REVISION HISTORY			
Revision Level	**Effective Date**	**Initiator**	**ECO Number**
D		M. Cookson	
Section Number	**Description and Justification of Changes**		
All	Release for review		

TABLE OF CONTENTS

1 PURPOSE

This document indicates how to install SMC application software such as those listed on the SMC specific configurations BOM (02795), starting with the introduction of RegulusOS

2 SCOPE

This procedure applies to SMC application software, such as those listed on the SMC specific configurations BOM, starting with the introduction of RegulusOS

3 RESPONSIBILITIES

It is the responsibility of manufacturing technicians and engineers to test and record measured data per the procedures outlined in this document. Any measurement logs will be kept for future use.

4 REFERENCES

05855 MPI, MICRO SD CARD SMC KERNEL INSTALLER WITH OPTIONAL CRYPTO

05859-XX KIT, MICRO SD CARD 16GB WITH KERNEL, REGULUSOS, XX

5 REQUIRED MATERIALS AND EQUIPMENT

A Windows PC loaded with Ubuntu Linux in a virtual environment like VMWare or a PC running Ubuntu Linux natively; the user must have administrative rights via sudo

A micro-SD card programmer attached to the PC

An applicable micro-SD card of at least 4Gb (for example, 01366 “MICRO SD CARD, 16 GB”) that has been programmed with an operating system (kernel and root filesystem) that is compatible with the application; the application BOM indicates the correct version.

For SD card programmers that work only with full-sized SD cards, an interface carrier may be required

A SMC assembled with a PIB (01288) and interconnected with a Float C&C as a payload; the Float C&C should be accessible to WGMS via XBee *Note that for some tests, the Float C&C needs to be receiving GPS and the RUDICS modem (if included) needs antenna connectivity and a view of the sky.*

A USB console cable (02638)

6 SAFETY REQUIREMENTS

TBD

7 INSTALLATION PROCEDURE

7.1 Setup of Tools on Ubuntu

7.1.1 Install *cryptsetup* to support encrypted partitions (one-time setup):

```
sudo aptitude install cryptsetup
```

If you don't have aptitude installed, you can use **apt-get**: `sudo apt-get install cryptsetup`

7.2 Copy the SMC Software to the SD Card

7.2.1 With Ubuntu active, Insert the freshly-programmed micro SD card (i.e. with operating system) into reader.

- SD cards with an unencrypted XDATA partition will mount **BOOT**, **LINUX** and **XDATA**.
- SD cards prepared with an encrypted XDATA partition will only mount the **BOOT** and **LINUX** partitions; in this case, the matching encryption *passphrase* must be available in order to proceed.

* In the following cases, the SMC software tarball is referred to as *nnnnn-nn*_REV_A.tar.bzip2; make adjustments to the name and path as necessary.

7.2.2 With Unencrypted XDATA Partition[1]

```
mike@dsk-sv-mikedev:~$ sudo cp nnnnn-nn REV A.tar.bz2 /media/LINUX/root
mike@dsk-sv-mikedev:~$ sudo umount /media/{BOOT,LINUX,XDATA}
```

7.2.3 With Encrypted XDATA Partition[2]

```
mike@dsk-sv-mikedev:~$ echo 'passphrase' | sudo cryptsetup create --cipher aes-
cbc-essiv:sha256 --key-size 256 --hash sha256 secsd /dev/sdf3
mike@dsk-sv-mikedev:~$ sudo mkdir --parents /mnt/secsd
mike@dsk-sv-mikedev:~$ sudo mount /dev/mapper/secsd /mnt/secsd
mike@dsk-sv-mikedev:~$ sudo cp nnnnn-nn REV A.tar.bz2 /mnt/secsd
mike@dsk-sv-mikedev:~$ sudo umount /mnt/secsd
mike@dsk-sv-mikedev:~$ sudo cryptsetup remove secsd
mike@dsk-sv-mikedev:~$ sudo umount /media/{BOOT,LINUX}
```

[1] In the fixed font sections, the underlined text is typed by the user; items in italics may require some interpretation. For example, *nnnnn-nn* is the part number of the SMC software being installed.

[2] The RC3 kernel (05859-01) does not support encrypted partitions; support is scheduled for -02.

7.3 Initial Power Up

7.3.1 With the SMC power off, insert the micro SD card into the card slot and slide the metal clamp into the locked position.

7.3.2 Install the console cable (02638) and open a terminal session to the console serial port at 115,200 baud, 8 data bits, 1 stop bit and no parity. For example, from an Ubuntu terminal session you can use screen[3] (adjust the port name according to your hardware configuration):

```
screen /dev/ttyS2 115200
```

7.3.3 Apply power to the SMC payload and watch the output.

- If the terminal displays a 'losh>' prompt, the boot process has stopped at the Logic Loader, so it is likely that the SD card was not read or that the SD card was not correctly formatted with the kernel and root filesystem. Power off the SMC payload and verify connection or check the SD card, then re-apply power.

```
*****************************************************************

                        LogicLoader

 (c) Copyright 2002-2011, Logic PD, Inc. All Rights Reserved.

 LoLo Version:      2.5.1
 SOM Model Number:  SOMDM3730-20-2780AGCR-A
 SOM Part Number:   1017878
 SOM Serial Number: 5011M00265

*****************************************************************

losh>
```

- If SMC starts to boot up, but stops while it is loading the kernel, continue at **Configuring U-Boot** (sometimes this is required when upgrading from an older kernel version.)

```
Texas Instruments X-Loader 1.42  for dm3730logic (2013-11-28 06:25:24)
DRAM: 256MB (MT29C4G48MAZAPAKQ5)
Starting U-boot on MMC
Reading boot sector
444900 bytes read from MMC to 80400000

U-Boot 2011.06-00006-gb1b89e0-dirty  (Nov 28 2013 - 06:24:53)

OMAP3630/3730-GP ES2.1, CPU-OPP2, L3-200MHz, Max CPU Clock 1 Ghz
Logic DM37x/OMAP35x reference board + LPDDR/NAND
I2C:   ready
DRAM:  256 MiB

Board: DM37xx Torpedo

Enable battery backup charger (BB_CFG = 0x1c)
NAND:  512 MiB
NAND: Internal to NAND ECC selected
No 'display' variable found in environment; suppress splashimage
In:    serial
Out:   serial
Err:   serial
Product ID data cached to: 40200000
Die ID #5cb400029ff800000163810c14021014
```

[3] Note that you can exit **screen** with ctrl-A \

```
OTG_SYSCONFIG: 00001008 - needs to be 00002001

ID data ROM  : Gen 1
Part Number  : 1017878
Model Name   : SOMDM3730-20-2780AGCR-A
Serial Number: 5011M00265

Data (writethrough) Cache is ON

Net:   smc911x-0
Hit any key to stop autoboot:  1

mmc1 is available

reading uImage
```

← SMC hangs while booting kernel

- Otherwise, if the output stops at the following prompt, then the kernel has started up and you can continue at **Configuring Users**

```
Generating public/private ecdsa key pair.
Your identification has been saved in /etc/openssh/ssh_host_ecdsa_key.
Your public key has been saved in /etc/openssh/ssh_host_ecdsa_key.pub.
The key fingerprint is:
6b:c3:f7:88:42:b4:60:ff:53:ff:31:87:aa:28:46:8d root@dm3730_zoom_torpedo
The key's randomart image is:
+--[ECDSA  256]---+
|                 |
|                 |
|                 |
|    o .          |
|   . + +S        |
|      E....    . |
|     o .=...  + .|
|      +.o= o.. + |
|     . oo.o.o..  |
+-----------------+
Starting /usr/sbin/sshd: [ OK ]


Distribution built using LinuxLink by Timesys
Kernel 3.0.0-ts-armv7l-RegulusOS-1.0.0-RC3 for armv7l
dm3730_zoom_torpedo login:
```

Note that if “Generating public/private ecdsa key pair” is not shown, then the card is not freshly formatted.

7.4 Configuring U-Boot

7.4.1 Cycle power to the payload and watch the startup.

7.4.2 Hit Enter during the countdown, then execute the following commands:

```
Texas Instruments X-Loader 1.42  for dm3730logic (2013-11-28 06:25:24)
DRAM: 256MB (MT29C4G48MAZAPAKQ5)
Starting U-boot on MMC
Reading boot sector
444900 bytes read from MMC to 80400000

U-Boot 2011.06-00006-gb1b89e0-dirty  (Nov 28 2013 - 06:24:53)
```

```
OMAP3630/3730-GP ES2.1, CPU-OPP2, L3-200MHz, Max CPU Clock 1 Ghz
Logic DM37x/OMAP35x reference board + LPDDR/NAND
I2C:   ready
DRAM:  256 MiB
Board: DM37xx Torpedo
Enable battery backup charger (BB_CFG = 0x1c)
NAND:  512 MiB
NAND: Internal to NAND ECC selected
No 'display' variable found in environment; suppress splashimage
In:    serial
Out:   serial
Err:   serial
Product ID data cached to: 40200000
Die ID #5cb400029ff800000163810c14021014
OTG_SYSCONFIG: 00001008 - needs to be 00002001

ID data ROM  : Gen 1
Part Number  : 1017878
Model Name   : SOMDM3730-20-2780AGCR-A
Serial Number: 5011M00265

Data (writethrough) Cache is ON
Net:   smc911x-0
Hit any key to stop autoboot:  1
```

← **Hit Enter to stop the count down**

```
OMAP Logic # env default -f
## Resetting to default environment
OMAP Logic # run makelriboot
Saving Environment to NAND...
Erasing Nand...
Erasing at 0x220000 --  33% complete.
Erasing at 0x240000 --  66% complete.
Erasing at 0x260000 -- 100% complete.
Writing to Nand... done
OMAP Logic # reset
resetting ...
```

← **SMC reboots**

```
Texas Instruments X-Loader 1.42  for dm3730logic (2013-11-28 06:25:24)
DRAM: 256MB (MT29C4G48MAZAPAKQ5)
Starting U-boot on MMC
Reading boot sector
444900 bytes read from MMC to 80400000
```

