

IP Network Engineering

The basic network provided by the MARS DCS system is an IP over Ethernet system. At the high level, the optical transport can be neglected and the system treated much as an ordinary copper network system.

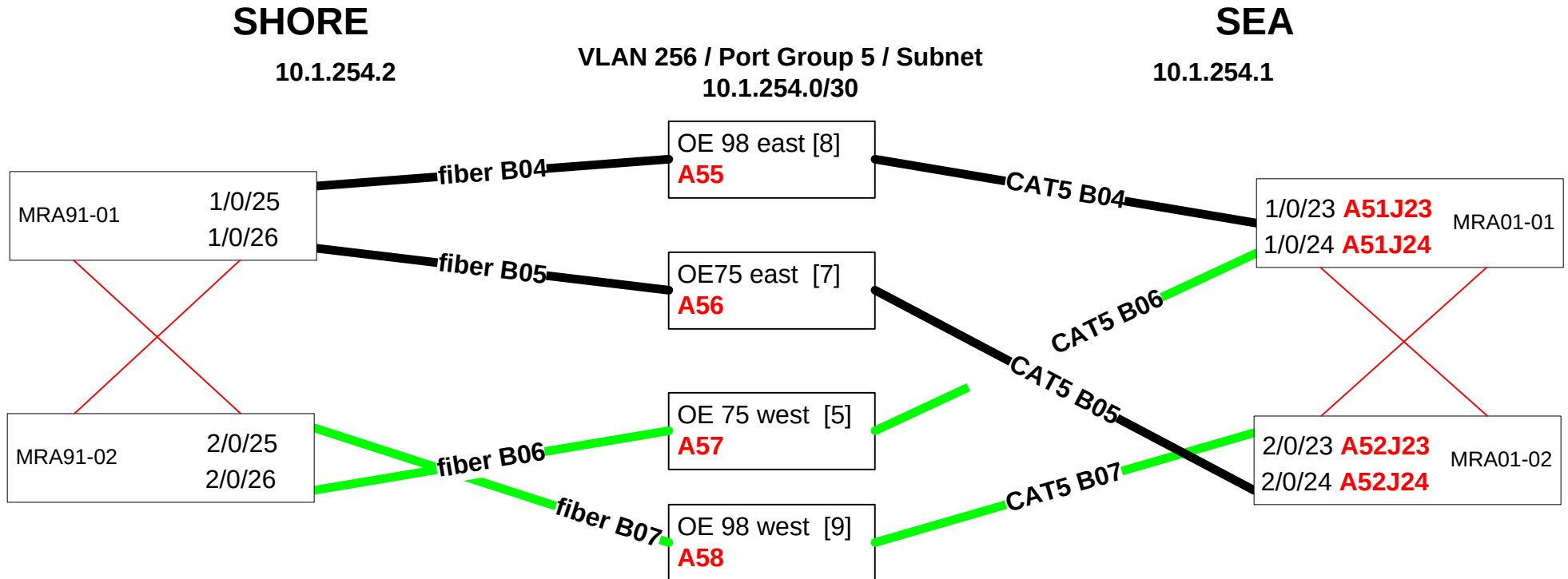
The basic backbone of MARS is the sea-shore connection. This consists of a 4 link Etherchannel with 1Gbs links. The routers on each end are paired into a stackwise configuration, the pairs representing themselves to the network as a single routing/switching entity.

For debugging purposes the below diagram is very useful. This shows the mapping of the EtherChannels from sea to shore, giving the individual router ports and the Media Converters involved.

Note the crossing of the connections on the sea side. This provides further redundancy to the system, so that if one router on each end fails, we still have a connection available.

If one disconnects a fiber on the shore side or CAT5 on the sea side, the corresponding light on the router port at the opposite end will go out. (WARNING-at this time a known bug in Cisco IOS makes this pattern indeterminate)

BACKBONE-mapping of ethernet channels from sea to shore



IP Network Engineering

Shown on the next page is the complete IP network for MARS. It can be described as follows:

The backbone, as mentioned on the prior page, is a 4Gbs EtherChannel backbone connecting the Sea and Shore CISCO stacks. The backbone is placed in subnet 10.1.254.0/30

There are two primary class B subnets for MARS.

