GSB Operational Procedure
(Ver. Released, Oct 2010)

1. GSB hardware.

GSB has 1 to 50 nodes and control machines.

RACK 1 nodes 1 - 16 are data acquisition nodes (AtoD)
RACK 2 nodes 17 - 32 are computing nodes (corr)
RACK 3 nodes 33 - 48 (for 32MHz Full stokes and rawdump modes)
RACK 4 nodes 49,50, gsbm1,gsbm2.gsbm3,gsbm4

node 49 and 50 are used for pulsar data record.
node49 - IA and node50 - PA.

gsbm1 is control machine for GSB.

gsbm4 is for interferometry data record.

gsbm2 and gsbm3 are used for pulsar offline work.

Gateway to GSB is gcc-l5. (server room)

astro8 - gsb console machine (control-room)

All the GSB control is done through astro8 machine and it is located in the control room. "gsbuser" on astro8 is dedicated local account for GSB control.

LO5 has to set through elab@loconf
LO5 can be set through online also.

GSB can be run through ONLINE with remote/local mode.
(online machines shivneri/lenyadri)

LTO4 tape drive is available for user data backup on gsbm2
machine (/dev/nst0)

2. Available modes of the GSB
(Release Ver. 1 Oct 2010)

	Observation Type	Usage Mode		Input IF BW (MHz)	Acquisition BW / Final o/p BW (MHz)	Number of Channels	Output Time Resolution
1	Interferometric : Continuum	Total Intensity (32 MHz mode)		32,16,6	32	512,256	2,4,8..(sec)
		Total Intensity (16 MHz mode)		16,6	16	512,256	2,4,8..(sec)
						128	0.5,1,2..(sec)
						64	0.25,0.5,1..(sec)
		Full Stokes (32 MHz mode)		32,16,6	32	256	2,4,8..(sec)
		Full Stokes (16 MHz mode)		16,6	16	256	2,4,8..(sec)
2	Interferometric : Spectral Line	Total Intensity (16 MHz and lower BW modes)		16,6	16 / FBW 4,2,1,0.5, 0.025,0.0125	512,256	2,4,8..(sec)
3	Array: Beams	IA	Total Intensity (32 MHz mode)	32,16,6	32	512,256	Pre:2 # Post: 1,2,4
			Total Intensity (16 MHz mode)	16,6	16 / FBW 4,2,1	512,256	Pre:1,2 $ Post: 1,2,4
		PA	Total Intensity (32 MHz mode)	32,16,6	32	512,256	Pre:2 # Post:1,2,4
			Total Intensity (16 MHz mode)	16, 6	16 / FBW 4,2,1	512,256	Pre:1,2 $ Post: 1,2,4
			Full Stokes (16 MHz mode)	16,6	16	256	Pre:2 $ Post:1,2,4
			Voltage Beam (32 MHz mode)	32,16,6	32	512,256	15.x nsec @
			Voltage Beam (16 MHz mode)	16,6	16	512,256	30.x nsec @
4	Raw Dump	Raw voltages from all antennas		16,6	16		30.x nsec at 4 bits per sample

Notes :

\# For 32 MHz modes : base integration is 30.72 uSec for 512 channels, 15.36 uSec for 256 channels

$ For 16 MHz modes : base integration is 61.44 uSec for 512 channels, 30.72 uSec for 256 channels

@ Output data is in spectral voltage form; needs one inverse FT to get voltage time series with time resolution of 15.x nsec for 32 MHz mode and 30.x nsec for

16 MHz mode.

3. GSB control through ONLINE.

GSB is run the through ONLINE by three different ways.
1. remote mode - GSB   (sockcmd).
2. remote mode - GHB + GSB   (sockcmd).
3. local mode - GHB + GSB (GHB dependent getcmd).

Following table explains the various commands and options for GSB control through online.

