

State Machine Features

Version 1.0

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Pre-Requisites:

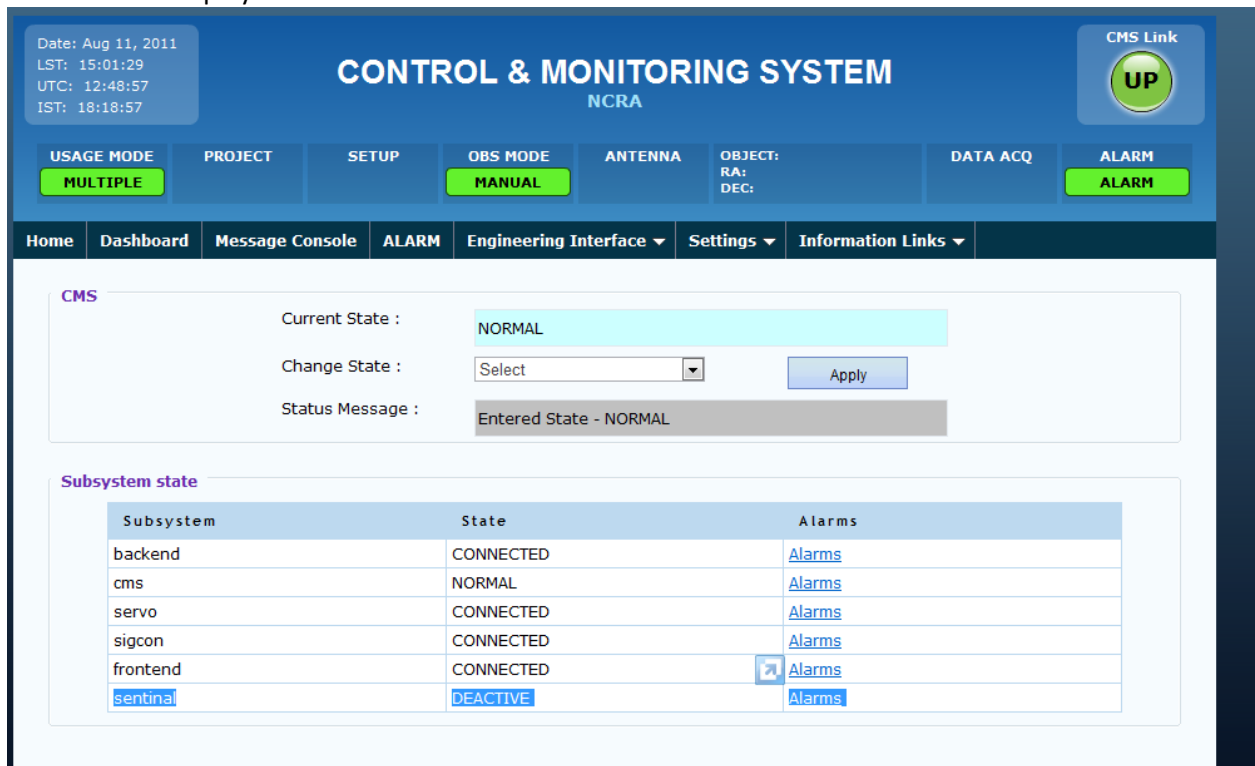
Following are the pre-requisites for state machine features:

1. All cms configurations as mentioned in CMS Configuration and Deployment [NCRA] document should be done.

CMS Dashboard

To view the dashboard login into CMS with user who has expert permission can see the Dashboard tab. The Dashboard displays the following:

1. Dashboard shows the current state of the CMS, and other sub system states, expert can change the CMS state by selecting the state and clicking on apply button. The dashboard screenshot is displayed below:



The screenshot displays the 'CONTROL & MONITORING SYSTEM' dashboard for NCRA. The top navigation bar includes tabs for Home, Dashboard, Message Console, ALARM, Engineering Interface, Settings, and Information Links. The main content area shows the 'CMS' status with a 'Current State' of 'NORMAL' and a 'Status Message' of 'Entered State - NORMAL'. Below this, the 'Subsystem state' section lists various subsystems and their states.

Subsystem	State	Alarms
backend	CONNECTED	Alarms
cms	NORMAL	Alarms
servo	CONNECTED	Alarms
sigcon	CONNECTED	Alarms
frontend	CONNECTED	Alarms
sentinal	DEACTIVE	Alarms