7.5 Configuring Users

Execute the following script to set up the system users. By convention, the password is set to “1329moffet” for all accounts.

```
Distribution built using LinuxLink by Timesys
Kernel 3.0.0-ts-armv7l-RegulusOS-1.0.0-RC3 for armv7l
dm3730_zoom_torpedo login: root
```

```
No mail.
root@dm3730_zoom_torpedo:~$ useradd smc
root@dm3730_zoom_torpedo:~$ useradd smc0
root@dm3730_zoom_torpedo:~$ usermod -a -G dialout smc
root@dm3730_zoom_torpedo:~$ usermod -a -G dialout smc0
root@dm3730_zoom_torpedo:~$ passwd
Changing password for root
Enter the new password (minimum of 5, maximum of 8 characters)
Please use a combination of upper and lower case letters and numbers.
New password:                          ← Enter password (not echoed)
Re-enter new password:                 ← Re-enter password (not echoed)
passwd: password changed.
root@dm3730_zoom_torpedo:~$ passwd smc
Changing password for smc
Enter the new password (minimum of 5, maximum of 8 characters)
Please use a combination of upper and lower case letters and numbers.
New password:                          ← Enter password (not echoed)
Re-enter new password:                 ← Re-enter password (not echoed)
passwd: password changed.
root@dm3730_zoom_torpedo:~$ passwd smc0
Changing password for smc0
Enter the new password (minimum of 5, maximum of 8 characters)
Please use a combination of upper and lower case letters and numbers.
New password:                          ← Enter password (not echoed)
Re-enter new password:                 ← Re-enter password (not echoed)
passwd: password changed.
root@dm3730_zoom_torpedo:~$
```

7.6 Decompressing the Software Archive

7.6.1 With Unencrypted XDATA Partition

```
root@dm3730_zoom_torpedo:~$ tar xvjpf /root/nnnnn-nn_REV_A.tar.bzip2 -C /
etc/
etc/init.d/
etc/init.d/S98-smc
etc/sudoers
etc/network/
etc/network/interfaces
etc/cron.deny
etc/ppp/
etc/ppp/pap-secrets
etc/hosts
home/                                  ← Archive is expanded (continues)
```

7.6.2 With Encrypted XDATA Partition

```
root@dm3730_zoom_torpedo:~$ echo 'passphrase' | cryptsetup create --cipher aes-
cbc-essiv:sha256 --key-size 256 --hash sha256 secsd /dev/mmcblk0p3
root@dm3730_zoom_torpedo:~$ mount /dev/mapper/secsd /home/smc
kjournald starting.  Commit interval 5 seconds
EXT3-fs (dm-0): using internal journal
```

```
EXT3-fs (dm-0): mounted filesystem with writeback data mode
root@dm3730_zoom_torpedo:~$ tar xvjpf /home/smc/nnnnn-nn_REV_A.tar.bzip2 -C /
etc/
etc/init.d/
etc/init.d/S98-smc
etc/sudoers
etc/network/
etc/network/interfaces
etc/cron.deny
etc/ppp/
etc/ppp/pap-secrets
etc/hosts
home/                          ← Archive is expanded (continues)
```

7.7 Reboot the SMC

```
home/smc/roots/200_LogListener/.disabled
home/smc/roots/200_Sharctail/
home/smc/roots/200_Sharctail/.disabled
home/smc/roots/000_EthernetSwitch/
home/smc/roots/000_EthernetSwitch/.disabled
home/smc/roots/200_WHOIMM/
home/smc/roots/200_WHOIMM/.disabled
root@dm3730_zoom_torpedo:/$ shutdown -r now
                               ← SMC restarts
```

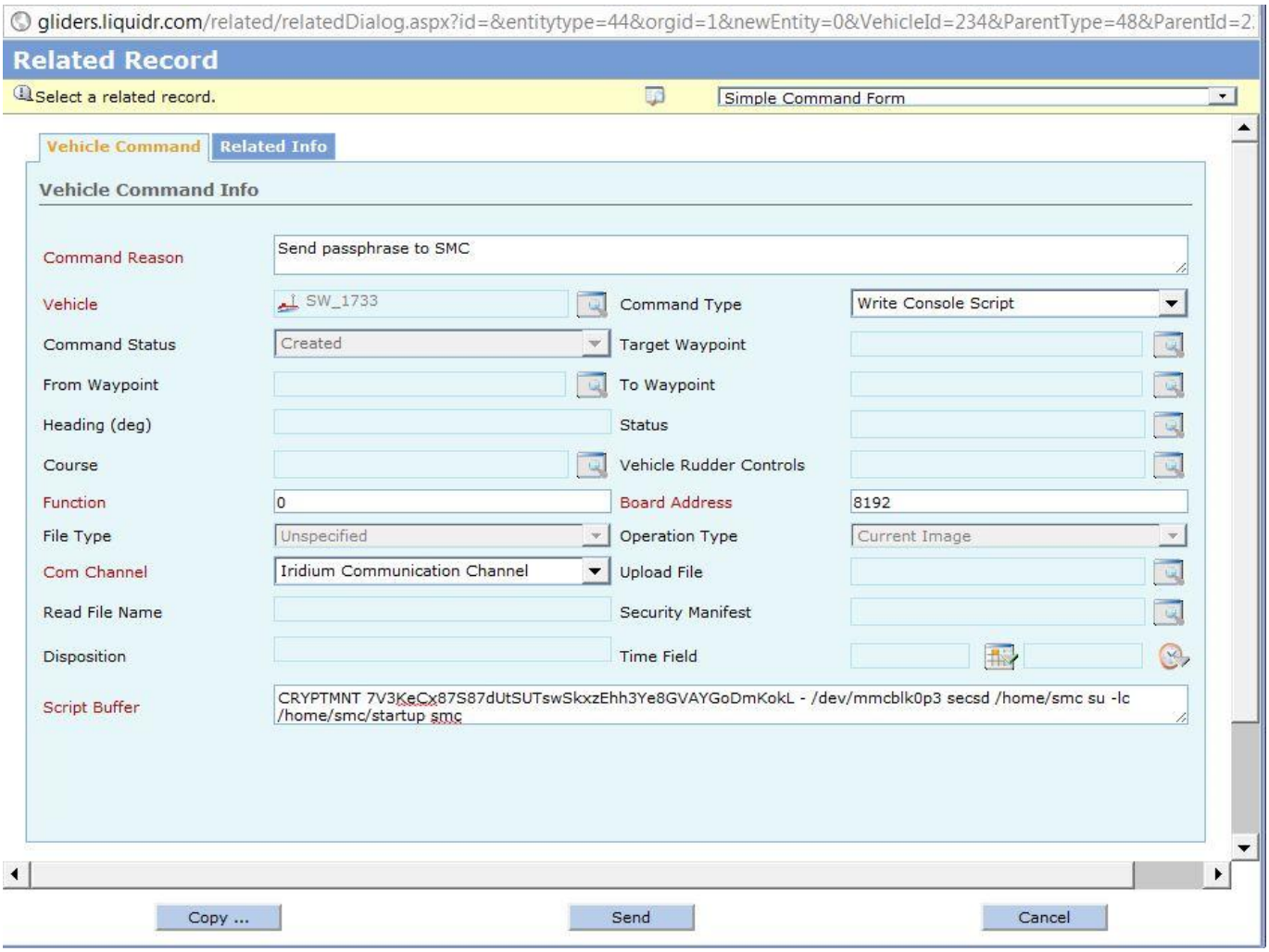
7.8 Starting up the SMC with Encrypted XDATA Partition

If the SMC starts up and there is no /home/smc/startup script available, it defaults to /home/smc0/startup and displays a message like:

```
====================
Starting SMC (wait)
====================
```

A message is sent to the WGMS indicating that software needs a decryption passphrase to continue; this is the passphrase that was created when the SD card was formatted. The passphrase can be provided by sending a Write Console Script command to the board address of the SMC (8192 in the case of a board ID of 0x20.) The format of the message should be:

CRYPTMNT '*passphrase*' - /dev/mmcblk0p3 secsd /home/smc su -lc /home/smc/startup smc



The encrypted partition is then decrypted and an attempt is made to execute the startup command as the smc user.

7.9 Complete the Standard Configuration[4]

The following message is displayed during a non-encrypted startup startup or after the encryption key is provided:

```
=========================
Starting SMC applications
=========================

no crontab for smc
Automatic startup disabled: to enable it, run "touch ~/autostart"
```

[4] Sections 8-10 contain other configurations that are not always required; complete those configurations before completing the standard configuration.

Continue the standard configuration as follows:

```
Distribution built using LinuxLink by Timesys
Kernel 3.0.0-ts-armv7l-RegulusOS-1.0.0-RC3 for armv7l
dm3730_zoom_torpedo login: smc
Password:                          ← Enter the smc account password (not echoed)
No mail.
smc@dm3730_zoom_torpedo:~$ sudo SetupXDATA
/dev/mmcblk0p3 is already mounted at /mnt/XDATA
mkdir --parents /mnt/XDATA
mv /home/smc/log /mnt/XDATA
ln -s /mnt/XDATA/log /home/smc
mkdir --parents /mnt/XDATA
mv /home/smc/sc /mnt/XDATA
ln -s /mnt/XDATA/sc /home/smc
mkdir --parents /mnt/XDATA/PPPHost
mv /home/smc/roots/200_PPPHost/NewFiles /mnt/XDATA/PPPHost
ln -s /mnt/XDATA/PPPHost/NewFiles /home/smc/roots/200_PPPHost
mkdir /mnt/XDATA/GPS
chown smc /mnt/XDATA/GPS
chgrp smc /mnt/XDATA/GPS
mkdir /mnt/XDATA/MAM
chown smc /mnt/XDATA/MAM
chgrp smc /mnt/XDATA/MAM
mkdir /mnt/XDATA/AQUAT
chown smc /mnt/XDATA/AQUAT
chgrp smc /mnt/XDATA/AQUAT
mkdir /mnt/XDATA/C3
chown smc /mnt/XDATA/C3
chgrp smc /mnt/XDATA/C3
mkdir /mnt/XDATA/Microstrain
chown smc /mnt/XDATA/Microstrain
chgrp smc /mnt/XDATA/Microstrain
mkdir /mnt/XDATA/GPSWaves
chown smc /mnt/XDATA/GPSWaves
chgrp smc /mnt/XDATA/GPSWaves
smc@dm3730_zoom_torpedo:~$
                          ← Complete any additional setup items (like RUDICS; see §8 -10)
smc@dm3730_zoom_torpedo:~$ touch autostart
smc@dm3730_zoom_torpedo:~$ sudo shutdown -r now
                          ← SMC restarts
```

7.10 Verification Checks

☑ Verify that the application starts up (details will vary, depending on the configuration):

```
=========================
Starting SMC applications
=========================

no crontab for smc
Starting omniNames
Starting EventManager
```

