

Minutes of Plan meet of 5 Mar 2014 (follow-up of some pending topics from different areas) :

## 1. Documentation related :

1.1 Documentation : follow-up on level 2 (ITR) -- from 19 Feb & earlier :

(i) Check status of new items : work was ongoing for

(a) power monitor (Gaurav) -- rough draft ready, can first version be released?

(b) 250-500 main + sub-band filters (Sougata) -- is it started?

(c) 550-900 main + sub-band filters (Imran) -- is it started?

(following are to be taken up later : temp monitor, spares for 1420 feed)

To check if (a) can be released, and what is the status of (b) & (c)

==> (a) will done now as SFA is now released; (b) has just started; (c) will start shortly.

(ii) Also, can we look at which ITRs may be ready for conversion to NTRs : it was thought that filter design work can be taken up for this, once the ITR is done (to be kept pending till then).

==> to wait for some more time.

Regular follow-up on all items after 2 weeks.

1.2 Follow-up on level 3 (NTR) -- pending for long : from 26 Feb & long before (SSK): to check status of report on design of OF system -- SSK to try and couple this with work on paper for MWSky. Needs urgent update.

==> no direct updates. To check again after 2 weeks.

## 2. FE & OF related :

2.1 Update on results from test range -- pending from 19 Feb & before (HRB/GSS/SSK) :

(i) phase centre tests for 250-500 CDF : to report on expt with 10 to 20 cm height change in 250-500 feed on one antenna to see how much change in sensitivity is seen.

Need short note summarising the results : to check if last measurement with reduced height has been completed and results ready for release. Agreed to try alternative of cutting the support legs of one 250-500 feed cone to the 10 cm reduction, instead of shortened stool (to avoid fouling with cable assembly); modified structure was ready and test was done on C6 more than 2 weeks ago; need update from the results.

==> no updates as HRB not present -- to be asked to provide an update on results.

(ii) update on calculation (based on reference paper) of the expected deflection at 450 or 500 MHz and comparison with measurements to see if we are losing significant sensitivity -- GSS to come back with refined version more relevant for GMRT, and to see if further expts with 250-500 or 500-1000 feed are useful : cross check of results from code (0.3 dB for 0.5 lambda) wrt curves from Kildall paper was confirmed, and work was on for GMRT specific case of 250-500 to get efficiency factor as a function of freq over the band, after porting the data for the feed pattern -- first results for cone-dipole at 400 MHz showed 50% less aperture efficiency than expected : error was found in the code, which is now corrected and getting better results (9.9 dB vs 11.6 dB expected); follow-up action included trying to include realistic phase response (instead of 1.0) by reading data from a file etc.

==> work in progress, can check again after 2 weeks.

(iii) status of phase centre checking for ver1 550-900 CDF and CSIRO feeds --

waiting for results with new VVM set-up, after installation of new encoder + notch filter for mobile band :

(a) protection circuit for encoder and improved corrosion protection to be decided: GS to update on recent discussions.

==> discussions with servo group : better grounding/isolation and proper alignment of shaft are possible options; after discussion with IntelTek, Ajee will take up the jobs to be done.

(b) new results from tests of ver2 550-900 CDF show : reasonable E-H match at 610 and then degradation in shape and matching at 700 & 800; partially supported by older measurements from Dec 2013 (with slightly different set-up).

Action items : (b.i) to compare simulation vs measurement at 610; (b.ii) to repeat with more frequency steps and then noise source instead of CW signal; (b.iii) to get back original ver 2b dipole from GMRT (after new dipoles are delivered).

==> HRB has comparison plots which he will circulate; new measurements yet to be done; 2 new dipoles have come -- will spare one dipole that can be sent back to the range.

Also to complete the phase centre of ver1 550-900 CDF and CSIRO feeds...

==> Regular follow-up on all items after 2 weeks.