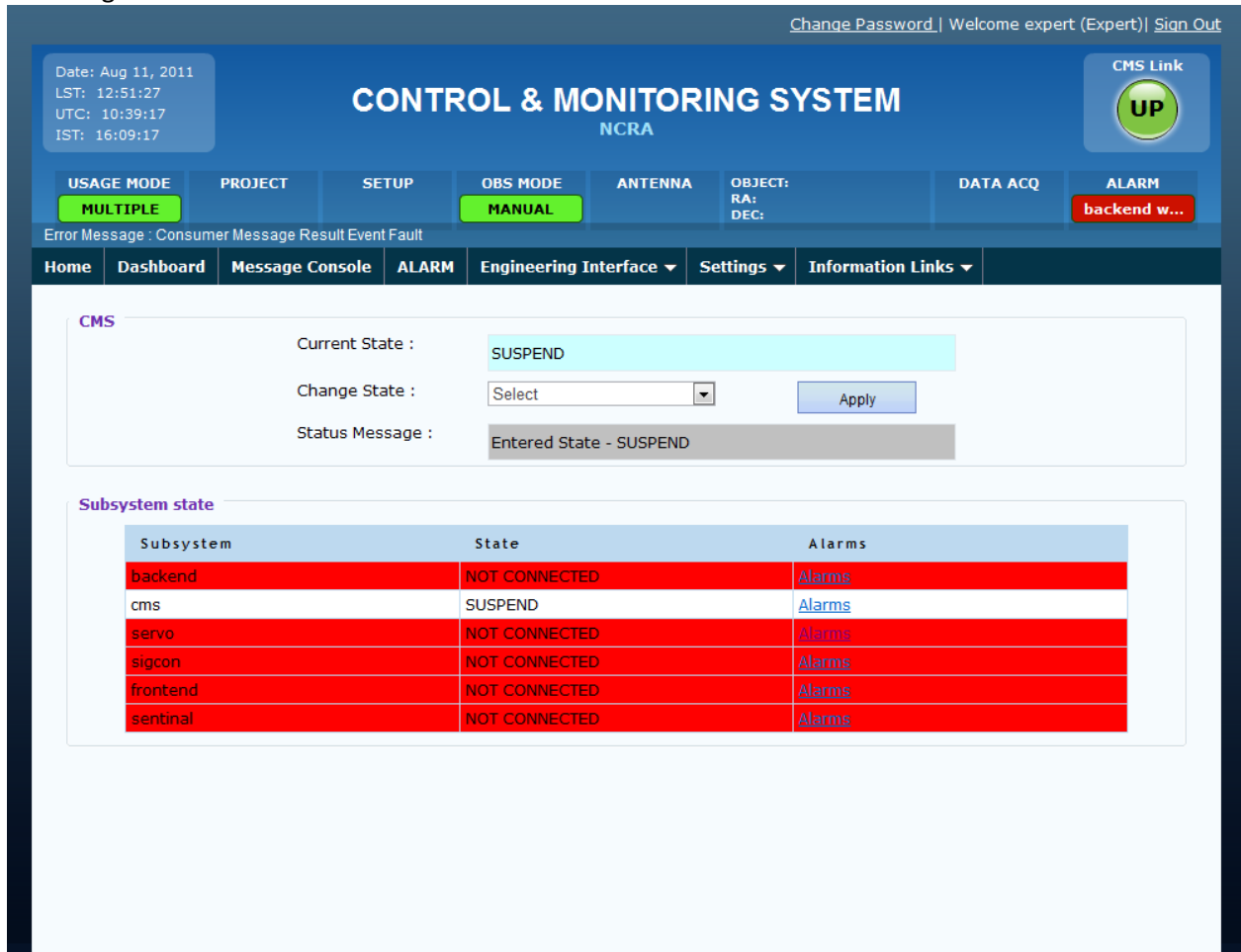
2. The Status Message displays the cms state change information. When state change is in progress it will display the transition in progress message. When the state transition is in progress user is not allowed to change the state.
3. Deactivated sub system status is displayed as DEACTIVE as shown in above screenshot.

Start up and Initialization in State Machine:

State Machine start-up:

When CMS is started it always enters the START state and the CMS functions as mentioned below.

1. CMS checks the wrapper connectivity for configurable amount of time if wrapper is not connected than CMS raises the wrapper down alarms, and move into SUSPEND state – refer below figure



The screenshot displays the CONTROL & MONITORING SYSTEM (CMS) interface. The top navigation bar includes links for [Change Password](#), [Welcome expert \(Expert\)](#), and [Sign Out](#). The main header shows the date and time: Date: Aug 11, 2011, LST: 12:51:27, UTC: 10:39:17, IST: 16:09:17. The system title is "CONTROL & MONITORING SYSTEM NCRA". A "CMS Link" button with an "UP" indicator is visible. Below the header, there are tabs for USAGE MODE (MULTIPLE), PROJECT, SETUP, OBS MODE (MANUAL), ANTENNA, OBJECT: RA: DEC:, DATA ACQ, and ALARM (backend w...). An error message "Error Message : Consumer Message Result Event Fault" is displayed. The main content area shows the "CMS" section with "Current State : SUSPEND", "Change State : Select" (dropdown), and "Status Message : Entered State - SUSPEND". Below this is the "Subsystem state" section with a table showing the status of various subsystems.