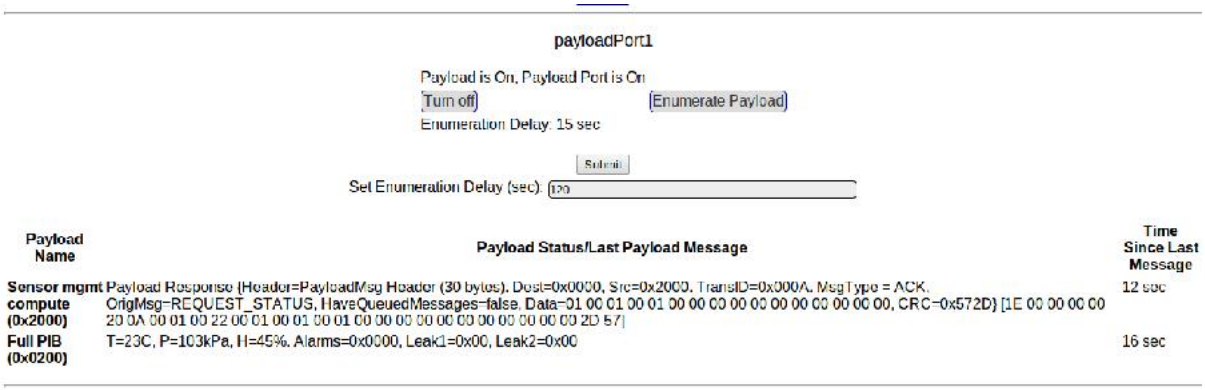
```
Starting PayloadManager
Starting PayloadInterface
Starting GPSListener
Starting PPPHost
```

☑ (SV2) Verify that the SMC enumeration is displayed in the XBee console window along with the PIB enumeration (details of the versions will vary, depending on the configuration); note that there is not always a PIB present for SV3 payloads using a shim:

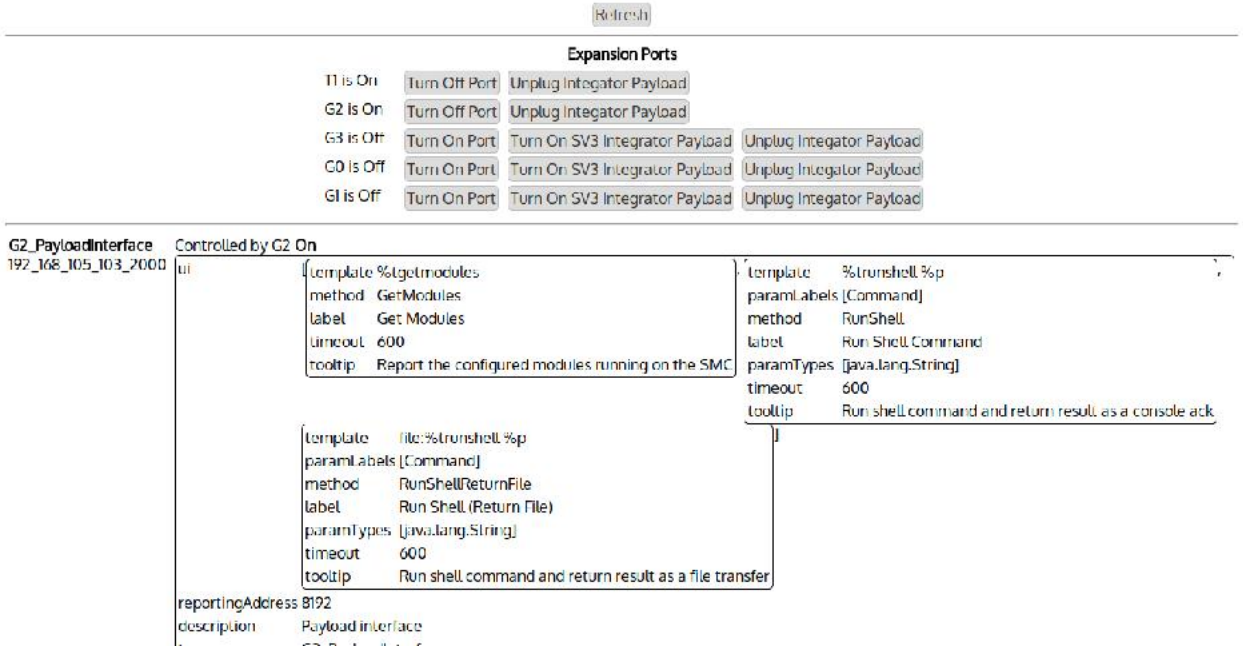
```
Description:  Base PIB@57600N82
Address:  0200  Major:  1  Minor:  0  Build:  5182
Payload 2 Port

Description:  Sensor mgmt compute
Address:  2000  Major:  1  Minor:  0  Build:  10
Payload 2 Port
```

☑ (SV3, Sensor Port) Pull down the Operate menu and select SV2 Payload Ports; verify that the SMC enumeration is displayed



☑ (SV3, Expansion Port[5]) Pull down the Operate menu and select SV3 Payloads; verify that the SMC payloads (each process) are shown



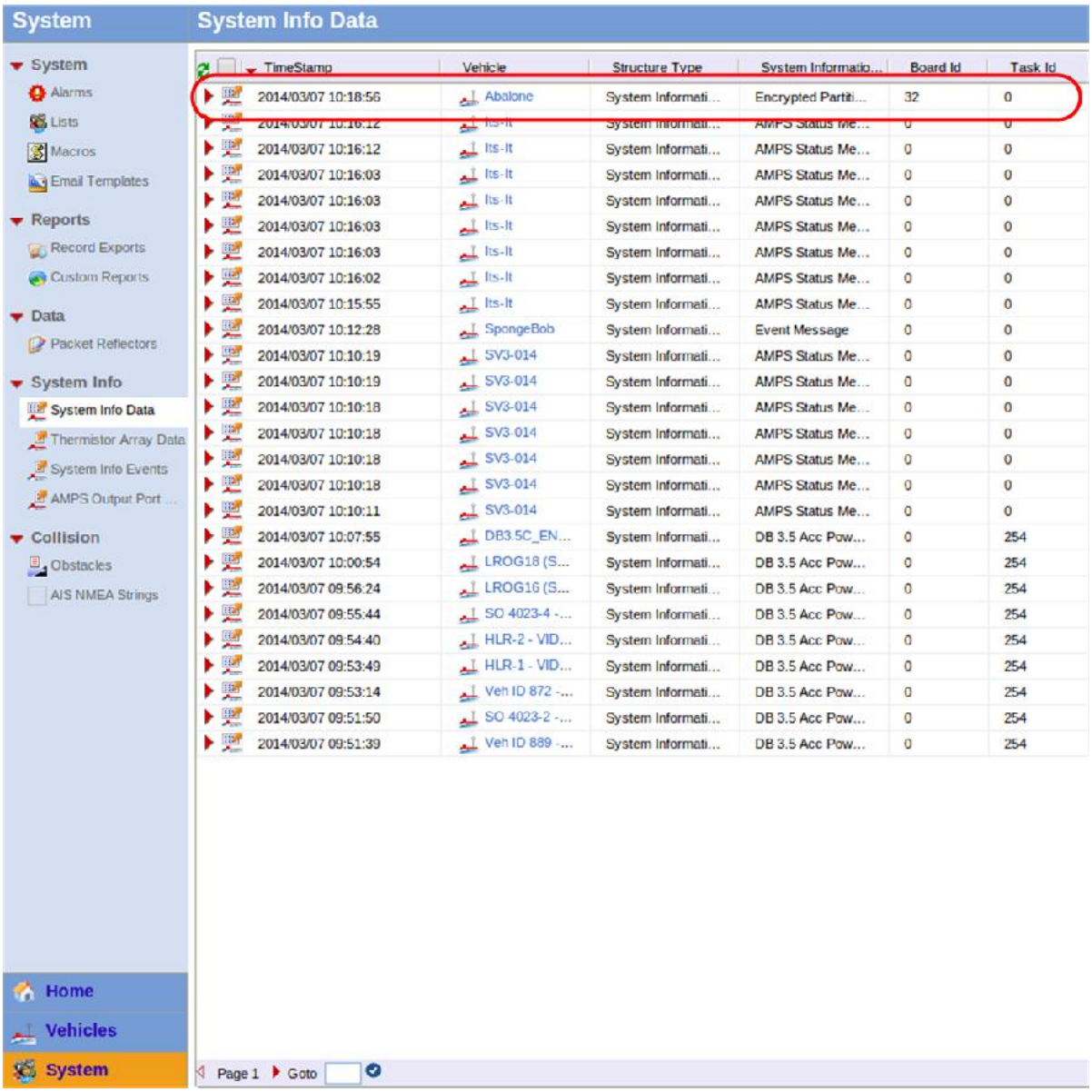
☑ Log in as 'smc' and issue the 'date' command; verify that the date and time are correct (UTC):

```
smc@omap35x_torpedo:~$ date
Wed Sep 14 21:59:03 UTC 2011
smc@omap35x_torpedo:~$
```

If the date and time are incorrect, either the GPSListener program is not running or GPS NMEA strings are not reaching the SMC, which may indicate a wiring problem or a component failure.

[5] Complete section 9 configuration for SMC software running on an expansion port

☑ Verify that the SMC reports its encrypted partition status (this happens on each enumeration request.) Verify the board ID for the SMC is correct.



☑ Turn off power to the payload: verify that the SMC console shows that the SMC is shutting down and displays ‘System halted’

8 RUDICS CONFIGURATION

8.1 Ensure that the SMC software is not running

```
smc@dm3730_zoom_torpedo:~$ sudo killsmc
```

8.2 Configure the RUDICS modem

This section is only required once for each modem. If the modem has already been used for RUDICS, you can continue with the next section.

8.2.1 Power on the modem.

```
smc@omap35x_torpedo:~$ sudo SetPowerSwitch 1 1
SetPowerSwitch: 0x11
```

8.2.2 With the modem connected to an available serial port, establish a terminal session to the modem using HyperTerminal or putty (Windows) or GkTerm, minicom or screen (Linux) The default configuration should be able to operate at 19,200 baud, 8 data bits, 1 stop bit and no parity.

Screen[6] example: `screen /dev/ttyLX0 19200`

8.2.3 Reset the modem to factory default configuration by typing `AT&F0` (enter) and verify that the modem answers with `OK` or `0`

8.2.4 Set the baud rate to a fixed 19,200 baud by typing `AT+IPR=6,0` (enter) and verify that the modem answers with `OK` or `0`

8.2.5 Set 'verbose' mode by typing `ATV1` (enter) and verify that the modem answers with `OK`

8.2.6 Set echo off by typing `ATE0` (enter) and verify that the modem answers with `OK`

8.2.7 Save the configuration first typing `AT&W0` (enter) and then `AT&W1` (enter), verifying that the modem answer with `OK` after each command.

8.2.8 Cycle power to the modem and then type `AT+IPR?` (enter), verifying that it is still configured as set above (6,0)

8.2.9 Read the IMEI number from the modem by typing `AT+CGSN` (enter); if desired, record the resulting number for reference and compare with billing or provisioning records.

8.2.10 Read the ICC ID (Integrated Circuit Card Identification) or SIM card number by typing `AT+CICCID` (enter); the response should be a 19 or 20 digit number. Various errors may be returned if the SIM card is not properly installed: a SIM card is required for RUDICS. If desired, record the SIM card number for reference and compare with billing or provisioning records.