The Sea is subnet 10.1.0.0 /16

The Shore is subnet 10.91.0.0/16

These B subnets are further partitioned into management subnets of sea=10.1.128.0/24 and shore=10.91.128.0/24. All IP relating to the operation of the network infrastructure, such as monitoring, is contained in the 10.x.128.0 subnets

The subsea subnet is also further partitioned into B subnets for containing each of the 8 science ports and the science equipment attached thereon:

10.1.11.0/24 for science port 1. 10.1.12.0/24 for science port 2..... 10.1.18.0/24 for science port 8.

The shore subnet is also further partitioned into a B subnet for containing the shore science servers.

10.91.4.0/24

The MARS network contains 3 ancillary switches in addition to the 3750 backbone switches:

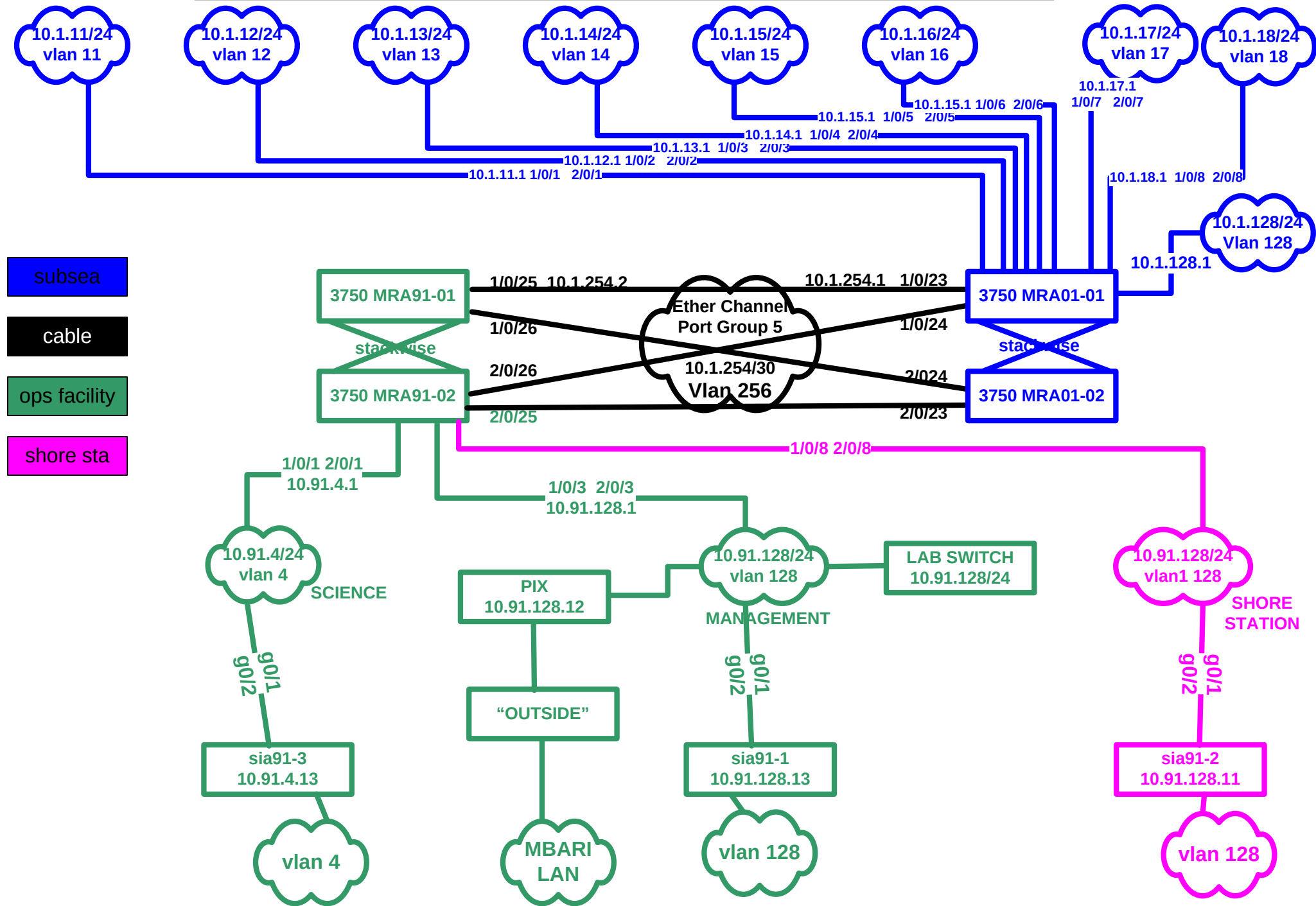
sia91-1 is a management switch, into which the various network management servers are connected