Subsystem	State	Alarms
backend	NOT CONNECTED	Alarms
cms	SUSPEND	Alarms
servo	NOT CONNECTED	Alarms
sigcon	NOT CONNECTED	Alarms
frontend	NOT CONNECTED	Alarms
sentinal	NOT CONNECTED	Alarms

2. To view the alarm for the particular subsystem click on the alarm link. Refer below figure for the servo sub system

State Machine Features

CMS - Windows Internet Explorer

Alarm

⚠ Critical
⚠ Warning
i Information
Refresh

Level	Name	SubSystem	Date And Time	Description	Acknowledge Status	Ack By User	Clear Status	Clear By User
⚠	wrapper down	servo	11/08/2011 16:23	servo wrapper down	No Acknowledge		No Clear	
⚠	domon	servo	10/08/2011 17:57	domon command failed	No Acknowledge		Yes	expert
⚠	domon command failed	servo	10/08/2011 17:56	domon command failed	No Acknowledge		Yes	expert
⚠	domon command timed out	servo	11/08/2011 12:17	domon command timed out	No Acknowledge		Yes	expert

State Machine initialization

1. If previously CMS was SHUTDOWN properly and wrappers are connected then CMs moves to INIT state and execute the all sub system initialization script "initAllSubsystems.txt".

State Machine Features

Date: Aug 11, 2011
LST: 13:15:43
UTC: 11:03:29
IST: 16:33:29

CONTROL & MONITORING SYSTEM

NCRA

CMS Link
UP

USAGE MODE
MULTIPLE

PROJECT

SETUP

OBS MODE
MANUAL

ANTENNA

OBJECT:
RA:
DEC:

DATA ACQ

ALARM
ALARM

Home | Dashboard | Message Console | **ALARM** | Engineering Interface ▼ | Settings ▼ | Information Links ▼

CMS

Current State : **INIT**

Change State :

Status Message : Entered State - INIT

Subsystem state

Subsystem	State	Alarms
backend	CONNECTED	Alarms
cms	INIT	Alarms
servo	CONNECTED	Alarms
sigcon	CONNECTED	Alarms
frontend	CONNECTED	Alarms
sentinal	CONNECTED	Alarms

- After successfully completion of the INIT state CMS moves into NORMAL state as displayed below:

State Machine Features

Date: Aug 11, 2011
 LST: 12:52:36
 UTC: 10:40:26
 IST: 16:10:26

CONTROL & MONITORING SYSTEM

NCRA

USAGE MODE
 MULTIPLE

PROJECT

SETUP

OBS MODE
 MANUAL

ANTENNA

OBJECT:
 RA:
 DEC:

DATA ACQ

ALARM
 ALARM

[Home](#)
[Dashboard](#)
[Message Console](#)
[ALARM](#)
[Engineering Interface](#)
[Settings](#)
[Information Links](#)

CMS

Current State : NORMAL

Change State :