8.3 Configure the RUDICS call parameters

The **ConfigureRUDICSCall** script can be invoked in a few different ways:

```
(1)   ConfigureRUDICSCall key-name
(2)   ConfigureRUDICSCall key-name login-name
(3)   ConfigureRUDICSCall key-name login-name directory-name
(4)   ConfigureRUDICSCall key-name login-name directory-name phone-number
```

[6] You can exit the SMC's **screen** program with ctrl-A ctrl-\ However, if you're working within a **screen** interface from Ubuntu, the sequence is ctrl-A A ctrl-\

The *key-name* is the name of the encryption key to be generated. Two files are generated: *key-name* and *key-name*.pub. The .pub file must be installed on the server so that ssh and scp invocations can log in without a password.

The *login-name* is the user name and the server name; for example, "PSN98765@myserver.com"

The *directory-name* is the directory that the **runscp** script goes to after logging in to get the **runme** file.

The *phone-number* is the RUDICS phone number to call; this number defaults to the number for LRI's Iridium provider (**88160000617**) If the Customer is using a different provider, the correct number should be provided.

Examples:

- `ConfigureRUDICSCall PSN98765`

  Call into **ggsmac** server using PSN98765 as the key with the login, PSN98765@ggsmac, and copy the "runme" file from the "." directory; uses the default phone number.

```
smc@dm3730_zoom_torpedo:~$ ConfigureRUDICSCall PSN98765
Key name:          PSN98765
Phone number:      88160000617
Server login:      PSN98765@ggsmac
Server directory: .

Generating key with no pass phrase

Copy the new PSN98765.pub file to the server
```

- `ConfigureRUDICSCall PSN98765 vehicle@smactest`

  Call into **smactest** server using PSN98765 as the key with the login, vehicle@smactest, and copy the "runme" file from the "PSN98765" directory; uses the default phone number.

```
smc@dm3730_zoom_torpedo:~$ ConfigureRUDICSCall PSN98765 vehicle@smactest
Key name:          PSN98765
Phone number:      88160000617
Server login:      vehicle@smactest
Server directory: PSN98765

Generating key with no pass phrase

Copy the new PSN98765.pub file to the server
```

- `ConfigureRUDICSCall PSN98765 "" "" 88169999999`

  Call into **ggsmac** server using PSN98765 as the key with the login, PSN98765@ggsmac, and copy the "runme" file from the "." directory; uses a custom phone number, `88169999999`.

```
smc@dm3730_zoom_torpedo:~$ ConfigureRUDICSCall PSN98765 "" "" 88169999999
Key name:          PSN98765
Phone number:      88169999999
Server login:      PSN98765@ggsmac
Server directory: .

PPPHost process is currently disabled; do you want to enable it? n
Generating key with no pass phrase

Copy the new PSN98765.pub file to the server
```

- `ConfigureRUDICSCall PSN98765 vehicle@smactest "" 88169999999`

  Call into **smactest** server using PSN98765 as the key with the login, vehicle@smactest, and copy the "runme" file from the "PSN98765" directory; uses a custom phone number, `88169999999`

```
smc@dm3730_zoom_torpedo:~$ ConfigureRUDICSCall PSN98765 vehicle@smactest "" 88169999999
Key name:          PSN98765
Phone number:      88169999999
Server login:      vehicle@smactest
```

```
Server directory: PSN98765

PPPHost process is currently disabled; do you want to enable it? n
Generating key with no pass phrase

Copy the new PSN98765.pub file to the server
```

Note that **ConfigureRUDICSCall** will prompt the user for action if the PPPHost process is not enabled in the configuration or if it is about to overwrite a previously-generated key; for example:

```
smc@dm3730_zoom_torpedo:~$ ConfigureRUDICSCall PSN98765
Key name:         PSN98765
Phone number:     88160000617
Server login:     PSN98765@ggsmac
Server directory: .

PPPHost process is currently disabled; do you want to enable it? y
One or more of the key files (PSN98765.pub or PSN98765) already exist; are you sure you want to
overwrite them? y
Generating key with no pass phrase
PSN98765 already exists.
Overwrite (y/n)?

Copy the new PSN98765.pub file to the server
```

ConfigureRUDICSCall updates the *chat-iridium* script and also writes a bash-compatible source file (.rudics) in the PPPHost configuration directory. Scripts like "runscp" or server-side scripts can include this file (`source .rudics`) and make use of the variables. Here's an example file:

```
KEYNAME="joe"
PHONENUM="88160000999"
SERVERLOGIN="joe@joesserver"
SERVERDIR="joesdirectory"
```

8.4 Copy the generated key file to the server

The public key file that was generated in the previous step (for example, PSN98765.pub) must be retrieved from the SMC and stored on the target server. Note that the **ConfigureRUDICSCall** script places the new key in the /home/smc/roots/200_PPPHost directory.

There are several ways to get the file from the SMC, but one way is to transfer it using Z-Modem. Many terminal programs include Z-Modem transfer and automatically handle receiving a file when a transfer is initiated. The following is an example using the minicom terminal program (from Ubuntu):

```
smc@dm3730_zoom_torpedo:~/roots/200_PPPHost$ lsz mikessmc.pub
**B00
+----------[zmodem download - Press CTRL-C to quit]-----------+
|                                                             |
|Receiving: mikessmc.pub.0                                    |
|Bytes received:     405/    405   BPS:9190                   |
|                                                             |
|Transfer complete                                            |
|                                                             |
| READY: press any key to continue...                         |
+-------------------------------------------------------------+
```

8.5 Verify access to the server and update the known hosts file

The first time the SMC calls the server, it must store the server's host key in the known hosts file (~/.ssh/known_hosts) This operation can be combined with a verification step by using the **VerifyRUDICSCall** script:

```
smc@dm3730 zoom torpedo:~/roots/200 PPPHost$ VerifyRUDICSCall
```

```
Key name:         PSN98765
Server login:     PSN98765@ggsmac
Server directory: .

Removing existing ControlMaster, if any. Control socket
connect(/home/smc/.ssh/controlmasters/mikessmc@216.93.163.108:22): Connection refused

2000/01/01 00:01:16.088511 dm3730_zoom_torpedo PPPHost[609] SCPExecutor initializing
2000/01/01 00:01:16.117014 dm3730_zoom_torpedo PPPHost[609] Running the call-in scenario once
2000/01/01 00:01:16.120615 dm3730_zoom_torpedo PPPHost[609] SCPExecutor background thread starting
2000/01/01 00:01:16.125833 dm3730_zoom_torpedo PPPHost[609] SCPExecutor delaying 2 seconds for startup
settling
2000/01/01 00:01:16.138101 dm3730_zoom_torpedo PPPHost[609] SCPExecutor delaying 1.98 seconds for startup
settling
2000/01/01 00:01:18.126189 dm3730_zoom_torpedo PPPHost[609] SCPExecutor starting to connect
2000/01/01 00:01:18.137633 dm3730_zoom_torpedo PPPHost[609] PPPHost new connection status is DISCONNECTED
was DISCONNECTED
2000/01/01 00:01:18.149840 dm3730_zoom_torpedo PPPHost[609] PPPHost new connection status is
INITIALIZING MODEM was DISCONNECTED
SetPowerSwitch: 0x11
2000/01/01 00:01:21.807993 dm3730_zoom_torpedo PPPHost[609] PPPHost to send command 'ATV1' expecting 'OK'
if successful or 'ERROR' for errors
2000/01/01 00:01:21.811015 dm3730 zoom torpedo PPPHost[609] PPPHost sending 'ATV1\r' to modem
2000/01/01 00:01:21.822703 dm3730_zoom_torpedo PPPHost[609] PPPHost expecting a single line within 5
seconds
…
2000/01/01 00:01:38.586500 dm3730_zoom_torpedo PPPHost[609] Executing protocol daemon verb './runppp'
2000/01/01 00:01:38.600660 dm3730_zoom_torpedo PPPHost[609] AsynchronousProcessExecutor background thread
started
2000/01/01 00:01:39.136149 dm3730_zoom_torpedo PPPHost[609] Daemon> abort on (BUSY)
2000/01/01 00:01:39.140147 dm3730 zoom torpedo PPPHost[609] Daemon> abort on (NO CARRIER)
2000/01/01 00:01:39.140787 dm3730_zoom_torpedo PPPHost[609] Daemon> abort on (ERROR)
2000/01/01 00:01:39.143503 dm3730_zoom_torpedo PPPHost[609] Daemon> abort on (NO DIALTONE)
…
2000/01/01 00:01:39.995306 dm3730 zoom torpedo PPPHost[609] Daemon> send (ATDT0088160000617^M)
2000/01/01 00:01:40.184483 dm3730_zoom_torpedo PPPHost[609] Daemon> expect (CONNECT)
2000/01/01 00:01:40.189061 dm3730 zoom torpedo PPPHost[609] Daemon> ^M
2000/01/01 00:01:51.661076 dm3730_zoom_torpedo PPPHost[609] Daemon> ^M
2000/01/01 00:01:51.668919 dm3730_zoom_torpedo PPPHost[609] Daemon> CONNECT
2000/01/01 00:01:51.673375 dm3730_zoom_torpedo PPPHost[609] Daemon>  -- got it
2000/01/01 00:01:51.676274 dm3730_zoom_torpedo PPPHost[609] Daemon>
2000/01/01 00:01:51.679021 dm3730 zoom torpedo PPPHost[609] Daemon> send (\d)
2000/01/01 00:01:52.687438 dm3730_zoom_torpedo PPPHost[609] Daemon> Script /usr/sbin/chat -s -v -t 240 -f
chat-iridium finished (pid 629), status = 0x0
2000/01/01 00:01:52.689147 dm3730_zoom_torpedo PPPHost[609] Daemon> Serial connection established.
2000/01/01 00:01:52.696441 dm3730 zoom torpedo PPPHost[609] Daemon> using channel 1
2000/01/01 00:01:52.751799 dm3730_zoom_torpedo PPPHost[609] Daemon> Using interface ppp0
2000/01/01 00:01:52.766082 dm3730 zoom torpedo PPPHost[609] Daemon> Connect: ppp0 <--> /dev/ttyLX0
2000/01/01 00:01:52.768737 dm3730_zoom_torpedo PPPHost[609] PPPHost new connection status is CONNECTING
was DIALING
2000/01/01 00:01:53.776452 dm3730_zoom_torpedo PPPHost[609] Daemon> Warning - secret file /etc/ppp/pap-
secrets has world and/or group access
2000/01/01 00:01:53.788781 dm3730_zoom_torpedo PPPHost[609] Daemon> sent [LCP ConfReq id=0x1 <asyncmap
0x0> <magic 0x87d1f4f7> <pcomp> <accomp>]
2000/01/01 00:01:55.000292 dm3730_zoom_torpedo PPPHost[609] Daemon> rcvd [LCP ConfReq id=0x41 <asyncmap
0xa0000> <auth chap MD5> <magic 0x7a8fe513> <pcomp> <accomp> <mrru 1524> <endpoint
[local:4d.4d.4c.50.5f.73.74.61.63.6b]>]
…
2000/01/01 00:02:04.224761 dm3730_zoom_torpedo PPPHost[609] Daemon> local  IP address 192.168.20.150
2000/01/01 00:02:04.229797 dm3730 zoom torpedo PPPHost[609] Daemon> remote IP address 192.168.20.254
2000/01/01 00:02:04.234069 dm3730_zoom_torpedo PPPHost[609] Waiting for 1 second after PPP connected
2000/01/01 00:02:04.240356 dm3730 zoom torpedo PPPHost[609] Daemon> primary   DNS address 199.2.252.10
2000/01/01 00:02:04.244933 dm3730_zoom_torpedo PPPHost[609] Daemon> secondary DNS address 204.97.212.10
2000/01/01 00:02:04.267333 dm3730_zoom_torpedo PPPHost[609] Daemon> Script /etc/ppp/ip-up started (pid
630)
2000/01/01 00:02:04.472776 dm3730_zoom_torpedo PPPHost[609] Daemon> Script /etc/ppp/ip-up finished (pid
630), status = 0x0
2000/01/01 00:02:05.242212 dm3730_zoom_torpedo PPPHost[609] PPPHost new connection status is CONNECTED was
CONNECTING
```

```
2000/01/01 00:02:05.245325 dm3730_zoom_torpedo PPPHost[609] Saving modem serial number '300025010413330'
to IMEI
2000/01/01 00:02:05.254327 dm3730_zoom_torpedo PPPHost[609] Saving modem SIM card number
'8988169414001281532' to SIMCARD
2000/01/01 00:02:05.261072 dm3730_zoom_torpedo PPPHost[609] SCPExecutor running SCP verb 'ssh -o
StrictHostKeyChecking=no -i PSN98765 PSN98765@ggsmac "echo \"Reply from server\"" ; sleep 2'
2000/01/01 00:02:05.265466 dm3730_zoom_torpedo PPPHost[609] AsynchronousProcessExecutor background thread
started
2000/01/01 00:02:26.597629 dm3730_zoom_torpedo PPPHost[609] Received SCP_OUTPUT 'Warning: Permanently
added '216.93.163.108' (RSA) to the list of known hosts.'
2000/01/01 00:02:46.746448 dm3730_zoom_torpedo PPPHost[609] Received SCP_OUTPUT 'Reply from server'
2000/01/01 00:02:49.719455 dm3730 zoom torpedo PPPHost[609] AsynchronousProcessExecutor waitpid(634):
exited with status 0
2000/01/01 00:02:49.722018 dm3730_zoom_torpedo PPPHost[609] SCP_EXITED exited with status 0
2000/01/01 00:02:49.723758 dm3730_zoom_torpedo PPPHost[609] SCP command succeeded
…
2000/01/01 00:03:01.783295 dm3730_zoom_torpedo PPPHost[609] PPPHost new connection status is DISCONNECTED
was DISCONNECTING
2000/01/01 00:03:01.786682 dm3730 zoom torpedo PPPHost[609] PPPHost new connection status is DISCONNECTED
was DISCONNECTED (not firing event)
SetPowerSwitch: 0x00
2000/01/01 00:03:02.400326 dm3730_zoom_torpedo PPPHost[609] SCPExecutor starting to shut down
2000/01/01 00:03:02.401425 dm3730 zoom torpedo PPPHost[609] Executing next call interval verb 'if [ -f
callinTime ] ; then cat callinTime ; fi'
2000/01/01 00:03:02.451351 dm3730 zoom torpedo PPPHost[609] Next call interval verb returned blank
2000/01/01 00:03:02.452389 dm3730_zoom_torpedo PPPHost[609] Next call interval is 3600 seconds
2000/01/01 00:03:02.453274 dm3730_zoom_torpedo PPPHost[609] SCPExecutor delaying 3600 seconds for call-in
interval
2000/01/01 00:03:02.457150 dm3730 zoom torpedo PPPHost[609] SCPExecutor thread received shutdown request
and will now exit (SCPExecutor detected object shutdown while delaying for call-in interval)
2000/01/01 00:03:02.457913 dm3730 zoom torpedo PPPHost[609] SCPExecutor thread exiting
2000/01/01 00:03:02.459957 dm3730_zoom_torpedo PPPHost[609]
2000/01/01 00:03:02.460690 dm3730_zoom_torpedo PPPHost[609]
2000/01/01 00:03:02.461392 dm3730_zoom_torpedo PPPHost[609] *** SUCCEEDED
```