2.2 RF dump tests for new feeds -- from 19 Feb & before (HRB/GSS/SSK/PAR/NK)

(i) new data and results for 130-260, 250-500, 550-900 (HRB/SSK/NK) : (a) follow-up on discussion of current results : understanding of bad antennas for 250-500 band : still waiting for cause of failure of dipole on C4 to be confirmed; to check if monthly overlay plots now available with off-source and on-off plots for comparison.

(b) new expts with antennas tracking on-source & off-source for long duration (4-5 hr) were planned, and some work has been done -- status update from these.

(c) follow-up from analysis done by NK and plans for interferometric tests at 130-260.

==> C4 dipole checked in the lab and found to be fine -- hence, real cause of the problem is not understood ! ANR will remind Ankur about updating the plots as specified; no fresh data from long runs; interferometric tests planned with NK tonight.

(ii) scheme for (re)calculation of expected values across the broad bands to be finalised (and added to measured curves) -- (SSK/GP/HRB) : curves now being done with constant QH value and with variation of T<sub>lna</sub> with freq incorporated; FE team to model the effect of the main BPF and see if the curves match better with data.

New curves with effect of BPF included to be generated (discussed last week) : the deflection peak is now matching fairly well across the band, but the curve rise and fall at the edges of the band is not quite matching : needs a closer look to see if this can be understood and resolved.

==> mismatch found to be due an offset in freq; corrected plots to be circulated and then follow-up action to be discussed (including possibility to try it for Lband).

==> Regular follow-up on all aspects after 2 weeks.

2.3 Follow-up on 550-900 MHz band filters -- from 19 Feb & before (ANR/SSK) :

(i) comparison of product obtained from ICON with in-house effort and finalisation of plans : technical comparison of individual filter responses shows in-house design to be slightly better; but need to complete integrated unit for insertion loss etc before taking a final decision, including plans for mass production. Tests with integrated unit using new PCB show insertion loss increases to 3 dB now and some change in slope on higher side; to complete chassis and full integration and then repeat the tests and make detailed comparison with ICON results. Some results have been circulated : to discuss and decide next course of action.

==> detailed comparison shows that performance is very similar except for some

out of band bumps (at 30 dB level) and slightly slower roll-off ; to try with AC coupling capacitors added to check and then finalise the design; meanwhile to make realistic cost estimate for in-house production and get quotes from other parties (ICON and Argus etc) and compare and decide. To check status after 2 weeks.

2.4 Total power detector for FE & common boxes -- from 19 Feb & earlier (GP/ANR/SSK):

follow-up on plans for final scheme : 20 dB coupler for CB and 10 dB coupler for FE (at final output) with common 20 dB amplifier (maybe Galli-52 instead of Sirenza)

-- sample unit ready and tested in the lab with 2 chans for 1 common box; lab monitoring of signals via MCM card now working :

(i) sample data from 2 units installed on E2 shows basic things are working ok: more sophisticated tests with on and off source tracking to be done (alongwith digital backend recording, if possible) -- first round of testing showed 11 dB deflection (for 12.4 dB expected), flat-top on-source waveform to be understood; new tests with noise on-off to be reported upon (also if weaker source like Crab has been tried).

==> no fresh data; to try tonight and see if E2 can be used for night time tests.

also to check what is the rms of noise vs least count of adc

(ii) plans for building 70 units for CB : all PCBs and chassis are now in hand; need to decide plan and schedule for mass production and installation on upgraded antennas.

==> agreed to work out an algorithm such that new units are made ready to match the typical / expected consumption rate of going into boxes.

(iii) plans for prototype of the FE monitoring unit : 2 units had been assembled and found to give identical performance as per specs; problem of feed-thru vs connector was resolved in favour of feed-thru (as per original chassis design); all testing completed in the lab; was put up on C4 in original 250-500 FE box, but not tested -- was to be done alongwith further tests of E2 common box power detector; to check if online monitor channel has been identified (with JPK) and sky tests have been carried out or not

==> not done yet; may happen today.