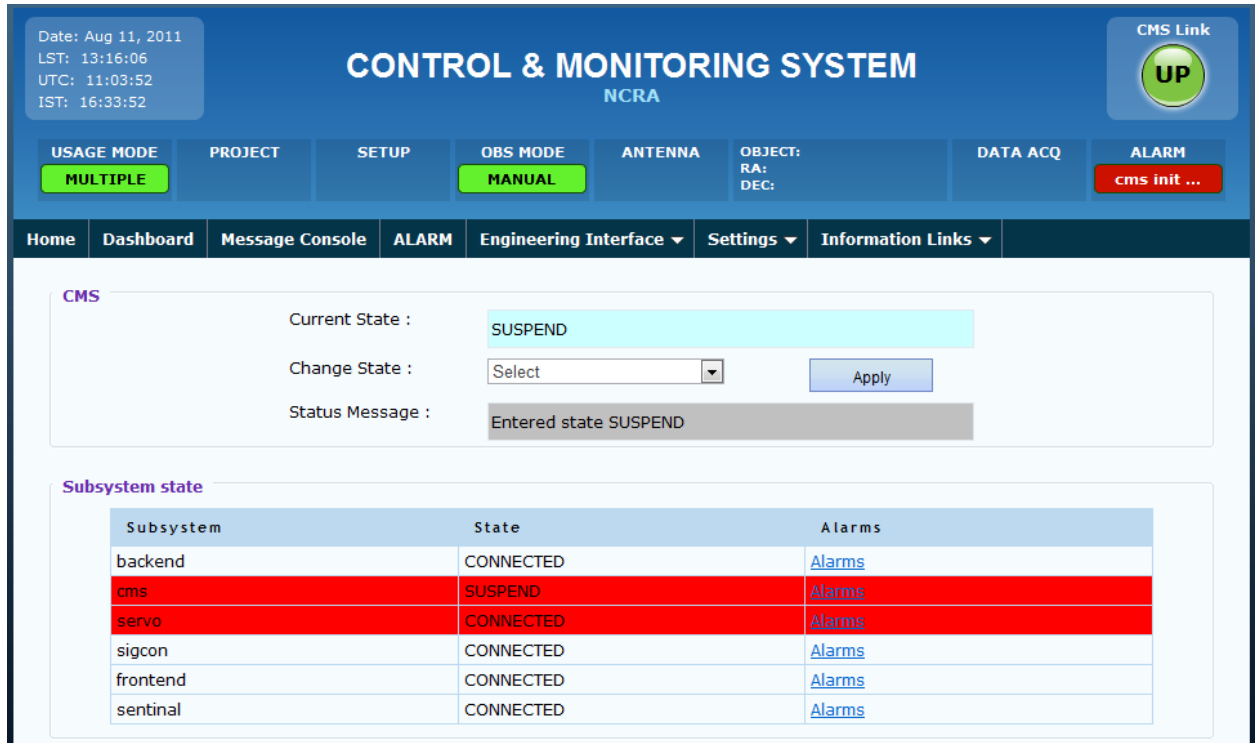
Status Message : Entered state NORMAL

Subsystem state

Subsystem	State	Alarms
backend	CONNECTED	Alarms
cms	NORMAL	Alarms
servo	CONNECTED	Alarms
sigcon	CONNECTED	Alarms
frontend	CONNECTED	Alarms
sentinal	CONNECTED	Alarms

- If initialization is not successful than CMS raises the initialization fail alarm as show below and moves to SUSPEND state.

State Machine Features



CONTROL & MONITORING SYSTEM
NCRA

Date: Aug 11, 2011
LST: 13:16:06
UTC: 11:03:52
IST: 16:33:52

CMS Link: **UP**

USAGE MODE: **MULTIPLE** | PROJECT: | SETUP: | OBS MODE: **MANUAL** | ANTENNA: | OBJECT: RA: DEC: | DATA ACQ: | ALARM: **cms init ...**

Home | Dashboard | Message Console | **ALARM** | Engineering Interface ▼ | Settings ▼ | Information Links ▼

CMS

Current State : **SUSPEND**

Change State :

Status Message : Entered state SUSPEND

Subsystem state

Subsystem	State	Alarms
backend	CONNECTED	Alarms
cms	SUSPEND	Alarms
servo	CONNECTED	Alarms
sigcon	CONNECTED	Alarms
frontend	CONNECTED	Alarms
sentinal	CONNECTED	Alarms

4. Click on the alarms link to view the alarm raised for the particular subsystem.

State Machine initialization on power failure

1. If previously CMS was not SHUTDOWN properly and wrappers get connected after CMS start-up then CMS moves to INIT_ON_POWERFAILURE state as shown in below screenshot. In this state CMS executes all the sub system restore scripts as specified in "init_on_powerfailure.txt" batch script.

State Machine Features

Date: Aug 11, 2011
LST: 12:32:50
UTC: 10:20:43
IST: 15:50:43

CONTROL & MONITORING SYSTEM

NCRA

CMS Link
UP

USAGE MODE
MULTIPLE

PROJECT

SETUP

OBS MODE
MANUAL

ANTENNA

OBJECT:
RA:
DEC:

DATA ACQ

ALARM
servo dom...

Home Dashboard Message Console **ALARM** Engineering Interface Settings Information Links

CMS

Current State : **INIT_ON_POWERFAILURE**

Change State :

Status Message : Entered State - INIT_ON_POWERFAILURE

Subsystem state

Subsystem	State	Alarms
backend	CONNECTED	Alarms
cms	INIT_ON_POWERFAILURE	Alarms
servo	CONNECTED	Alarms
sigcon	CONNECTED	Alarms
frontend	CONNECTED	Alarms
sentinal	CONNECTED	Alarms


- If CMS couldn't restore the sub system than CMS raises the alarm for initialization failure and then moves into SUSPEND state.

State Machine Features

Date: Aug 11, 2011
LST: 13:16:06
UTC: 11:03:52
IST: 16:33:52

CONTROL & MONITORING SYSTEM

NCRA

CMS Link


USAGE MODE
MULTIPLE

PROJECT

SETUP

OBS MODE
MANUAL

ANTENNA

OBJECT:
RA:
DEC:

DATA ACQ

ALARM
cms init ...

[Home](#)
[Dashboard](#)
[Message Console](#)
[ALARM](#)
[Engineering Interface ▾](#)
[Settings ▾](#)
[Information Links ▾](#)

CMS

Current State : **SUSPEND**

Change State :

