

# OMC Operations: Asset Status and Health

- Current System
  - Developed as an “interim solution,” pending delivery of the full featured Cyberinfrastructure.
  - Engineering, single level, fixed Displays with no scope for further maintenance or modification post-MREFC.
  - GUIs provide a mix of useful, non-useful and incomplete information for the Marine Operator. Difficult to use.
  - Incomplete Alerts and Alarms.
  - Application is useful for Integration, Test and Installation, not for monitoring status and health of multiple moorings.

# Present Day: OMC Platform Status

## CG Platform Shore Server Dashboard



Coastal Pioneer Central Surface Mooring - Current Time: 2014/04/06 15:55:01 GMT version:

View	Status	System	CPM	CTL	ME	Alarms	Errors	Msgs	Serial Cfg	Network Cfg	Fault Tables	Data
Syslog	All	MPIC	PSC	GPS	PPS	NTP	CPU	FB250	Intd	Call Logs	logins.txt	SBD Data XEOS Data View dcl_syslog

Plot: mp cpm psc cpu dcl13 dcl12 dcl25 dcl27 dcl35 dcl37 ldet Watch Circle

## CP01CNSM

D0001

### PLATFORM LIST

#### Detailed Status

- SBD13-06-METBK
- SBD13-01-MOPAK
- SBD12-08-DOCH2
- SBD12-06-METBK
- SBD12-05-WAVSS
- SBD12-04-PCO2A
- RID27-04-DOSTA
- RID27-03-CTDEP
- RID27-02-FLOIT
- RID27-01-OPITAA
- RID26-08-SEKIR
- RID26-07-NUTNB
- RID26-06-PHSEN
- RID26-05-ACOMM
- RID26-04-VELPT
- MED37-04-DOSTA
- MED37-03-CTDEP
- MED37-01-OPITAA
- MED35-06-PHSEN
- MED35-05-PCO2W
- MED35-04-VELPT
- MED35-02-PRESF
- MED35-01-ADCP
- MED00-09-ZPLSC

Platform: cp01cnsn MyId: cpm1 Time: 2014/02/17 12:04:41.832

CPM1 Status - lu: 0.001

Up: 8 days 19:03:21 Load: 1.18 0.75 0.54 Eflag: 00400000

Temp: 13.4 10.9 degC Humid: 0.6% Press: 14.5 psi

GndFlt: 2.4 -81.0 727.0 -3.6 ua Ldet: 1208.0 1201.0 mv Enable: gf=0f ld=03

Main: 28.60 v 360.00 ma 10.30 w wtc: 0.00 wpc 1

CPM Heartbeat: enable 1 dtme 125 threshold 2

Hotel1: wake 1 ir 0 0 0 0 0 0 hfwf 0 0 0 0 0 0 gps 1 sbd 0 0 pps 0 dcl 66 esw 1 dsl 1

Hotel2: eth0 1 eth1 0 fb1 1 fb2 0

Load Shed: ena 0 low 22.0 high 22.5 priority 1,2,3 shed:

RDAs: 28.56 272.07 00000000 gf 0 0 0 0 0 0 0 0 0 0 type 1 rda 1 0 0 0 0 0 0 0

RDAT: 28.31 41.01 00000000 gf 0 0 0 0 0 0 0 0 0 0 type 2 rda 0 0 0 0 0 0 0 0

Alarms: CPM1=2014/02/08 17:03:42 404 Loss of CI status on 1391878981

Error Cnts:

No cpm.wake.schedule: View Wipe Codes Load Detect

Timing Status - lu: 0.028

RefId: PPS Offset: 0.103 ms Jitter: 0.061 ms

NMEA Lock: TRUE Bad Pulses: 0001 TS: 2014/02/17 12:04:41.001

Power Controller Status - lu: 4.178

Vol: 28.40 Curr: 2573.33 ma Chrg: 95.90%

Watts: 73.08

Override: 0100 Eflag: 00400000.00000000.0c0000c9

Connected: p1 p2 p3 p4 wt1 wt2 cvt

BT (degC) 6.94 7.34 7.34 7.34

BT (v) 28.30 28.25 28.31 28.30

BT (ma) -2635 0 -2424 0 -2400 0 -2531.0

BT Net -9990 ma Charging

PV (ma) 2.00 0.00 0.00 1716.00

WT (ma) 7032.00 5484.00

FC (ma) 0.00 0.00

CVT 1.376 31.105 0.0 1.8

CPM Telemetry Schedule Status - lu: 1.160

Name	State	Sched	Status
mf1n pwr	started	1:0-23:55:15	Remaining: 321 sec
telem fb1	started	1:0-6:12:18:0-15	Remaining: 621 sec
telem fb2	stopped	1:3-9:15:21:0-15	Start in: 10521 sec
telem int1	stopped	1:0-4:8:12:16:20:10:20	Start in: 321 sec