sia91-3 is a science server switch, to which the science data servers are attached. Its ports are placed in subnet 10.91.4.0/24

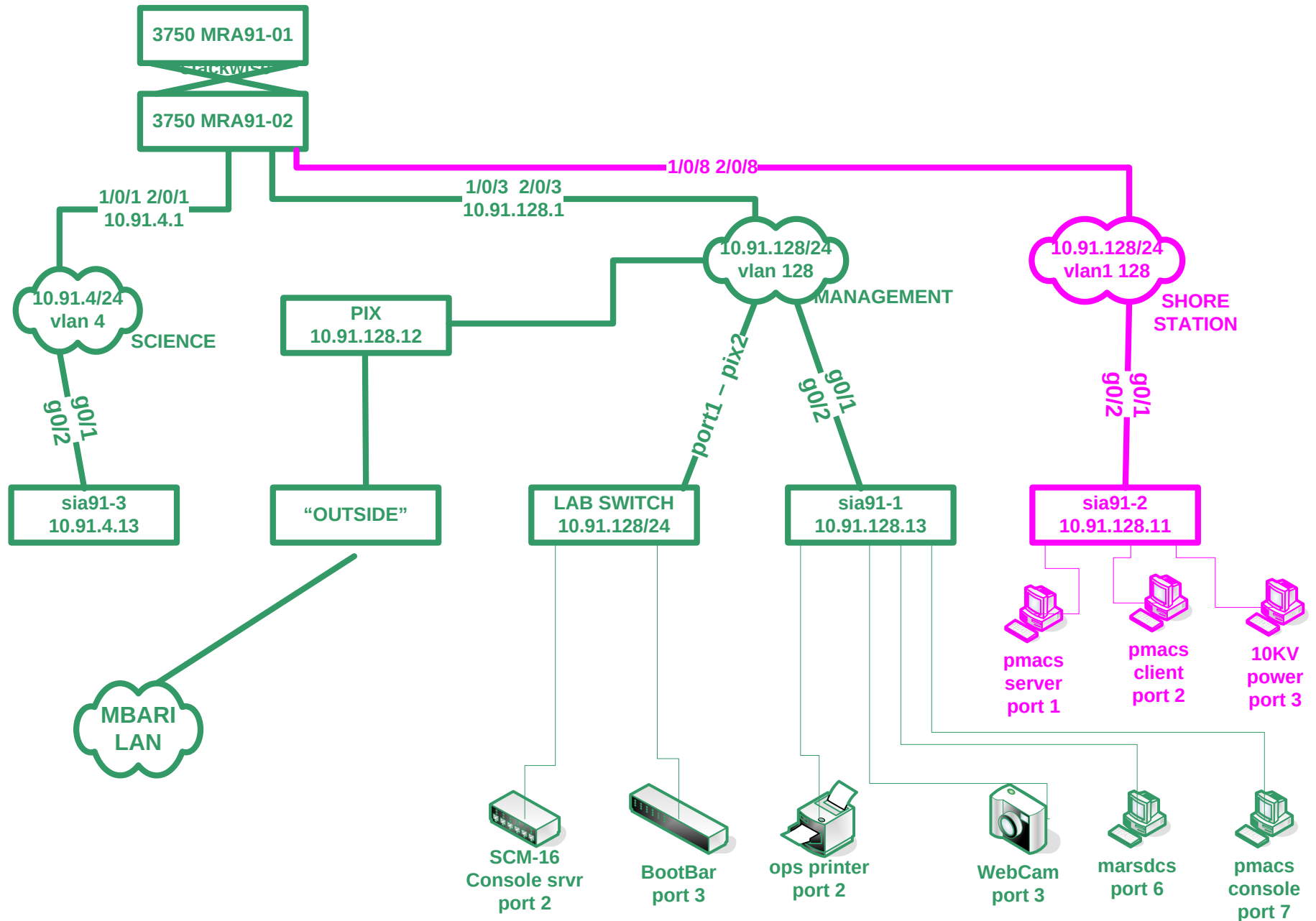
sia91-2 is the shore station switch remoted to the beach via fibers. It contains the power-system servers (PMACs client & server)