#	Control	Corr	Online init file	IFR-dascmd	IA-dascmd	PA-dascmd
1	remote	GSB sockcmd	/temp2/data/gsb.hdr cmode=8 "/home/observer/bin/gsbdassrv"	initndas initprj strtndas stpndas stpprj hltndas		
2	remote	GHB+GSB sockcmd	/temp2/data/gsb.hdr cmode=15 "/home/observer/bin/gsbdassrv" (add manually content of corrsel.hdr to gsb.hdr and use gsb.hdr)	initndas initprj strtndas stpndas stpprj hltndas		
3	local	GHB+GSB getcmd	/temp2/data/corrsel.hdr cmode=3 "/home/observer/bin/dassrv"	initndas initndas.gsb initprj initprj.gsb strtndas strtndas.gsb* stpndas stpndas.gsb* stpprj stpprj.gsb hltndas hltndas.gsb	initndas.ia strtndas.ia* stpndas.ia* hltndas.ia	initndas.pa strtndas.pa* stpndas.pa* hltndas.pa
				* auto mode. gsb_auto - IFR gsb_auto_iapa - IFR + IA + PA (sub 4)		

Note :
commands in blue color are shell commands and these commands can issued through terminal window of the online machine or through user window of the online by using "/" in the beginning of the command. Example.

>strtnda.gsb - for shell (terminal window).
>/strtndas.gsb - for online user/command file.

4. Default common setup for GSB usage.

Normally the default common setup is always present on astro8 machine, it is required only when machine is reboot or change in the GSB mode (released/trial).

Astro8 setup at control-room

log in as gsbuser@astro8 located in control-room.(normally this machine is always in log in state, log in is required only when it is log out or machine is restarted.)

Following desktops are created for the GSB-operation.

```
GSBCONSOLE  - gsb_main_console, gsb_dasconsole and online interface.
CONFIG/PHS  - gsb_config and phasing.
IFR-MON     - IFR data monitoring.
IA-MON      - IA  data monitoring.
PA-MON      - PA  data monitoring.
TAX         - running tax on lta data.
DASD/LO5    - starting dasd and to set LO5.
```

Desktop DASD/LO5
on desktop DASD/LO5 open 5 terminals if they are not open.

```
1. log in as gsbuser@gsbm1  and issue command  "dasd gsbuser"
2. log in as gsbuser@node49 and issue command  "dasd gsbuser"
3. log in as gsbuser@node50 and issue command  "dasd gsbuser"
4. log in as gsbuser@gsbm4  and issue command  "dasd gsbuser"
5. log in as elab@loconf    and issue command  "fswqt"
```
(these commands needs only when machine is reboot or dasd/fswqt is not running
 to logon to node49 and 50 logon to gsbm1 first then log on to node 49 and 50)

Desktop GSBCONSOLE
start GSB mainconsole.
Open one window and put it at the left bottom corner of the screen and issue the command "start_gsb". It will open the graphics window and will ask for the mode selection. select the "released" mode and say OK. It will the open GSB main console. put the window at the left bottom corner and hide the terminal. Put the gsb_console on all the desktops.

Open one more terminal for online interface (for das commands). Put it at the right bottom corner of the screen. Log in as observer@shivneri/lenyadri (online machine). One can call it as command window.

Open the dasconsole window from gsbmainconsole by clicking on GSB_DASCONSOLE. Start the required windows from the the menu of gsbdasconsole.

Desktop CONFIG/PHS

GSB initial configuration.
open the configure window from the gsbmainconsole. It is the common
configuration window for continuum, line and pulsar observations. Configure it
based on user requirement and save it.(normally gsbconfig is alway open).

GSB phasing window.
open the phasing window from gsbmainconsole. It is the GUI based phasing tool
for GSB. It has antenna selection window for antenna selection. This antenna
selection window is also used by the command line phaseing script.

Desktop IFR-MON
open the IFR-MON window from the gsbmainconsol. One has to restard this ifr-mon
for every new change is GSB configuartion.

Desktop IA-MON
open the IA-MON window from gabmainconsole. It has GUI to monitor the the pulsar
data in IA-mode.

Desktop PA-MON
open the PA-MON window from gabmainconsole. It has GUI to monitor the the pulsar
data in PA-mode.

Desktop TAX
this desktop is used for running tax or ltahdr on lta files.

5. Starting the observations

GSB — control local

Following table explains the sequence of the commands to start the gsb-das chain for IFR and IFR+PSR observations.