The final line should indicate that the operation succeeded. The listing above also shows that the key from the server was saved.

8.6 Test the call-in scenario manually (optional)

You can manually test the call-in scenario when the SMC software is not running by issuing “PPPHost once”:

```
smc@dm3730_zoom_torpedo:~/roots/200_PPPHost$ PPPHost once
2000/01/01 00:03:11.131390 dm3730_zoom_torpedo PPPHost[668] SCPExecutor initializing
2000/01/01 00:03:11.141186 dm3730_zoom_torpedo PPPHost[668] Running the call-in scenario once
2000/01/01 00:03:11.144085 dm3730 zoom torpedo PPPHost[668] SCPExecutor background thread starting
2000/01/01 00:03:11.149029 dm3730_zoom_torpedo PPPHost[668] SCPExecutor delaying 1.99001 seconds for
startup settling
2000/01/01 00:03:13.146394 dm3730_zoom_torpedo PPPHost[668] SCPExecutor starting to connect
2000/01/01 00:03:13.158631 dm3730 zoom torpedo PPPHost[668] PPPHost new connection status is DISCONNECTED
was DISCONNECTED
2000/01/01 00:03:13.161897 dm3730 zoom torpedo PPPHost[668] PPPHost new connection status is
INITIALIZING_MODEM was DISCONNECTED
SetPowerSwitch: 0x11
2000/01/01 00:03:16.753583 dm3730_zoom_torpedo PPPHost[668] PPPHost to send command 'ATV1' expecting 'OK'
if successful or 'ERROR' for errors
2000/01/01 00:03:16.756818 dm3730_zoom_torpedo PPPHost[668] PPPHost sending 'ATV1\r' to modem
2000/01/01 00:03:16.773389 dm3730 zoom torpedo PPPHost[668] PPPHost expecting a single line within 5
seconds
2000/01/01 00:03:16.869244 dm3730_zoom_torpedo PPPHost[668] PPPHost received 'OK' from modem
…
2000/01/01 00:03:55.456106 dm3730_zoom_torpedo PPPHost[668] Daemon> local  IP address 192.168.11.73
2000/01/01 00:03:55.461294 dm3730_zoom_torpedo PPPHost[668] Daemon> remote IP address 192.168.11.254
2000/01/01 00:03:55.464743 dm3730_zoom_torpedo PPPHost[668] Waiting for 1 second after PPP connected
2000/01/01 00:03:55.469656 dm3730 zoom torpedo PPPHost[668] Daemon> primary   DNS address 12.127.17.72
2000/01/01 00:03:55.479513 dm3730_zoom_torpedo PPPHost[668] Daemon> secondary DNS address 204.97.212.10
2000/01/01 00:03:55.498495 dm3730_zoom_torpedo PPPHost[668] Daemon> Script /etc/ppp/ip-up started (pid
689)
```

```
2000/01/01 00:03:55.698934 dm3730_zoom_torpedo PPPHost[668] Daemon> Script /etc/ppp/ip-up finished (pid
689), status = 0x0
2000/01/01 00:03:56.462418 dm3730_zoom_torpedo PPPHost[668] PPPHost new connection status is CONNECTED was
CONNECTING
2000/01/01 00:03:56.465531 dm3730_zoom_torpedo PPPHost[668] Saving modem serial number '300025010413330'
to IMEI
2000/01/01 00:03:56.471482 dm3730_zoom_torpedo PPPHost[668] Saving modem SIM card number
'89881694140012815 32' to SIMCARD
2000/01/01 00:03:56.475907 dm3730_zoom_torpedo PPPHost[668] SCPExecutor running SCP verb './runscp'
2000/01/01 00:03:56.479966 dm3730_zoom_torpedo PPPHost[668] AsynchronousProcessExecutor background thread
started
2000/01/01 00:03:56.681991 dm3730 zoom torpedo PPPHost[668] Received SCP OUTPUT 'Re-creating workspace
area'
2000/01/01 00:03:56.781081 dm3730 zoom torpedo PPPHost[668] Received SCP OUTPUT 'Executing SCP'
2000/01/01 00:03:56.871504 dm3730_zoom_torpedo PPPHost[668] Received SCP_OUTPUT 'Removing existing
ControlMaster, if any. Stop listening request sent.'
2000/01/01 00:04:41.167016 dm3730_zoom_torpedo PPPHost[668] AsynchronousProcessExecutor waitpid(693):
exited with status 0
2000/01/01 00:04:41.170403 dm3730_zoom_torpedo PPPHost[668] SCP_EXITED exited with status 0
2000/01/01 00:04:41.173486 dm3730_zoom_torpedo PPPHost[668] SCP command succeeded
2000/01/01 00:04:41.175805 dm3730_zoom_torpedo PPPHost[668] AsynchronousProcessExecutor background thread
exiting
2000/01/01 00:04:41.177331 dm3730 zoom torpedo PPPHost[668] AsynchronousProcessExecutor exiting
2000/01/01 00:04:41.187279 dm3730_zoom_torpedo PPPHost[668] SCPExecutor running user command 'cd workspace
&& ./runme'
2000/01/01 00:04:41.190941 dm3730_zoom_torpedo PPPHost[668] AsynchronousProcessExecutor background thread
started
2000/01/01 00:04:47.657674 dm3730_zoom_torpedo PPPHost[668] AsynchronousProcessExecutor waitpid(703):
exited with status 0
2000/01/01 00:04:47.659993 dm3730_zoom_torpedo PPPHost[668] USER_PROGRAM_EXITED exited with status 0
2000/01/01 00:04:47.661549 dm3730_zoom_torpedo PPPHost[668] run command succeeded
2000/01/01 00:04:47.663502 dm3730_zoom_torpedo PPPHost[668] AsynchronousProcessExecutor background thread
exiting
2000/01/01 00:04:47.664632 dm3730_zoom_torpedo PPPHost[668] AsynchronousProcessExecutor exiting
2000/01/01 00:04:47.667927 dm3730 zoom torpedo PPPHost[668] SCPExecutor starting to disconnect
2000/01/01 00:04:47.671742 dm3730_zoom_torpedo PPPHost[668] PPPHost new connection status is DISCONNECTING
was CONNECTED
2000/01/01 00:04:48.024798 dm3730_zoom_torpedo PPPHost[668] Daemon> Terminating on signal 15
2000/01/01 00:04:48.025775 dm3730_zoom_torpedo PPPHost[668] Daemon> Connect time 0.9 minutes.
2000/01/01 00:04:48.026416 dm3730_zoom_torpedo PPPHost[668] Daemon> Sent 6265 bytes, received 5665 bytes.
2000/01/01 00:04:48.041552 dm3730_zoom_torpedo PPPHost[668] Daemon> Script /etc/ppp/ip-down started (pid
721)
2000/01/01 00:04:48.043261 dm3730_zoom_torpedo PPPHost[668] Daemon> sent [LCP TermReq id=0x3 "User
request"]
2000/01/01 00:04:48.047442 dm3730_zoom_torpedo PPPHost[668] Daemon> Terminating on signal 15
2000/01/01 00:04:48.129595 dm3730 zoom torpedo PPPHost[668] Daemon> Script /etc/ppp/ip-down finished (pid
721), status = 0x0
2000/01/01 00:04:49.035749 dm3730 zoom torpedo PPPHost[668] Daemon> rcvd [LCP TermAck id=0x3]
2000/01/01 00:04:49.037213 dm3730_zoom_torpedo PPPHost[668] Daemon> Connection terminated.
2000/01/01 00:04:49.097394 dm3730_zoom_torpedo PPPHost[668] AsynchronousProcessExecutor waitpid(685):
terminated with signal 15
2000/01/01 00:04:49.099286 dm3730_zoom_torpedo PPPHost[668] Process terminated with signal 15
2000/01/01 00:04:49.102795 dm3730_zoom_torpedo PPPHost[668] AsynchronousProcessExecutor background thread
exiting
2000/01/01 00:04:49.103680 dm3730_zoom_torpedo PPPHost[668] AsynchronousProcessExecutor exiting
SetPowerSwitch: 0x00
2000/01/01 00:04:59.693438 dm3730_zoom_torpedo PPPHost[668] PPPHost new connection status is DISCONNECTED
was DISCONNECTING
2000/01/01 00:04:59.697252 dm3730_zoom_torpedo PPPHost[668] PPPHost new connection status is DISCONNECTED
was DISCONNECTED (not firing event)
SetPowerSwitch: 0x00
2000/01/01 00:05:00.314376 dm3730 zoom torpedo PPPHost[668] SCPExecutor starting to shut down
2000/01/01 00:05:00.315413 dm3730_zoom_torpedo PPPHost[668] Executing next call interval verb 'if [ -f
callinTime ] ; then cat callinTime ; fi'
2000/01/01 00:05:00.365065 dm3730_zoom_torpedo PPPHost[668] Next call interval verb returned blank
2000/01/01 00:05:00.365828 dm3730_zoom_torpedo PPPHost[668] Next call interval is 3600 seconds
2000/01/01 00:05:00.367018 dm3730 zoom torpedo PPPHost[668] SCPExecutor delaying 3600 seconds for call-in
interval
```