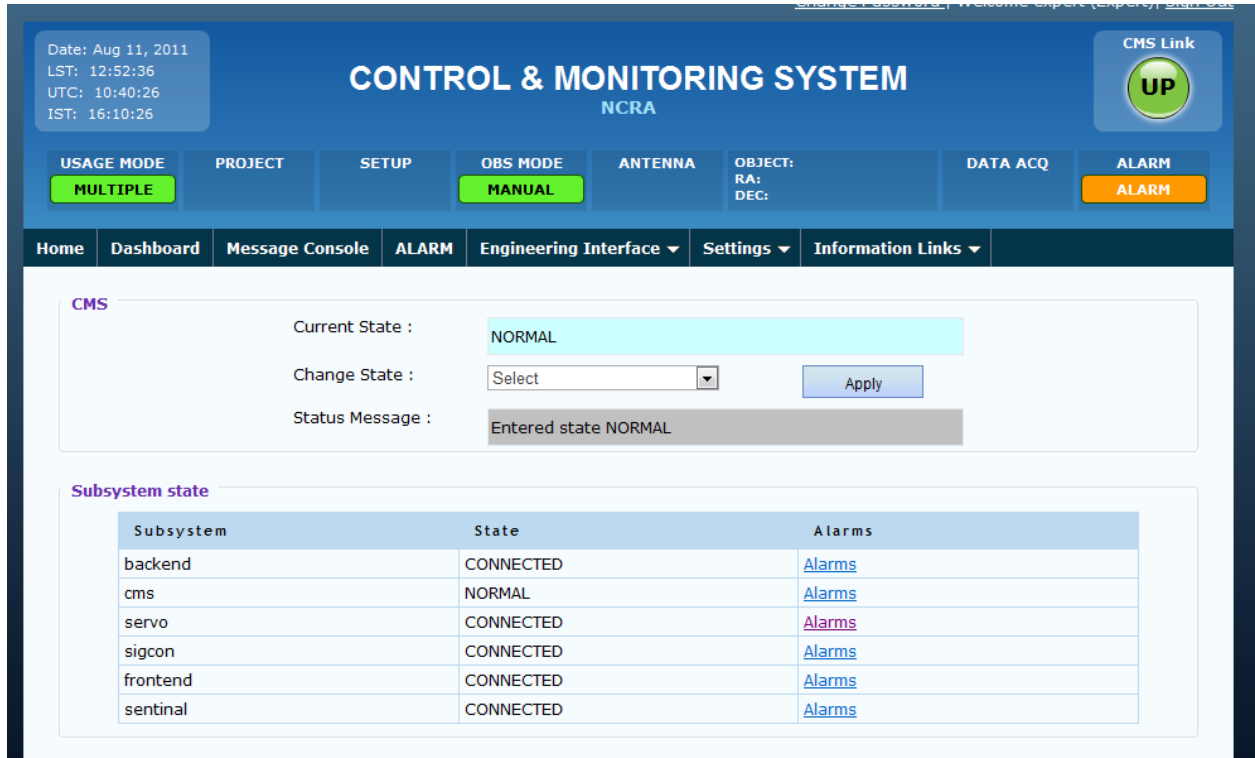
Status Message : Entered state SUSPEND

Subsystem state

Subsystem	State	Alarms
backend	CONNECTED	Alarms
cms	SUSPEND	Alarms
servo	CONNECTED	Alarms
sigcon	CONNECTED	Alarms
frontend	CONNECTED	Alarms
sentinal	CONNECTED	Alarms

- If CMS either successfully completed INIT or INIT_ON_POWERFAILURE than CMS move into NORMAL state and no alarms are shown.

State Machine Features



CONTROL & MONITORING SYSTEM
NCRA

Date: Aug 11, 2011
LST: 12:52:36
UTC: 10:40:26
IST: 16:10:26

USAGE MODE: **MULTIPLE** PROJECT: SETUP: **MANUAL** ANTENNA: OBJECT: RA: DEC: DATA ACQ: **ALARM**

Home Dashboard Message Console **ALARM** Engineering Interface Settings Information Links

CMS

Current State : **NORMAL**

Change State :