Platform: cp01cnsn MyId: DCL12 Time: 2014/02/17 12:04:35.828

DCL12 Status - lu: 1.813

Up: 87 days 22:57:17 Load: 0.29 0.29 0.23 Eflag: 00000060

Temp: 15.8 14.3 19.7 20.0 24.9 degC Humid: -1.0% Press: 14.5 psi

GndFlt: 1.6 721.8 -266.9 ua Ldet: 0.0 0.0 mv Enable: gf=07 ld=00

Main: 28.60 v 465.00 ma 13.30 w

Pwrbd: Hi Pwr mode=I2C vsel=3 vmain=9.61 w 12v=2.83 w 24v=0.00 w

Load Shed: ena 0 low 22.0 high 22.5 priority 8,7,6,5,4,3,2,1 shed:

Alarms:

Error Cnts:

GPS Status - lu: 0.000

2014/02/17 12:04:35.825 Spd: 2.30 COG: 000.70

Lat: 40.136223 Lon: -70.769017 Alt: 9.20

Fix\_q: 2 Naat: 9 Hdop: 0.90

Timing Status - lu: 8.825

RefId: PPS Offset: 0.282 ms Jitter: 0.061 ms

NMEA Lock: TRUE Bad Pulses: 0000 TS: 2014/02/17 12:04:27.000

Instrument Port Status

Port	State	volt	ma	Err	Inst	Status	bad	ld	lu
1	Off	0.00	0.00	0	none	na	0	-1	-1.00
2	Off	0.00	0.00	0	none	na	0	-1	-1.00
3	Off	0.00	0.00	0	none	na	0	-1	-1.00
4	On	11.90	-4.90	0	pc02w	DAQ	0	322	20.25
5	On	11.90	73.30	0	wavss	DAQ	0	30	30.40
6	On	11.90	122.20	0	metbk2	DAQ	0	32	0.43
7	Off	0.00	0.00	0	none	na	0	-1	-1.00
8	Off	0.00	0.00	0	none	na	0	-1	-1.00

dmgr status: 2014/02/17 12:04:27.318 act1 3 str 4 hit 1 fd 0 map:00000000

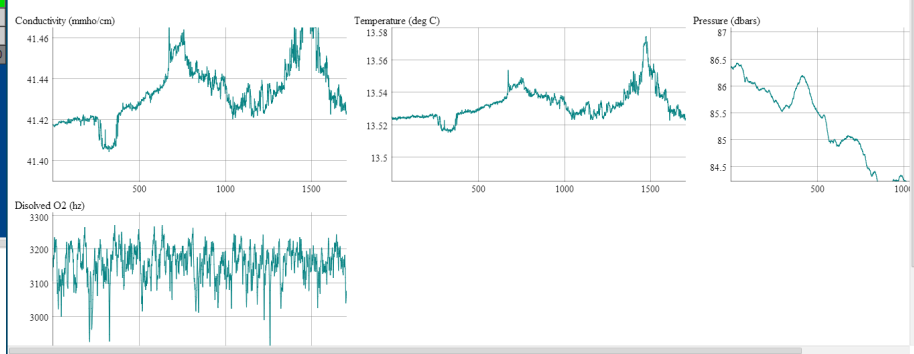
dcl12 Data Dir Summary

Inst Name	Current File	File Size (bytes)	Last Modified
metbk2	20140217.metbk2.log	84889 (0.08 mb)	48 03 50:26
pc02a	20140217.pc02a.log	22140 (0.02 mb)	48 03 56:36
rsync	20140217.rsync.log	2214 (0.00 mb)	48 03 50:52
superv	20140217.superv.log	239093 (0.24 mb)	48 03 50:51
wavss	20140217.wavss.log	1216 (0.00 mb)	48 04 23:32

## CTDPF/DOFST Data

C0000011.TXT

Profile Number: 11  
CTD Power On Time: 11/25/2013 12:00:02  
CTD Power Off Time: 11/25/2013 12:28:37  
Read 1704 data records



# Going Forward: Marine Operator Requirements for Cyberinfrastructure

- “Assets at a Glance” world screen, with overlays and drilldown.
- Asset Tracking
  - Marine Operator responsible for entry of “As-Built” Asset Information.
  - Connect TBD Asset Tracking Database to Operations.
- Alerts: Configurable notifications that indicate an event that requires attention
  - Ex: moisture level increasing within pressure housing, missed telemetry connection, incomplete data, and instrument measurement out of range, spikey, zeroed, etc.
- Alarms: Configurable notifications that indicate an event that requires 24/7 action
  - Buoy moves out of pre-defined range circle.
  - XEOS Beacon on bottom of Surface Buoy begins transmitting.
  - AUV or Glider position is consistent with an unapproved recovery.
- Action Management
  - JIRA-Based
  - Provides method to track problem resolution through assigned actions, Engineering Investigations and FMEA.
- Associations
  - User configurable capability to display “side by side” measurements from different instruments and/or systems for cross comparison.
- Activity Log Files
  - Support Troubleshooting and Lessons Learned
  - Provides for Marine Operator Handoff
  - Integrated with TBD Asset Tracking Database
- Trouble Tickets
- Support to Asset Deployment/Recovery