(iv) status of ITR on the work, which was ongoing.

==> will be able to spend more time on it, as SFA is done.

Regular follow-up on all items after 2 week.

2.5 Fixing non-working L-band feeds (short-term problem) -- from 19 Feb & before (SSK/ANR) : we have 32 feeds, 3 not working (1 dismantled for making drawings of new feed); all are device failures, but not able to put new device and tune it; now some LNAs have been successfully assembled by Gopi and C3,W1,E2 & E5 have been fitted with these and found working ok.

(i) Spares : Agreed to have 5 LNAs ready and available as spares : device is available, PCBs ordered, chassis under request, gold plating of wire completed; to check status of assembly of the 8 LNAs that are being done.

==> 10 nos of LNAs have been assembled and are being tuned.

(ii) check status of alternate LNA designs : to try and see if design used for 550-900 can be modified for 1-2 GHz use ; to also check the design done by Abhay Kulkarni -- ANR now looking into this design to see if it can be improved for our needs; to check if design files have been obtained and what is the status.

==> design files have been obtained, need to be checked by ANR.

Regular follow-up on all items after 2 weeks.

2.6 Spares for L-band FE electronics -- from 19 Feb & before (ANR/SSK) :

(check which of these items are complete and can be closed)

(i) RFCM-type card status (3 nos of old RFCM cards are ready) : status of new RFCM

card -- all tests cleared and agreed to get 10 nos of this PCB for current LBand spares : to update status of this.

==> 10 PCBs have come; 1-2 will be assembled and tested immediately; for others, components are being procured.

(ii) noise gen : PCB assembled; bench test completed; to integrate with one spare feed for final testing -- waiting for spare feed : status update needed.

==> no change in status.

(iii) timescale for integration : all components (except LNAs) for assembly of 3 feeds now ready : check (a) progress on LNAs (only 1 spare was ready on 20th Nov, 2nd was being assembled) (b) plans for integration of one unit, using the presently dis-assembled feed (there was a problem of AI strips) : need status update on this.

(iv) finalisation of plans for having total of 7 working spare feeds -- from mechanical to electronics : (a) mechanical issues to be updated upon (see item 6.x) (b) shortfall in electronics for these to be checked and addressed.

==> email update from ANR : one pair of LNAs is being tuned (10 nos have been assembled); mounting plates for the the electronics are being fabricated at NCRA w'shop -- work held up due to shortage of rivets (?).

==> Regular follow-up after 2 weeks.

2.7 Filters at different stages of receiver chain -- from 19 Feb & before (SSK) :

(i) scheme for filters at antenna base : 3 type of ckts being designed using the new device : 2, 4, 8 way switches with different possible applications : (a) notch filter bank switching in rx room (b) filter bank switching inside FE box (c) rcvr room monitoring. ckt for 2:1 and 4:1 versions assembled & tested -- 25 dB isolation achieved (changes from 25 to 17 dB with frequency for 8:1 switch); aim is to target (a) integrated units for 550-900 with 4 sub-band filters with integration of RFCM switch and compare against ICON units -- see item 2.X; (b) for 250-500, agreed to go ahead with the discrete design for now (which is now fully tested and ready for integration into new FE box); work on integrated PCB has also started -- looks like it may have switch separate from integrated filter PCB.

==> 550-900 detailed comparison work ongoing as detailed above; for 250-500 individual units already integrated in new FE box; integrated design now looking at 2 PCBs for 4 sub-bands in one chassis + switch PCB in separate chassis -- this design is done and prototype PCB is going out shortly.