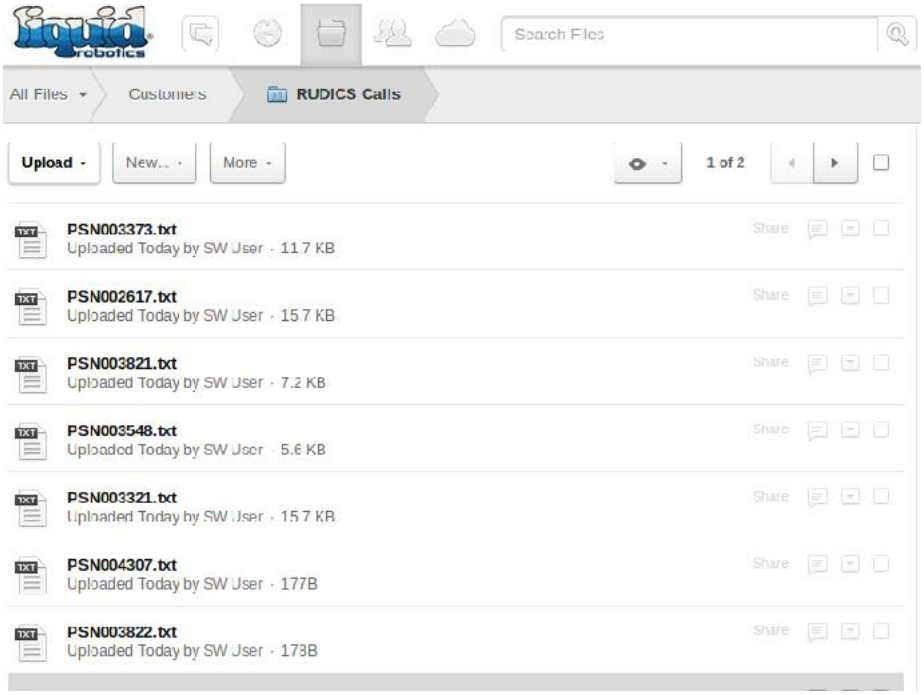
```
2000/01/01 00:05:00.370741 dm3730_zoom_torpedo PPPHost[668] SCPExecutor thread received shutdown request
and will now exit (SCPExecutor detected object shutdown while delaying for call-in interval)
2000/01/01 00:05:00.371474 dm3730_zoom_torpedo PPPHost[668] SCPExecutor thread exiting
2000/01/01 00:05:00.373305 dm3730_zoom_torpedo PPPHost[668]
2000/01/01 00:05:00.374220 dm3730_zoom_torpedo PPPHost[668]
2000/01/01 00:05:00.374953 dm3730_zoom_torpedo PPPHost[668] *** SUCCEEDED
```

The final line should indicate that the operation succeeded. You can see that the SCP command and the user command each ran and succeeded.

8.7 Complete application installation and verify that PPPHost calls in and executes the expected behavior on the server.

The typical installation on ggsmac sends advisory information to be stored in the WGMS command log whenever a RUDICS call is received:

The typical installation on SMACTest updates a file (responses.txt) for each vehicle, and the last 100 lines of each of those is stored in a file named for the key file under "/Customers/RUDICS Calls" on LRI's box.com account:



The last few lines of the file show recent logins and verify some information about the machine state; the fact that the SMC is calling into the server can indicate correct configuration:

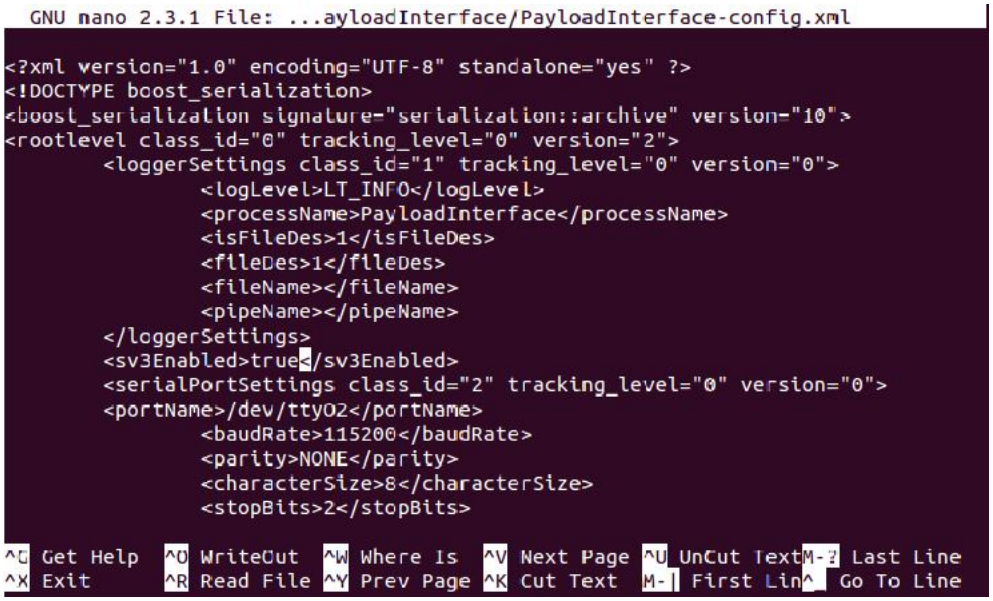
```
Local time Wed Mar  5 06:05:03 PST 2014 : v-time=Wed Mar  5 14:04:30 UTC 2014 IMEI=300025010726580
SIM=8988169224001094995 UpTime=482555.01 Used=35% / 6% /mnt/XDATA  GetResults4
Local time Wed Mar  5 18:07:17 PST 2014 : v-time=Thu Mar  6 02:06:43 UTC 2014 IMEI=300025010726580
SIM=8988169224001094995 UpTime=522583.28 Used=35% / 6% /mnt/XDATA  GetResults4
```

```
Local time Thu Mar  6 06:09:28 PST 2014 : v-time=Thu Mar  6 14:08:52 UTC 2014 IMEI=300025010726580
SIM=8988169224001094995 UpTime=562519.67 Used=35% / 6% /mnt/XDATA  GetResults4
Local time Thu Mar  6 18:11:47 PST 2014 : v-time=Fri Mar  7 02:11:12 UTC 2014 IMEI=300025010726580
SIM=8988169224001094995 UpTime=602412.11 Used=35% / 6% /mnt/XDATA  GetResults4
```

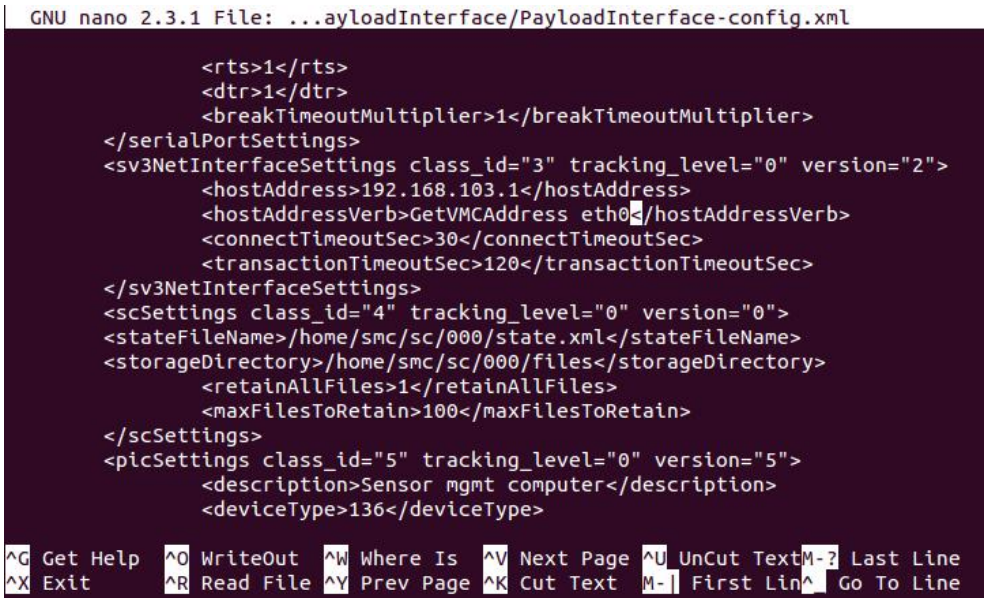
9 SV3 EXPANSION PORT CONFIGURATION

9.1 Reconfigure PayloadInterface for Expansion Port protocol

Using **nano** or **vi**, edit /home/smc/roots/100_PayloadInterface/PayloadInterface-config.xml and change *sv3Enabled* to true.