#	IFR	PSR	
		BEAM1(ia) subar3	BEAM2(pa) subar4
0	GHB must be running before starting GSB. There should not any previous process running on GSB. "hltndas.gsb", "hltndas.ia" and "hltndas.pa" must be successfully issued before starting GSB.		
1	configure with beams OFF (calculate the step # and LO5 in case of line obs and set it)	configure with beam1 ON	configure with beam2 ON
2	Open IFR windows	Open IA windows	Open PA windows
3	Start acq and collect		
4	initndas.gsb		
5	Wait for minute pulse		
6	initprj.gsb and statndas.gsb		
7	Strt GSB-IFR-MON		
8	Start record		
9		Do GAC config and psr config	Do GAC config and psr config
10		Do Phasing	Do Phasing
11		Start process_psr	Start process_psr
12		Start collect_psr	Start collect_psr
13		initndas.ia/pa, strtndas.ia/pa	initndas.ia/pa, strtndas.ia/pa
14		Start GSB-IA-MON	Start GSB-PA-MON
15		Start record	Start record
16	stpprj.gsb,stpndas.gsb	stpndas.ia/pa	stpndas.ia/pa
17	hltndas.gsb	hltndas.ia/pa	hltndas.ia/pa
18	ltahdr, tax to see lta data	Offline psr_mon	Offline psr_mon

Note:

1. Beam selection:
beam1 and beam2 are similar like two sub-array (subar1 and subar2), But two beams can be formed from single sub-array also. This antenna selection is done through GAC config.

following valid combinations are available for beam mode.

No.	Beam-1	Beam-2
1	IA	IA
2	PA	PA
3	IA	PA
4	IA	OFF
5	OFF	PA
6	OFF	VOLTAGE

Change in post integration or GAC config will reflect after the ia/pa scan is restarted.

2.
IFR record: record dir "/gsbifrdata/<cur date>" and
"/gsbifrdata1/<cur date>" on gsbm4.
command : <PRJCODE> <ltafile name with full path> <integ>
eg. 18_099 /gsbifrdata/2mar/18_099_02mar2010.lta 8m

Beam record:record dir "/mnt/a/gsbuser/<cur date>" on node49 and/or node50.
Command : -f <raw file name with full path> -n <no. of scans> -m 1
e.g. -f /mnt/a/gsbuser/25mar2010/psr_ia.raw -n 10 -m 1

if -n is 1 then one can use time option -t in minutes as follows

eg. -f /mnt/a/gsbuser/25mar2010/psr_ia.raw -n 1 -m 1 -t 10

3. Standard Lta utilities works on gsb-lta files. Lta utilities and gsb-lta data is made
available on all astro/gtac machines.

6. Beam DATA BACKUP

LTO4 drive is connected to gsbm2 (/dev/nst0)
SDLT600 drive is connected to node49 (/dev/nst0)

**** For LTO4 drive *****

The commands need to be used from node49 or node50 are given below

ssh gsbm2 "mt -f /dev/nst0 status"
tar cvfb - 20 <data file> | ssh gsbm2 "dd of=/dev/nst0 obs=20b"

**** For SDLT 600 drive *****

The commands need to be used from node50 are given below

ssh node49a "mt -f /dev/nst0 status"
tar cvfb - 20 <data file> | ssh node49a "dd of=/dev/nst0 obs=20b"

Note : Please take back-up when GSB is NOT IN USE for pulsar observation and users are
requested to use ONLY the given machine id for backup.

7. Phasing

GUI -
one can open the GSB phasing window from gsb main console. select the subar antennas
from the antenna selection box. put non woking antnnas in subar # 1. select the subary,
lta file names, records, scans, iteration no.

Before starting the phasing keep iteration 0 and say "ldphs" to load the zero pheses.
then start the record to collec the data. then clik on "phs" it will the do the phasing
but one has to start the new scan to see the effect. one can go backward or forward in
iteration no to load the old phases.

CMD LINE (for local control only)

one has to select the subar antenna selection from GUI phs window only. command
line phs reads the antennas selection form GUI window.

so say "phase.pl" on online machine window (command line window)

        phase.pl -r C00 -s 4 -t 30
              -h for help.
              -r -ref ant
              -s -subar #
              -t -record time in sec.

If the phasing is giving the error of "use on uninitialized val" then say

          phase.pl -Z once to solve the above problem.

Note :Effect of phasing will be seen only when the IFR scan is restarted.

8. HOW TO SET 5th LO.

1. GUI
   Use Desktop DASD/LO5 on astro8.
   login as elab@loconf
   issue the command "fswqt" and it will open the GUI

        Through this GUI one can set the Default 5th LOs for IF bandwidth as
        fllows.