(ii) to follow-up on refinements of the scheme for each FE box : update on 250-500 system (first to be done), alongwith LPF from 1750 and above for HI band. sample PCB for 1750 LPF had come and was to be tested + other elements were to be assembled to produce the first unit for 250-500 system : 2 versions (1550 & 1650 MHz cut-off) assembled and tested; it was agreed that 1650 cut-off will be better (in combination with 1800 notch-filter). Action items :

(a) real-life testing of prototype unit of 1800 notch filter has been done (for the case of full band selection of LBand BPF) : results show that LPF gets rid of large part of the 1800 mobile, but not all of it; with notch filter, almost all of it is gone. Two options are possible : notch filter at rx room in the main signal path -- to test its low frequency response for flatness; LPF always in the path with notch filter switched in when needed. To evaluate the 2 options and decide. (b) then install in antenna path for field tests -- to be combined with testing of switched filter bank at rx room.

==> Ankur has sent the plot showing LF response showing 0.5 dB change in loss over frequency -- so notch filter permanently in the path may be acceptable option; to confirm detail performance specs in 50 to 1500 MHz range and take a final decision. Regular followup on various aspects after 2 weeks.

2.8 Characterisation of new FE+OF systems -- from 19 Feb (PAR/SSK/SN) :

(i) Summary of L-band results & performance (along with new data from Dec & later):

(a) stability of power levels -- can be checked with existing data; also can this be coupled with regular program for monitoring in the control room?

(b) antennas with large (~ 18 dB) slope across 400 MHz (e.g. C13, W1, S2...) to be checked and reported -- can this be closed after checking with new data from Dec? updates to the above 2 items are long awaited !

(c) ripples and funny bandshapes to be characterised and compared with antenna base measurements to try and identify source of problem (S6 correction is done).

FE team to complete analysis of existing data from Dec etc alongwith the new data taken, and report the integrated results. URGENT !

==> no discussion as relevant members not present.

(ii) Summary of 250-500 band performance :

(a) stability of power levels and bandshapes; variation from antenna to antenna : some improvements in monthly plots have been suggested, including adding on-off deflection plots -- to check and follow-up on this.

(b) presence of RFI in the band (TV lines etc) : follow-up tests (also including regular monitoring with 30:1 data etc) and results to be discussed.

==> no clear discussion and conclusion -- to follow-up separately, as needed.

(iii) to characterise the recommended attenuator settings for different bands :

completed for Lband, 250-500, existing 610, only 130-260 / existing 150 -- to discuss once if values given to control room are optimal (e.g. 7,7 for Lband sub-bands) :

from tests done by YG and DVL, this appears to be sub-optimal and need to be discussed; FE team to test the power levels at OF o/p and cross-check against SFA values; also, at 1390 the problem appears to be somewhat less and may be related to having extra 10 dB gain stage; FE team to confirm which antennas have this modification.

==> VBB does not have a record of which antennas have the 1390 modification; could check with APR and see; otherwise has to be done empirically... (YG confirmed on Thursday, 6th with APK that his original notebook that has been given to FE team does have this information clearly listed / mentioned !).

==> Regular follow-up after 2 week (and a bit of it before that, as needed).

2.9 Releasing existing 610 MHz system as part of the wideband upgrade -- from 19 Feb (SSK/ANR) : Preliminary tests of existing 610 feed through the wideband path show that ~ 100 MHz usable bandwidth may be possible as part of phase-I uGMRT.

Agreed that only RF filter needs to be changed to new 550-900 BPF (alongwith mobile band and TV notch filters) -- two sample units had been made ready and were put in FE ch1 of C8 & C12; initial RF deflection tests look encouraging : extra 10 MHz on lower side and 20 MHz on upper side, leading to a total BW of ~ 120 MHz (~ 565 to ~ 690 MHz) + some lower level response (5 dB down) upto 780 MHz; action items :

(i) to carry out 2nd round of interferometric tests to characterise the performance; YG & DVL to report on this.

==> no explicit report presented on this.

(ii) to check progress on completing of 5 more antennas that can be done with present hardware, following the path of the 250-500 upgraded antennas : all items in hand, except for BPF chassis (which should have come by now).