# CGSN Mooring Status Items:

## Initial Strawman List of Alerts

- Communication functionality
  - Telemetry logs for all comms/ beacons
  - Cross-ref with FTP call logs if doubt
  - Instruments/profilers to the CPM or STC
  - DCL link and telemetry schedule
- Major platform controller components (CPM, DCL, STC)
  - Critical variables include voltage, humidity, leak detect, port status
  - Error codes
  - Look for anomalies and compare against previous day(s)
- Power System Controller
  - Inspect data graphically (battery charge, charge cycle, etc.)
  - Compare to weather and previous day/ week/month
  - Load-shedding may be necessary, algorithm is not automated
  - Supervisor logs to review the voltage & current draws
- Instrument
  - Presence of data, file size comparison to usual, and in range
  - View engineering
- MMP profiling functionality
  - Last profile, profile summary
  - Supervisor stc log data

3204-xxxxx CG Pioneer System Health Procedure (2013-11-26)

These Alerts can be Tiered based on Level of Concern

# Tier 1 Items

## Item

- Geolocation
  - Watch circle “geofence”
- Telemetry and Communication
  - Fleet Broadband
  - Iridium ISU (RUDICS)
  - Iridium SBD
  - Beacons
  - Instruments to the CPM or STC
  - DCL link and Schedule Variance

## Resource

- Status\_stc file
- Call logs, telem logs
- Config files vs. call logs
- Asset Tracking Database
- As-Built TDP

# Tier 2

## Item

- Power System Controller
  - Battery charge, charge cycle
  - Voltage and current draws
- Status of platform controllers
- CPM, DCL, STC, MPEA status
  - Voltage, humidity, leak-detect, port status
  - Error codes
  - Anomalies and trends
- MMP Profiling function
  - (Tier 2/3 because it drives telem)

## Resource

- PSC logs
  - Supervisor logs
- Supervisor logs for CPM, DCL, STC, and MMEA
- Config files vs. call logs
- PSC status logs
- MMP logs
- Asset Tracking Database
- As-Built TDP

# Tier 3

## Item

- Instrument Function
  - Data file presence, size
  - Data range and trend
  - Anomalies and trends
  - Specific instrument outputs
- MMP profiling function
  - (Tier 2/3 because it drives telem)

## Resource

- Instrument logs and data files
- MMP logs
- Asset Tracking Database
- As-Built TDP

# Status and Health Support from Contextual Data

- Connect Tier 1 parameters to geographic/geophysical context, including location, bathymetry, and METOCEAN.
- Visual cue and drill down details are provided that provide context for status, alerts and alarms.
- Display METOCEAN data from mooring sites (wind, waves, currents, temp).
- Layer environmental data (2d fields, wind, waves, currents, temp, altimetry).



# Status and Health Support from Mooring Context

- Connect displays to mooring “as-built” TDP and Asset Tracking information.
- Link to separate displays for each instrument, w/ relevant metadata and user defined statistics.
- Allow drill-down “hotkeys” to minimize access time to specific instrument, or display of sub-system time series or stats.
- Visual cue for alerts and alarms.
- Display deploy/recover ship overlay to support turn cruise operations.

# Metrics

- Displays provide support to aggregate and display of metrics.
- Data volumes per time.
- Telemetry link attempt versus actual time.
- Percentage of instrument data versus expected.
- Mooring/Subsystem Reliability.
- Engineering Investigations, FMEAs and Actions.
- Power Metrics, including charging, spikes, outtages, and wind, solar and fuel cell production, etc.

# Usual Operations

- Glider and AUV Piloting and Planning.
- Monitoring of Asset Status and Health.
- Problem triage, including Vendor Interaction, data analysis, alert and alarm response.
- Asset Tracking Database Data Entry, including management and scheduling of refurb/repair/replacement of assets.
- Assurance of Data delivery to CI.
- OMC Maintenance – management, configuration and troubleshooting of OMC servers and software.
- Operation Watch Transitions.
- Managerial Oversight, including scheduling, forecasting, workload, training, mission planning and review, performance assessment.
- Interaction with outside community.

# Unusual Operations

- Mooring out of Range Circle.
- Mooring, Vehicle, or Component shows unusual behavior.
- Alarm and Alert Response.
- Deployment and Recovery Operation Support and Handoff.
- Identifying and correcting issues working with relevant Design Engineer.
- Vendor Interactions.
- Asset Loss Response.