Status Message : **Entered state NORMAL**

Subsystem state

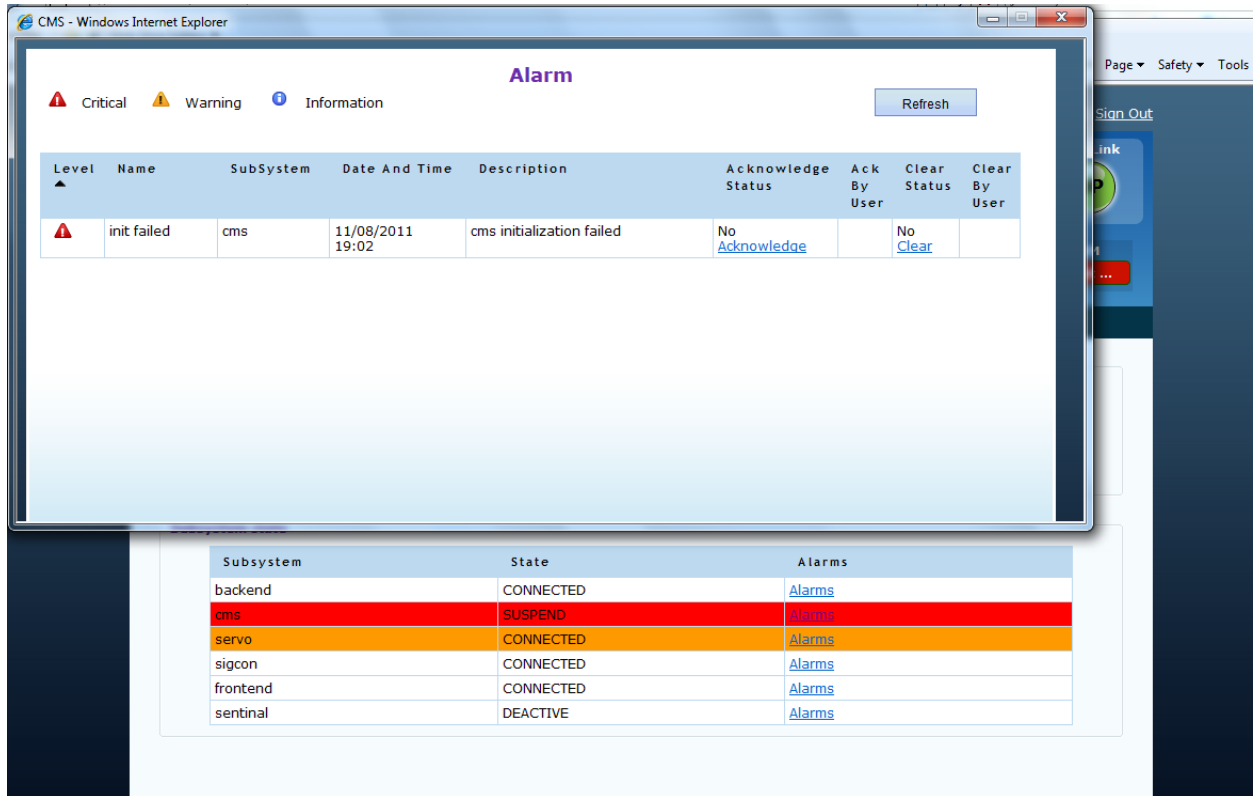
Subsystem	State	Alarms
backend	CONNECTED	Alarms
cms	NORMAL	Alarms
servo	CONNECTED	Alarms
sigcon	CONNECTED	Alarms
frontend	CONNECTED	Alarms
sentinal	CONNECTED	Alarms

Viewing the alarms

To view the recent raised alarms go to Dashboard Tab

1. Dashboard shows the current state of the CMS, and other sub system states, along with alarms link, depending on the alarm severity and level background color of subsystem is changed.
2. Click on alarm links show sub system specific alarms details and their severity level along with color.

State Machine Features



Alarm

▲ Critical
▲ Warning
● Information
Refresh

Level	Name	SubSystem	Date And Time	Description	Acknowledge Status	Ack By User	Clear Status	Clear By User
▲	init failed	cms	11/08/2011 19:02	cms initialization failed	No Acknowledge		No Clear	

Subsystem	State	Alarms
backend	CONNECTED	Alarms
cms	SUSPEND	Alarms
servo	CONNECTED	Alarms
sigcon	CONNECTED	Alarms
frontend	CONNECTED	Alarms
sentinal	DEACTIVE	Alarms

3. Alarms levels as below
 - 3.1. If alarm level 5 then background is shown in red color
 - 3.2. If alarm level equals 3 or 4 then background shown in orange color
 - 3.3. If alarm level equals 1 or 2 then background shown in yellow color

