-2.3.shore	134.89.42.123	10.91.42.3
science-2.4.shore	134.89.42.124	10.1.12.4
science-2.5.shore	134.89.42.125	10.1.12.5
science-2.6.shore	134.89.42.126	10.1.12.6
science-2.7.shore	134.89.42.127	10.1.12.7
science-2.8.shore	134.89.42.128	10.1.12.8
science-2.9.shore	134.89.42.129	10.1.12.9
science-3.0.shore	134.89.42.130	10.1.13.10
science-3.1.shore	134.89.42.131	10.1.13.11
science-3.2.shore	134.89.42.132	10.1.13.2
science-3.3.shore	134.89.42.133	10.1.13.3
science-3.4.shore	134.89.42.134	10.1.13.4
science-3.5.shore	134.89.42.135	10.1.13.5
science-3.6.shore	134.89.42.136	10.1.13.6
science-3.7.shore	134.89.42.137	10.1.13.7
science-3.8.shore	134.89.42.138	10.1.13.8
science-3.9.shore	134.89.42.139	10.1.13.9

Node Name	MARS IP	Global IP
science-4.0.shore	134.89.42.140	10.1.14.10
science-4.1.shore	134.89.42.141	10.1.14.11
science-4.2.shore	134.89.42.142	10.1.14.2
science-4.3.shore	134.89.42.143	10.1.14.3
science-4.4.shore	134.89.42.144	10.1.14.4
science-4.5.shore	134.89.42.145	10.91.44.5
science-4.6.shore	134.89.42.146	10.1.14.6
science-4.7.shore	134.89.42.147	10.91.44.7
science-4.8.shore	134.89.42.148	10.1.14.8
science-4.9.shore	134.89.42.149	10.1.14.9
science-5.0.shore	134.89.42.150	10.1.15.10
science-5.1.shore	134.89.42.151	10.1.15.11
science-5.2.shore	134.89.42.152	10.1.15.2
science-5.3.shore	134.89.42.153	10.1.15.3
science-5.4.shore	134.89.42.154	10.1.15.4
science-5.5.shore	134.89.42.155	10.1.15.5
science-5.6.shore	134.89.42.156	10.1.15.6
science-5.7.shore	134.89.42.157	10.1.15.7
science-5.8.shore	134.89.42.158	10.1.15.8
science-5.9.shore	134.89.42.159	10.1.15.9
science-8.0.shore	134.89.42.180	10.1.18.10
science-8.1.shore	134.89.42.181	10.1.18.11
science-8.2.shore	134.89.42.182	10.1.18.2
science-8.3.shore	134.89.42.183	10.1.18.3
science-8.4.shore	134.89.42.184	10.1.18.4
science-8.5.shore	134.89.42.185	10.1.18.5
science-8.6.shore	134.89.42.186	10.1.18.6
science-8.7.shore	134.89.42.187	10.1.18.7
science-8.8.shore	134.89.42.188	10.1.18.8
science-8.9.shore	134.89.42.189	10.1.18.9

Acronym List

- 1) **ACL** - Access Control List - Controls access to/from an IP Address/SubNet/Network.
- 2) **CIST** - Common and Internal Spanning Tree - The primary component of MSTP. This is a map of all VLANs sharing the same spanning-tree.
- 3) **Class C Network** - An address space that contains 256 addresses. Of this, only 254 are usable. All MARS Subnets are configured as Class C networks. An example: The subnet 10.91.128.0 is defined as a Class C network. The IP Address space for this network contains the following IP Addresses: 10.91.128.1 to 10.91.128.255. The addresses would be assigned as below:

10.91.128.0	First IP Address of the network. It defines the network and, therefore, can't be assigned to an interface. Sometimes called The Wire.
10.91.128.1	First usable IP Address. This IP is usually used as the address for router (virtual or physical).
10.91.128.2	First truly usable IP Address for a network Host
10.91.128.254	Last usable IP Address for a network Host
10.91.128.255	The Broadcast Address for the Subnet

- 4) **Interation Name** - A term that I made up to describe the number after the dash (-1 or -2) in the Lantech switch's name. I'm sure that there is a name for this, but, I can't think of it.
- 5) **LAN** - Local Area Networks - In the early days of networking (when dinosaurs roamed the land), There were NETworks and SUBNETworks. At MBARI, the Net is 134.89.0.0. A Subnet would always need to be 134.89.Y.0 (where Y is a number between 1 and 255). A host in each subnet would have to be physically attached to a switch only serves the 134.89.Y.0 network. This switch would then need to be able to reach THE physical port on a router that is assigned as the Network Address for the Subnet.
- 6) **Layer 1** - Is the actual network connection. The host device is in this layer. ie the Link Light.
- 7) **Layer 2** - The network layer that allows LAN, switched traffic. Switches are in this layer.
- 8) **Layer 3** - The network layer that allows traffic between different networks. Routers are in this layer.
- 9) **MSTI** - Multiple Spanning Tree Instances - This protocol allows you to set up MSTP instances on the same switch. MARS has only a single MSTP tree so MSTI is not implemented here.
- 10) **MM** - Multi-mode (fiber) - An optical fiber fiber designed to carry multiple signals. To allow multiple signals, the optical fiber has greater diameter than SM fiber. This larger diameter also limits the maximum distance that this fiber can be used (due to increased dispersion).
- 11) **MSTP** - Multiple Spanning Tree Protocol - A process that scans switches to make sure that there are no switch loops for a group of VLANs. Buy sending STP requests for a group of VLANs, instead of for sending and STP request for each individual VLAN, the switch topology can be obtained quicker using less switch resources. This is the version of STP that is implemented on the MARS Network.
- 12) **Network Address** - The router IP Address for a Subnet. For a Class C Network this address would usually be of the form X.Y.Z.1 (eg. 10.91.128.1) for the X.Y.Z.0 Subnet.
- 13) **SFP** - Small Form-Factor Pluggable module - A small transceiver that plug into switch/router. This transceiver can be an RJ45, a Single-mode fiber, or a Multi-mode fiber connection.
- 14) **SM** - Single-mode (fiber) - An optical fiber fiber designed to carry signal in one direction only.
- 15) **STP** - Spanning Tree Protocol - A process that scans switches to make sure that there are no switch loops for a particular VLAN. It will shut down as many links as needed to maintain full connectivity to all nodes while eliminating loops.
- 16) **VLAN** - Virtual LAN - VLAN technology allows you to create a Virtual Interface on a router and then assign a Network Address