Shown on the following 2 pages are network architecture diagrams.

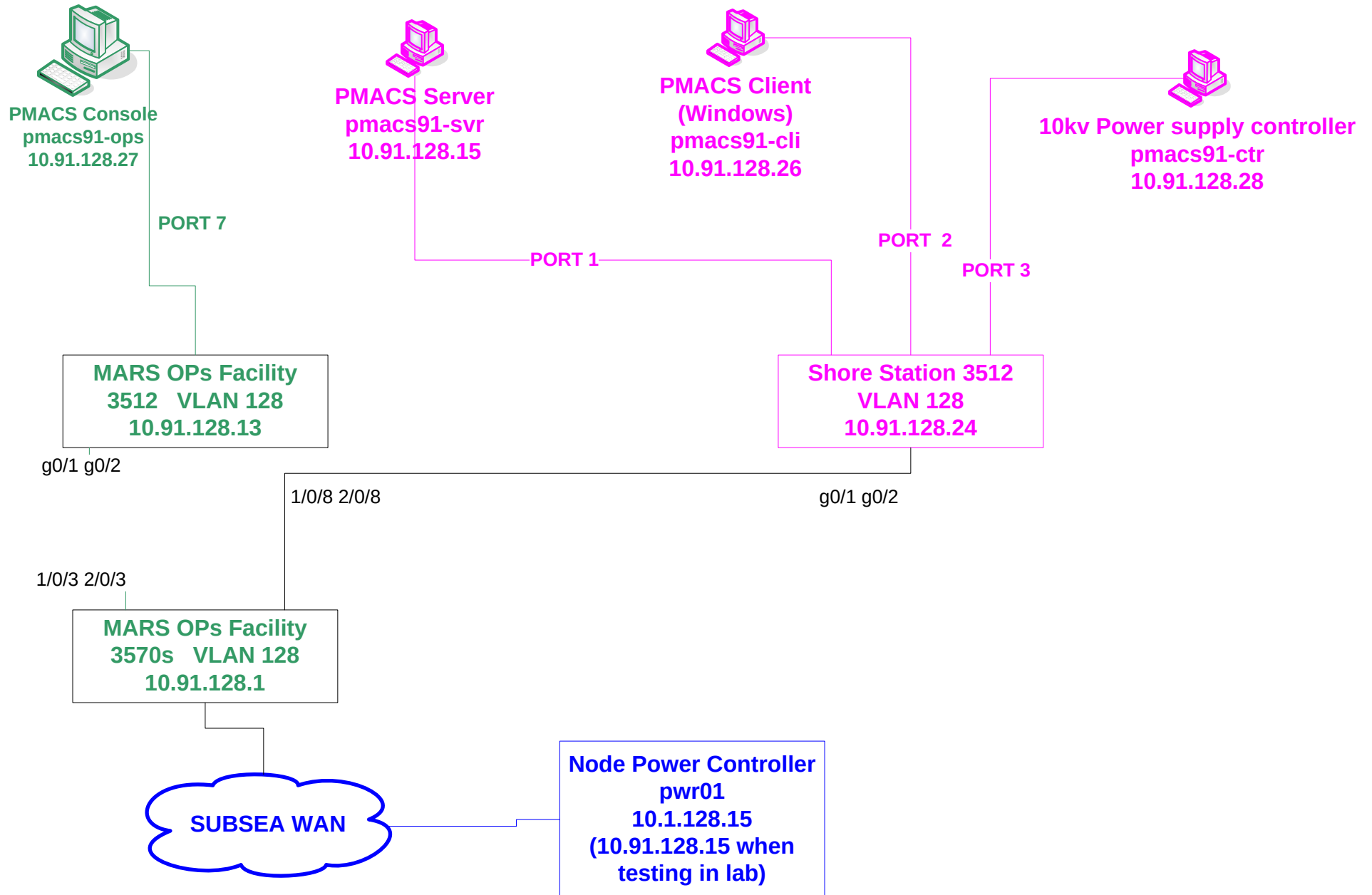
V02 – DCS Opened Node Validation (subnets)