The default algorithm for determining the VMC's address is to take the address on eth0 and change the last octet to 1. For example, if the SMC's assigned address is 192.168.105.100, the VMC's address would be 192.168.105.1. The script "GetVMCAddress" performs this function (in the *hostAddressVerb*) If for some reason this algorithm doesn't work, clear out *hostAddressVerb* and enter the correct address for the VMC in *hostAddress*.



9.2 Reconfigure the Network to Start Automatically and Set Static IP Address

If the SMC is connected via an expansion port, the network should be configured to start up automatically. Execute the following to enable the network at startup:

```
$ sudo EnableAutoEthernet
Auto ethernet enabled
```

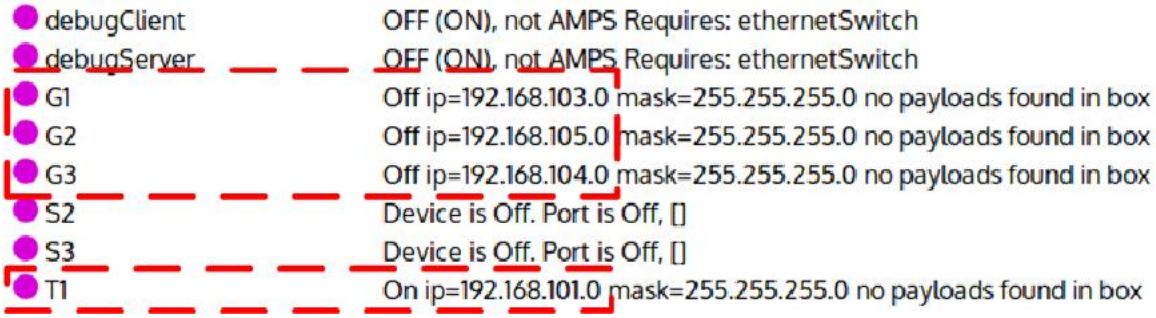
To disable the network at startup (which it is by default after installation), execute the following:

```
$ sudo DisableAutoEthernet
Auto ethernet disabled
```

By default, DHCP is used to assign Ethernet addresses, but this will not be appropriate if the IP address must be well known. For example, if another computer needs to contact the SMC, addresses must be manually-assigned. By convention, the VMC assigns subnets per expansion port are assigned as follows:

Expansion Port	Subnet
G1	192.168.103.*
G2	192.168.105.*
G3	192.168.104.*
T1 (thrudder)	192.168.101.*

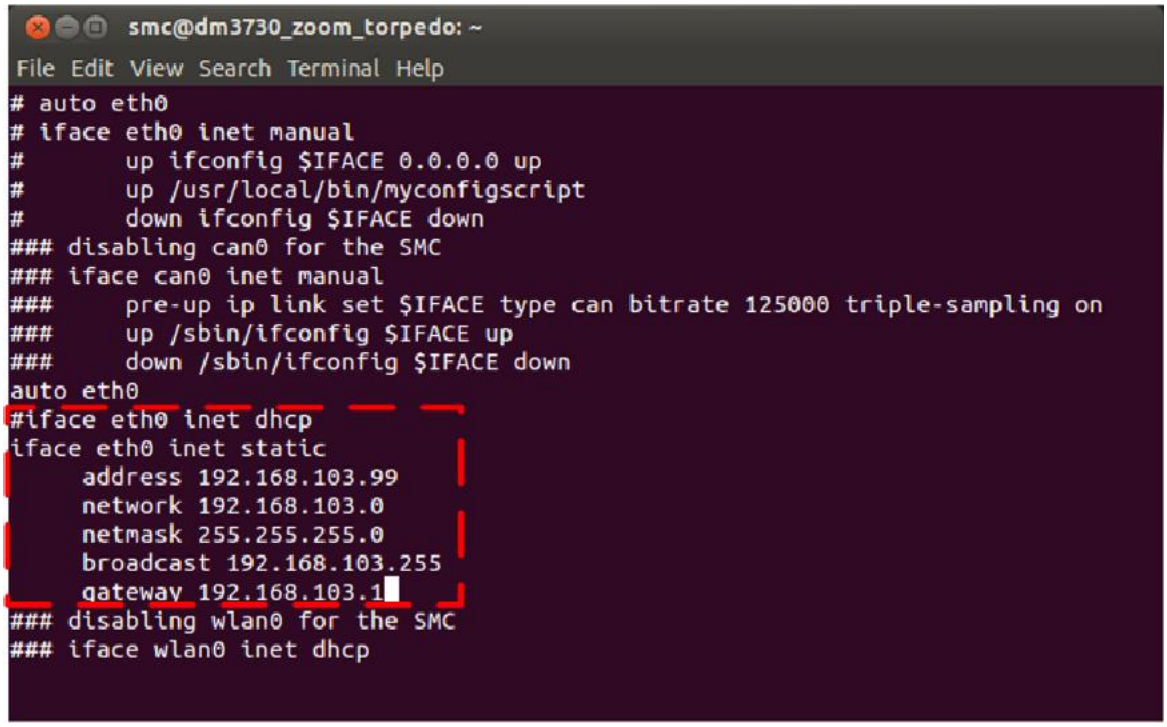
The SV3 web page includes the actual assignments by name; for example:



If required, choose a static IP address according to the port where the SMC is attached and assign the final octet uniquely in the range of 50 to 99; for example for port G1, an address of 192.168.103.99 would be a valid selection. Edit /etc/network/nterfaces as the root user:

```
$ sudo nano /etc/network/interfaces
        -- or --
$ sudo vi /etc/network/interfaces
```

Modify /etc/network/interfaces ("`sudo nano /etc/network/interfaces`") as shown:



- Add a pound sign (#) in front of the DHCP line
- Insert the static definition, substituting the appropriate subnet on the address, network, broadcast and gateway lines.

Save the file. Reboot the SMC (`sudo shutdown -r now`)

☑ After the system reboots, run "ifconfig eth0" and verify that an Ethernet address has been assigned as required.

9.3 Configure Expansion Switch Matrix

The SV3 allows the two auxiliary (aux) lines carried in the expansion port cable to be routed for different functions, depending on the application. The configuration item is currently on the AMPS page:

- **Slot 34:** Expansion Switch Module
  Firmware Version: 0x000035f1, Boot Loader Version: 0x0000381e
  Mfg. S/N=abalone434
  HW ID=0x002c001b3533363305473131
  Reported Arena Part Number = 4572A (matches manifest)
  Module Type = 7
  Found in Manifest by Serial Number.
  Configure Expansion Switches

  - #1: Umbilical Expansion Switch: Not Connected
  - #2: Debug Expansion Switch: Not Connected
  - #3: G1 Expansion Switch: Not Connected
  - #4: G2 Expansion Switch: Not Connected
  - #5: G3 Expansion Switch: Not Connected

Clicking the “Configure Expansion Switches” link brings up this configuration page:

Umbilical Aux Line Settings
- (•) Aux Lines Are Not Used
- ( ) Someone (G1, G2, G3, or Debug) is Connecting to Me
- ( ) Aux Lines Connect To GPS and PPS signals
- ( ) Aux Lines Connect To the Serial Port on the VMC

G1 Aux Line Settings
- (•) Aux Lines Are Not Used
- ( ) Aux Lines Connect To GPS and PPS signals
- ( ) Aux Lines Connect To The Umbilical

G2 Aux Line Settings
- (•) Aux Lines Are Not Used
- ( ) Aux Lines Connect To GPS and PPS signals
- ( ) Aux Lines Connect To The Umbilical

G3 Aux Line Settings
- (•) Aux Lines Are Not Used
- ( ) Aux Lines Connect To GPS and PPS signals
- ( ) Aux Lines Connect To The Umbilical/Towbody

[Configure Expansion Switches]

Configuring the Aux lines to carry GPS and PPS signals allows the GPSListener process to handle NMEA strings from the GPS on its own and set the time with some precision. If the GPS lines are not used or if they are being used for communication to a device attached to the sub, GPS information can be retrieved via the network interface.

☑ If you configure GPS to come in over the expansion port, verify that GPS strings are being received (note that the GPS receiver uses 9600 baud communication on SV3):