          IF   - Synth1,Synth2
        32 MHz. - 148000,157000 KHz.
        16 MHz. - 138000,167000 KHz.
         6 MHz. - 133000,172000 KHz.

        one can set any costom LO5 through the entry box.
        the green buttons of Synth1 and Synth2 indicates LO5 is set.

2. ONLINE.
        To control and monitor BB and GSB-LO systems through ONLINE,
        a 'bblocli' (Baseband GSBLO client) program developed
        using 'nbbserv' functionality. This client program will
        communicate with both the GSB-LO and Baseband server.

        Details are as follows :
        (1) The 'gsblosrv' server program runs on 'elab@loconf'
            machine. This program runs as a daemon process and
            will be always up. Messages by the 'gsblosrv'
            can be seen in '/usr/local/gsblosrv/gsblosrvmsg.0'
            file.
        (2) By default, 'bblocli' program communicate with both
            the servers. In case, user want to communicate with
            only one server, use 'bblocli -c 0 [BB] | 1 [GSBLO].

```
        (3) Commands to be given via ONLINE :
          # user0/master :
          > stgsb32lo, stgsb6lo, stgsb6lo # Set GSB LO for IF BW 32,16,6 MHz
          > stgsblo('X','X') # X valid GSBLO values in integer up to 6 digit
          # user2,3,4,5 :
          > stgsblo('X','X')
            Commands to control BB units are same as previous.
```

9. Decimate mode (sub band selection).

In case of line observations we need to set the sub band number and custom LO5.

Use script gsb_tpa

One can call it from observer@astro0 or any astro/gtac machine (~snk/bin/gsb_tpa).

```
        It needs following args.

        1. Lo1 higher or lower. ( H/L )
        2. Lo1 freq. MHz.
        3. Lo5 freq MHz. ( 133 for IF=6 and 138 for IF=16 )
        4. Final band width MHz in GSB config.(similar to BB BW in GHB)
        5. Line frequency MHz. ( middle channel freq )

        At o/p it will produce the list of steps and their freq. ranges,
        and the step in which line is preset. At the end it will tell you
        the step number which is to be used and the modified 5th LO freq.

        If you are using the IF band width 6 MHz. then your line must be
        be preset in the first 1/3 steps. ( there won't be any data after
        6 MHz of IFBW ). If IF band width is 16 MHz. then one can use any
        step.

        say "gsb_tpa -h" for help.

        e.g.
        >gsb_tpa  <L/H>  <lo1>  <lo5>  <fbw>  <line>

        >gsb_tpa    L    1210    138     1    1283.5
```

10. Switch OFF GSB hardware
Power down procedure for GSB cluster
(48 nodes + gsbm1 + gsbm2 + gsbm3 + gsbm4 + node49 + node50 + SDLT-2 drives + LTO-4 drives)

a. login as root on gsbm1
b. cd /mnt/code/jroy/gsb32/utilities/
c. run "halt_all.csh" to halt node1-node50
d. login to gsbm2, gsbm3 and gsbm4 and halt each of them
e. halt gsbm1
f. press the power swith of each node to stop the power comming to motherboard
g. switch off power switches on the GSB power sockets.

11. Switch ON GSB hardware
Power up procedure for GSB cluster :
a. switch on all the power switches of the power sockets.
b. switch on the gsbm1 first and wait for it to boot.

(as the /mnt/code/ disk is exported from gsbm1)
c. switch on the rest of the machines.

12. Reboot GSB
How to do soft reboot GSB Network switches :
if acq on dsasconsole report network band width problems and exit, we need to
follow the following steps.

a. loging as root to gsbm2
b. open firefox browser.
c. open four separate tabs for
    192.168.15.253, 192.168.15.252, 192.168.14.253 and 192.168.14.252 resp.
d. login as admin (passwd field keep empty) for all four windows.
e. go to the reset menu (left hand side of the browser page)
f. reset the swithches.
g. wait for 3 minutes.
h. check the connectivity (e.g. ping node1) from gsbm1.

13. Trouble shooting.
acq on dasconsole reporting problem of "PLL unlock" :
need to check the Rubiddium clock in the receiver room.

acq on dasconsole reporting problem of "DMA TIME OUT" .
need to check the "TM4" GPS in the receiver room and
GPS signal conversion unit near the blue trolley near the GSB rack