V02 – DCS Opened Node Validation (detail of 10.91.128.0/24 subnet)



Network Diagram 4 (detail of MARS power systems Elements)



Installing an Instrument

- 1) plug it's ethernet RJ45 into either the mra01-01 or mra01-02 router (both if you have a Y connector) using the port list below.
- 2) give the instrument an address of 10.1.xx.yyy where
 - a) xx is 11 thru 18 from the chart below
 - b) yyy is your choice, from 2 thru 254
- 3) Use a netmask of 255.255.255.0
- 4) give the instrument a gateway of 10.1.xx.1
- 5) On the shore routers you will need to connect your 'server' (or laptop). Use any of ports on mra91-02 from 3 thru 18. Give the server a gateway of 10.91.128.1/255.255.255.0
- 6) You probably will have to issue a "noshut" CISCO command to start the ports which were configured in the steps above.

At this point you should be able to ping the instrument from the server.

During our test phase you should let WHOI know when you add anything to the network. We can add it to our monitor list.

Switch Ports	IP Range	Gateway
1/0/1 2/0/1	10.1.11.xxx	10.1.11.1
1/0/2 2/0/2	10.1.12.xxx	10.1.12.1
1/0/3 2/0/3	10.1.13.xxx	10.1.13.1
1/0/4 2/0/4	10.1.14.xxx	10.1.14.1
1/0/5 2/0/5	10.1.15.xxx	10.1.15.1
1/0/6 2/0/6	10.1.16.xxx	10.1.16.1
1/0/7 2/0/7	10.1.17.xxx	10.1.17.1
1/0/8 2/0/8	10.1.18.xxx	10.1.18.1

V02 – DCS Opened Node Validation – ports for mra91-01 and mra91-02

01

SHORE

02

port	vlangs	to	port	Desc
1/0/01	4T	Sia91-3	Gi0/1	Science switch
1/0/02	4			
1/0/03	128T	Sia91-1	Gi0/1	ops fac switch
1/0/04	128			
1/0/05	128	linksys	1	linksys
1/0/06	128			
1/0/07	128			
1/0/08	128T	sia91-2	Gi0/1	shore sta switch
1/0/09	128			
1/0/10	128			
1/0/11	128			
1/0/12	128			
1/0/13	128			
1/0/14	128	PIX		10.91.128.12
1/0/15	128	GYDA		10.91.128.14
1/0/16	128			
1/0/17	128	ntp		10.91.128.55
1/0/18	128			
1/0/19				
1/0/20				
1/0/21				
1/0/22				
1/0/23				
1/0/24				
1/0/25	256	Mra01-01	1/0/23	etherchannel
1/0/26	256	Mra01-02	2/0/24	etherchannel
1/0/27				
1/0/28				

port	vlangs	to	port	Desc
2/0/01	4T	Sia91-3	Gi0/2	Science switch
2/0/02	4			
2/0/03	128T	Sia91-1	Gi0/2	ops fac switch
2/0/04	128			
2/0/05	128			
2/0/06	128			
2/0/07	128			
2/0/08	128T	sia91-2	Gi0/2	shore sta switch
2/0/09	128			
2/0/10	128			
2/0/11	128			
2/0/12	128			
2/0/13	128			
2/0/14	128			
2/0/15	128			
2/0/16	128			
2/0/17	128			
2/0/18	128			
2/0/19				
2/0/20				
2/0/21				
2/0/22				
2/0/23				
2/0/24				
2/0/25	256	Mra01-02	2/0/23	etherchannel
2/0/26	256	Mra01-01	1/0/24	etherchannel
2/0/27				
2/0/28				