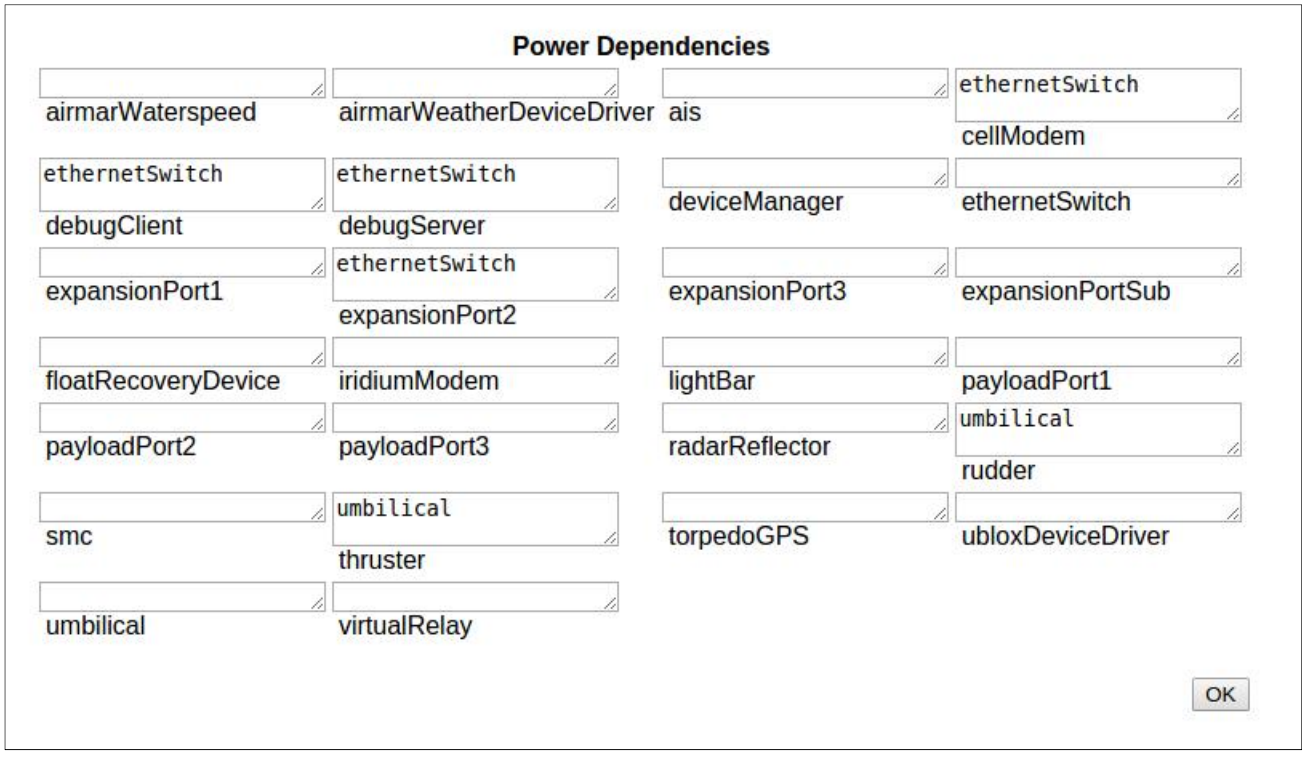
```
smc@dm3730_zoom_torpedo:~$ sudo killsmc
smc@dm3730_zoom_torpedo:~$ stty -F /dev/ttyO1 9600 raw
smc@dm3730_zoom_torpedo:~$ cat /dev/ttyO1
3724.65112,N,12200.26383,W,0.012,,080314,,,D*66
$GPVTG,,T,,M,0.012,N,0.022,K,D*25
$GPGGA,005034.00,3724.65112,N,12200.26383,W,2,12,0.75,10.7,M,-29.9,M,,0000*59
$GPGLL,3724.65112,N,12200.26383,W,005034.00,A,D*72
$GPGST,005034.00,15,,,,0.65,0.47,1.8*58
$GPZDA,005034.00,08,03,2014,00,00*68
$GPRMC,005035.00,A,3724.65111,N,12200.26384,W,0.008,,080314,,,D*68
$GPVTG,,T,,M,0.008,N,0.015,K,D*2A
$GPGGA,005035.00,3724.65111,N,12200.26384,W,2,12,0.75,10.8,M,-29.9,M,,0000*53
$GPGLL,3724.65111,N,12200.26384,W,005035.00,A,D*77
$GPGST,005035.00,15,,,,0.65,0.47,1.8*59
$GPZDA,005035.00,08,03,2014,00,00*69
```

9.4 Ethernet Switch Dependency

Regulus turns on power to modules by direct request or using dependencies. For example, the **cellModem** depends on the **ethernetSwitch** for connectivity to the VMC. When the cellModem is powered up, the ethernetSwitch is also powered up; and when the cellModem is not in use (by user command or because the vehicle is out of range), if nothing else is depending on the ethernetSwitch it is turned off.

Expansion ports hosting payloads that use Ethernet should be configured to depend on the **ethernetSwitch** device so that Ethernet communication is maintained as long as the payload is powered up. Note that battery payloads do not use Ethernet, so it is better to remove the dependency when battery payloads are installed.

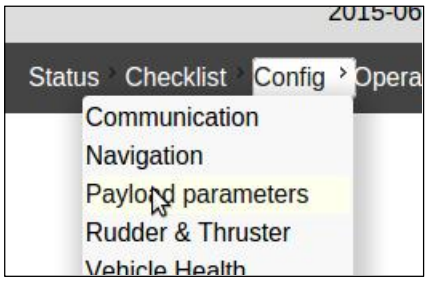
Pull down the **Config** menu and select **Power Dependencies**; then type “ethernetSwitch” (no quotes) in the box above each expansion port that hosts a payload that uses Ethernet and press the OK button. The following configuration would be used for an Ethernet payload on expansion port #2:



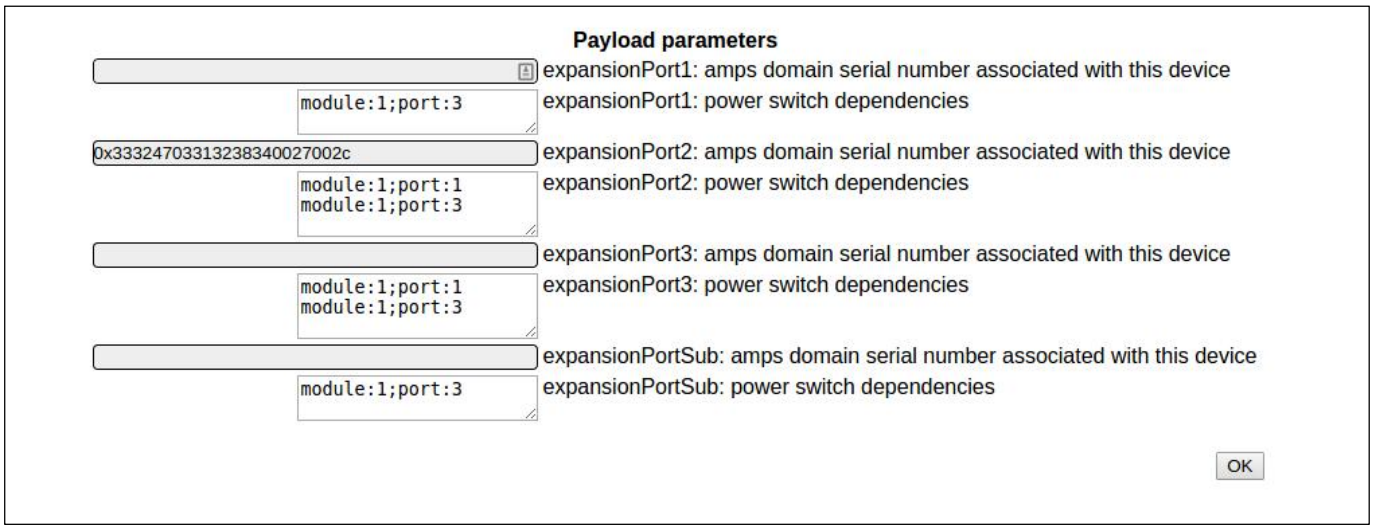
9.5 Configure AMPS Switches Powered on Startup

When Regulus starts up an integrator payload on an expansion port, it can be configured to turn on specific AMPS switches. The SMC is typically powered from a switch on port #3 of module #1, and it's usually sufficient just to turn it on. But if the SMC is connected to the VMC via an Ethernet switch in the payload, that Ethernet switch must be turned on as well. As long as the SMC can communicate with the VMC, it can turn on additional switches.

To configure which AMPS switches are powered on at startup, go to the vehicle web page, pull down the "Config" menu and select "Payload parameters":



The following page is displayed. Enter the module and port number as shown ("module:*mmm*;port:*ppp*") in the edit box adjacent to the expansion port where the payload will be connected. If multiple switches should be affected, enter them on separate lines:



Note that each expansion port is configured to turn on port #3 on module #1 (the SMC or other payload computer) whenever an integrator payload is powered on; but expansion port 2 (G2) will also turn on port #1 on module #1.

10 CONFIGURE SMC BOARD ADDRESS

The SV2 standardized on an addressing scheme for payloads using a 16-bit number or *board address*: the upper 8 bits are the *board ID* and the lower 8 bits are the *task ID*. The payload protocol, which runs on SV2's and over SV3 sensor ports, uses this addressing scheme and relies on each hardware component having a unique board ID; values 0 and 255 (0xFF) are reserved.

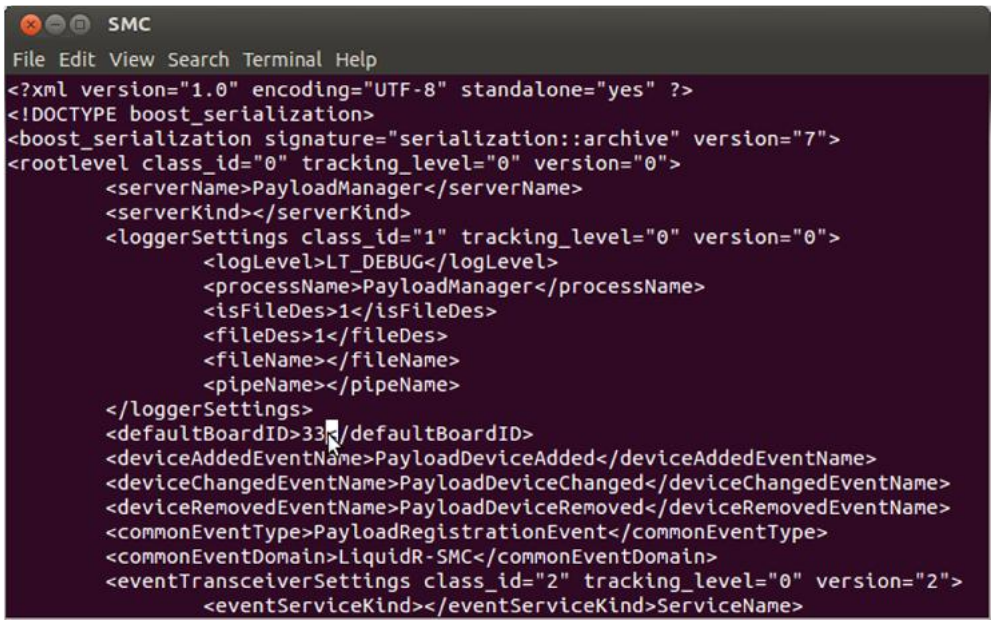
The task ID is meant to uniquely identify components, telemetry sources and command targets on the same board.

Even though payloads using SV3 expansion ports no longer use a protocol that relies on this addressing scheme, the messages sent back to WGMS still use the addresses to identify the components that reported telemetry, so unique board addresses are still required.

Conventions for assigning board ID's are:

Board ID	Base Board Address	Use
0	0	SV2 Float C&C or SV3 CCU
1	256 (0x100)[7]	PIB #1 (aft payload on SV2)
2	512 (0x200)	PIB #2 (forward payload on SV2)
3	768 (0x300)	Towfish PIB
32 (0x20)	8192 (0x2000)	SMC #1 (aft payload on SMC; default board ID)
33 (0x21)	8448 (0x2100)	SMC #2 (forward payload)
48 (0x30)	12288 (0x3000)	Towfish SMC

If the SMC is not going to use board ID 32, use **nano** or **vi** to change the **defaultBoardID** in /home/smc/roots/050_PayloadManager/PayloadManager-config.xml:



[7] Numbers shown with a leading "0x" are in base-16 (hexadecimal) format.

- ☑ The new value becomes effective on the next restart. Verify that the correct board ID comes up during enumeration (see XBee Console on SV2, SV2 Payload page on SV3)

- ☑ When the configuration is complete, verify that each device (PIB, SMC, 3rd party payload) has a unique board ID on the vehicle

END OF PROCEDURE