State Machine Features

CMS - Windows Internet Explorer

Alarm

▲ Critical
▲ Warning
● Information
Refresh

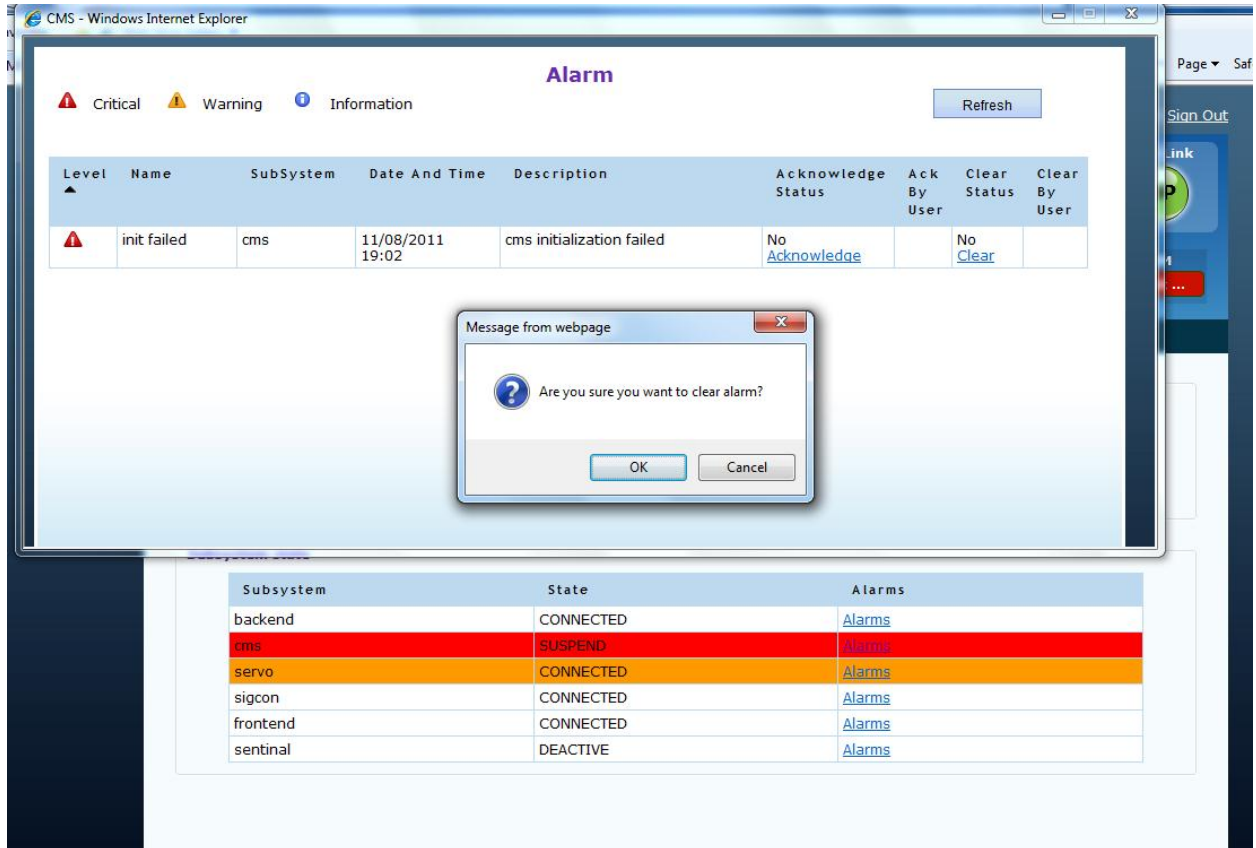
Level ▲	Name	SubSystem	Date And Time	Description	Acknowledge Status	Ack By User	Clear Status	Clear By User
▲	domon	servo	10/08/2011 17:57	domon command failed	No Acknowledge		Yes	expert
▲	domon command failed	servo	10/08/2011 17:56	domon command failed	No Acknowledge		Yes	expert
▲	domon command timed out	servo	11/08/2011 12:17	domon command timed out	No Acknowledge		Yes	expert
▲	initialization fail	servo	11/08/2011 16:33	Servo initialization fail	No Acknowledge		No Clear	
▲	wrapper down	servo	11/08/2011 16:33	servo wrapper down	No Acknowledge		Yes	

Clearing and acknowledging the alarms

Alarm clearing

1. When user clear the alarm it will ask for the conformation to clear the alarm if user selects ok the alarm get cleared and background color changes for the particular subsystem, and user name is updated in clear by user column.

State Machine Features



Alarm

⚠ Critical
⚠ Warning
ℹ Information
Refresh

Level	Name	SubSystem	Date And Time	Description	Acknowledge Status	Ack By User	Clear Status	Clear By User
⚠	init failed	cms	11/08/2011 19:02	cms initialization failed	No Acknowledge		No Clear	

Message from webpage

ⓘ Are you sure you want to clear alarm?

OK Cancel

Subsystem	State	Alarms
backend	CONNECTED	Alarms
cms	SUSPEND	Alarms
servo	CONNECTED	Alarms
sigcon	CONNECTED	Alarms
frontend	CONNECTED	Alarms
sentinal	DEACTIVE	Alarms

2. After clearing the CMS alarm CMS look like as below,

State Machine Features

Date: Aug 11, 2011
LST: 15:51:11
UTC: 13:38:31
IST: 19:08:31

CONTROL & MONITORING SYSTEM

NCRA

CMS Link
UP

USAGE MODE
MULTIPLE

PROJECT

SETUP

OBS MODE
MANUAL

ANTENNA

OBJECT:
RA:
DEC:

DATA ACQ

ALARM
servo dom...

Home Dashboard Message Console **ALARM** Engineering Interface Settings Information Links

CMS

Current State : SUSPEND

Change State :

Status Message : Entered State - SUSPEND

Subsystem state

Subsystem	State	Alarms
backend	CONNECTED	Alarms
cms	SUSPEND	Alarms
servo	CONNECTED	Alarms
sigcon	CONNECTED	Alarms
frontend	CONNECTED	Alarms
sentinal	DEACTIVE	Alarms

Alarm Acknowledging:

When user clicks on Acknowledge link on the recent alarm page the alarm gets acknowledge and the user name of the user who acknowledged the alarm appear on the page.

Changing state in CMS:

- List of the CMS states are as displayed below.

State Machine Features

Date: Aug 11, 2011
LST: 12:34:19
UTC: 10:22:12
IST: 15:52:12

CONTROL & MONITORING SYSTEM
NCRA

CMS Link
UP

USAGE MODE
MULTIPLE

PROJECT

SETUP

OBS MODE
MANUAL

ANTENNA

OBJECT:
RA:
DEC:

DATA ACQ

ALARM
servo dom...