==> chassis (20 nos, outsourced) have not yet come -- to check urgently.

(iii) to discuss finalisation of PCBs for the filters :

(a) we have 100 PCBs that can work for either 175, 540 or satellite filter; of these 12 nos are wired up for 540 filter; 2 nos used for satellite filter; will need a total of at least 120 nos of 540 filter for all GMRT (60 each for 2 bands); to order components for 120 nos of 540 filter; 80 nos of chassis are available; remaining to

be made (likely to be outsourced).

==> components have severe shortage of inductors, but indent is 3 months old -- to check the order status urgently; chassis (80 are available, not 20) and 20-40 more are ordered (outsourced).

(b) for mobile filter, 60 nos + 10% spare are needed; to add quantity to chassis request. To see if PCBs for 10 antennas can be ordered for this, given available substrate material (which is also needed for other PCBs). remaining PCBs can be done later on; more substrate material needs to be ordered.

==> some epsilon10 substrate (for microstrip filters only) has been received; but a repeat order will be needed. For lumped element filters, the FR4 is available with PCB manufacturer.

==> Regular follow-up on all items after 2 weeks (or earlier, if updates available).

2.10 Status of new CSIRO feeds : from 19 Feb & before (ANR/JNC) : to report on performance of the newly manufactured feeds -- new results are slightly better compared to ver2 (casting) but not as good as the original ver 1 (machined by Godrej) -- to decide follow-up action.

==> not resolved in this discussion... to follow-up after 2 weeks.

2.11 New filters for Lband -- from 19 Feb & before (ANR/SSK) : Sample Lband full-band BPF had been designed -- has no slope with freq and better insertion loss, and maybe a better option than the existing main BPF; similarly, prototype design of new sub-band filters (with better insertion loss) has also been done.

Agreed to go ahead with the main BPF as a low priority job -- PCBs (stripline) does not need much work for assembly -- can be given for manufacture; new chassis will be needed; population can be done as and when a FE box comes down. To discuss and finalise the plan of action and decide timescale for follow-up.

==> PCB order for 70 nos can be sent using existing eps10 board; both pols can be combined in one chassis requiring 35 nos only -- drawing to be finalised for rail-type chassis; to check if existing chassis can be re-used; can revisit after 4 weeks; part (ii) : sub-band filters can be taken up at even lower priority later on.

2.12 Calibration scheme with radiator at apex of antenna -- from 19 Feb & before (SSK/PAR/SRoy/DO/YG): to follow-up on detailed discussion meeting in August : to schedule follow-up action appropriately, breaking the issue into smaller, more tractable items :

(i) testing of dynamic range of old vs new electronics with parallel set-up on 2 antennas, C4 (new electronics) & C1 (old electronics) -- SRoy to work with FE team on this -- first round of tests done and preliminary results show the following : appears that 1 dB compression pt has improved by 6 to 8 dB (from -6 to -10 dBm to about -1 to 0 dBm); change in phase (and also ampl?) with change in elevation shows cyclic variation -- may be due to position shift? needs to be explored further; change with time shows... (?) present action items :

(a) to check the change in 1 dB compression pt against SFA numbers.

(b) to repeat on another antenna with new electronics (C6) and one with old;

(c) later to try for other wavebands when new transmitter antenna arrives.

(d) to get the plots done for the variation with antenna position (elevation etc)

and then work on interpretation

(e) later, to move to finer aspects of variation with time (see item (ii) below).

(ii) finer aspects of variation of ampl and phase with various external parameters (DO to work with FE team on this) -- need an update on the status of this.

(iii) other longer ranging goals :

(a) procurement of new broadband antenna : suitable unit has been identified and ordered -- expected date of delivery to be confirmed

(b) testing with broadband noise source : feasibility of connecting noise source and radiating has been checked by PAR -- plans for this to be finalised.

==> not discussed today. To follow-up again after 2 weeks, if possible.