V02 – DCS Opened Node Validation – ports for mra01-01 and mra01-02

01 (A51)

SEA

02 (A52)

port	vlangs	to	port	Desc
1/0/01	11	ADCP		science
1/0/02	12			science
1/0/03	13			science
1/0/04	14			science
1/0/05	15			science
1/0/06	16			science
1/0/07	17			science
1/0/08	18			science
1/0/09	128	Node pwr ctl		10.1.128.15
1/0/10	128			
1/0/11	128			
1/0/12	128			
1/0/13				
1/0/14				
1/0/15				
1/0/16				
1/0/17				
1/0/18				
1/0/19				
1/0/20				
1/0/21				
1/0/22				
1/0/23	256	Mra91-01	1/0/25	A51J23 – B04
1/0/24	256	Mra91-02	2/0/26	A51J24 – B06
1/0/25				
1/0/26				
1/0/27				
1/0/28				

port	vlangs	to	port	Desc
2/0/01	11			science
2/0/02	12			science
2/0/03	13			science
2/0/04	14			science
2/0/05	15			science
2/0/06	16			
2/0/07	17			science
2/0/08	18			science
2/0/09	128	GYDA	A52J09	10.1.128.14 – B03
2/0/10	128			
2/0/11	128	cyclades	A51J11	10.1.128.20 – B02
2/0/12	128			
2/0/13				
2/0/14				
2/0/15				
2/0/16				
2/0/17				
2/0/18				
2/0/19				
2/0/20				
2/0/21				
2/0/22				
2/0/23	256	Mra91-02	2/0/25	A52J23 – B07
2/0/24	256	Mra91-01	1/0/26	A52J24 – B05
2/0/25				
2/0/26				
2/0/27				
2/0/28				

LOGS are on /var/log/ciscl.log

V02 – DCS Opened Node Validation – ports for aux switches

sia91-1	10.91.128.13	MARS operations facility		
port	vlangs	to	port	Desc
1/0/01	128	<i>broken port</i>		<i>dont use</i>
1/0/02	128	pmacs cons	na	10.91.128.27
1/0/03	128	mars printer	na	10.91.128.29
1/0/04	128	web cam	na	10.91.128.23
1/0/05	128	marsdcs	eth1	10.91.128.57
1/0/06	128			
1/0/07	128			
1/0/08	128			
1/0/09	128			
1/0/10	128			
1/0/11	128			
1/0/12	128			
g0/1	po2	mra91-01	g1/0/3	
g0/2	po2	mra91-02	g2/0/3	

sia91-3	10.91.4.13	science hosting switch		
port	vlangs	to	port	Desc
1/0/01	4			
1/0/02	4			
1/0/03	4			
1/0/04	4			
1/0/05	4			
1/0/06	4			
1/0/07	4			
1/0/08	4			
1/0/09	4			
1/0/10	4			
1/0/11	4			
1/0/12	4			
g0/1	po1	mra91-01	g1/0/1	
g0/2	po1	mra91-02	g2/0/1	

sia91-2	10.91.128.24	shore station		
port	vlangs	to	port	Desc
1/0/01	128	pmacs svr		10.91.128.15
1/0/02	128	pmcas client	nic 1	10.91.128.26
1/0/03	128			
1/0/04	128			
1/0/05	128			
1/0/06	128			
1/0/07	128			
1/0/08	128			
1/0/09	128			
1/0/10	128			
1/0/11	128			
1/0/12	128			
g0/1	po3	mra91-01	g1/0/8	
g0/2	po3	mra91-02	g2/0/8	

PIX Firewall 10.91.128.12 / 134.89.42.12			
port	to	port	Desc
0	MBARI inet		
1	mra91-01	g1/0/14	
2	LAB SWITCH	1	
3			
4			
5			

LAB Switch			
port	to	port	Desc
01	PIX	2	
02	SCM16		10.91.128.17
03	Boot Bar		10.91.128.19
04			
05			
..... 16			