Home Dashboard Message Console **ALARM** Engineering Interface Settings Information Links

CMS

Current State : **NORMAL**

Change State : **Select** **Apply**

Status Message :

Subsystem state

Subsystem	State	Alarms
backend	CONNECTED	Alarms
cms	NO	Alarms
servo	CONNECTED	Alarms
sigcon	CONNECTED	Alarms
frontend	CONNECTED	Alarms
sentinal	CONNECTED	Alarms

- To change the state select the State and click on apply button. Then CMS will try to transition to the selected state, right now following transitions are supported.

Transition_NORMAL_TO_SHUTDOWN"
Transition_INIT_TO_NORMAL"
Transition_INIT_TO_MAINTENANCE"
Transition_INIT_ON_POWERFAILURE_TO_MAINTENANCE"
Transition_INIT_TO_SHUTDOWN"
Transition_INIT_ON_POWERFAILURE_TO_SHUTDOWN"
Transition_INIT_TO_EXCEPTION"
Transition_INIT_ON_POWERFAILURE_TO_EXCEPTION"
Transition_NORMAL_TO_MAINTENANCE"
Transition_START_TO_INIT"
Transition_START_TO_INIT_ON_POWERFAILURE"
Transition_INIT_ON_POWERFAILURE_TO_NORMAL"
Transition_INIT_ON_POWERFAILURE_TO_SUSPEND"
Transition_INIT_IN_PROGRESS"
Transition_MAINTENANCE_IN_PROGRESS"
Transition_NORMAL_IN_PROGRESS"
Transition_INIT_ON_POWERFAILURE_IN_PROGRESS"

State Machine Features

- Transition_NORMAL_TO_EXCEPTION"
 - Transition_EXCEPTION_TO_NORMAL"
 - Transition_EXCEPTION_TO_SHUTDOWN"
 - Transition_MAINTENANCE_TO_SHUTDOWN"
 - Transition_MAINTENANCE_TO_NORMAL"
 - Transition_NORMAL_TO_STANDBY"
 - Transition_STANDBY_TO_NORMAL"
 - Transition_STANDBY_TO_SHUTDOWN"
 - Transition_SUSPEND_IN_PROGRESS"
 - Transition_NORMAL_TO_SUSPEND"
 - Transition_SUSPEND_TO_NORMAL"
 - Transition_SUSPEND_TO_SHUTDOWN"
 - Transition_SUSPEND_TO_MAINTENANCE"
 - Transition_SUSPEND_TO_EXCEPTION"
 - Transition_EXCEPTION_TO_SUSPEND"
 - Transition_EXCEPTION_TO_STANDBY"
 - Transition_STANDBY_TO_EXCEPTION"
 - Transition_INIT_TO_SUSPEND"
 - Transition_SUSPEND_TO_INIT"
 - Transition_SUSPEND_TO_INIT_ON_POWERFAILURE"
 - Transition_NORMAL_TO_DRIFT"
 - Transition_DRIFT_TO_NORMAL"
 - Transition_SUSPEND_TO_DRIFT"
 - Transition_DRIFT_TO_SUSPEND"
3. If CMS is moved to INIT or INIT_ON_POWERFAILURE state than CMS again executes the initialization script or restore script and raises the alarm as mention in State Machine Initialization section.
 4. If CMS is moved to SHUTDOWN state the state-machine thread end and no other state-change happens. In future on SHUTDOWNM tomcat server will also be shutdown. And for CMS and state-machine to be up a tomcat restart will be required.

Monitoring Parameter out of range Alarms:









Monitoring Param out of range alarm would be raised whenever a monitoring parameter goes out of range.

Alarms for various subsystems would be displayed in various colors depending upon the level of alarms raised for that particular subsystem.

State Machine Features

Alarms that are configured for Monitoring Parameter out of range will only be raised. The alarm configuration is mentioned in the CMS Configuration and Deployment [NCRA] document. The alarm name and the monitoring param name should be same for the alarm to be raised.

For example: **“Wind velocities out of limit”** alarm would be raised whenever wind velocity reaches out of limit as shown below.

Alarm								
<div>  Critical  Warning  Information </div> <div>Refresh</div>								
Level	Name	SubSystem	Date And Time	Description	Acknowledge Status	Ack By User	Clear Status	Clear By User
	el_motor2_current	servo	08/08/2011 16:18	EZ motor 2 current is big	No Acknowledge		No Clear	
	Wind Velocities out of limit	servo	09/08/2011 17:59	Wind Velocities out of limit	No Acknowledge		No Clear	
	Az upper/lower limits crossed	servo	09/08/2011 17:59	Az upper/lower limits crossed	No Acknowledge		No Clear	
	EL current position upper limits crossed	servo	09/08/2011 17:59	EL current position upper limits crossed	No Acknowledge		No Clear	
	wrapper down	servo	11/08/2011 17:59	servo wrapper down	No Acknowledge		No Clear	

Configuring Rules

This feature will be available in the future release.

Exception Handling

This feature will be available in the future release.

State Machine Features