### 3. RFI related matters :

#### 3.1 RFI testing of Miltech PC + peripherals for antenna base -- from 19 Feb and earlier (PAR/SSK/SN):

Integrated testing new i5 Miltech PC with peripherals -- using new shielded ports, connectors, shielded media converter + cables, Rabbit card (with Akvira make shielded box) showed good performance (new report with block diag and conclusions/recommendations has been circulated); mech group had ordered 2 shielded boxes for Rabbit with Akvira (with modified connector diagrams and different back plates for extra SPI port). Tests were to be done with these new units (using feed through arrangement till shielded 37 pin D-type connectors come) : need status update on this work.

==> email update from PAR :

first round of tests have been done ; need first draft version of report on testing of integrated system to be circulated by RFI team. Meanwhile, partial consignment of the much-awaited connectors will come in the next 7-10 days. Regular follow-up after 2 weeks.

#### 3.2 RFI tests of ethernet switches for antenna base -- from 19 Feb & earlier (SN/BAK/SSK): Testing the available switches for RFI (as per 29 May discussion); plans for design of RFI box for ethernet switches :

(i) procurement & testing of switches : sample units from Cisco, HP, Dlink and DELL had come and have been tested for RFI -- conclusion from final report is that D-link is much better than others (but it is 2x more expensive than next best option of CISCO by 20K); also, use of shielded CAT5 cable provides significant improvement; agreed to wait till RFI enclosure is ready and do full test with CAT5 for both D-link and CISCO and take a final decision; meanwhile BE group can borrow the units for testing in GAB system.

(ii) design of RFI enclosure (see item 6.6 below)

==> email update from PAR :

first version of RFI enclosure has been received on 10th, and is under integration in the lab.

#### 3.3 Mobile phone RFI -- from 19 Feb & earlier (SSK/PAR) :

Progress on identifying the operators at and around E06, and in Nagar, Junnar directions : letter had been sent to BSNL, some follow-up action was on -- they had agreed to change to 1800 at 3 locations (Ale, Gulanchwadi & Pargaon Mangarul : to check status of this, including follow-up RFI test. This is pending for a long time now !

==> email update from PAR : frequent reminders to BSNL have not yielded any news or updates; to check again after 2 weeks.

#### 3.4 Follow-up on UPS RFI -- from 19 Feb & earlier (SSK/PAR/RVS) :

(i) procurement of units from Miltech (RVS) : both 1 and 3 kVA units are under discussion :

(a) RFI testing of 3 nos repaired 1 kVA units from Miltech showed significant RFI -- updated report comparing original Miltech 1 kVA test reports (with same load conditions) have been circulated; Miltech has offered to fix the problem with these units and electrical group is ready to give it a try (to transfer the order from servo to electrical) -- work ongoing to send units back to Miltech for improvement.

==> no updates.

(b) Miltech has offered improved version for 3 kVA unit -- order has been placed for the same and unit is expected by early-mid Feb : Miltech will deliver along with improved 1 kVA units. Need status update on (a) and (b).

==> no updates on either (b) or (a).

(ii) follow-up from RFI testing of Ador 3 kVA units -- 2 nos of tested and cleared units are in use : in C9 and C10. RFI team was to add some comparative statements at the end of the 2nd report quantifying the repeatability and circulate (then this item can be closed). NOT DONE YET !

==> will be done shortly !

(iii) Bigger units : agreed to order 2 nos of 4.5 kVA units with Ador, with option of 2 single phase o/p with different isolation transformers (3 + 1.5 kVA); expected delivery date is 31 Mar or before. To confirm status and then take up after 4-6 weeks. Need update on this.

==> no updates.

3.5 Discussion relating to Industrial RFI survey -- from 19 Feb & before (PAR/SSK) : revised docs (from 2009 and 2012 discussions) had been circulated by RFI group and were discussed in 5 June meeting (is the document too exhaustive?) : follow-up action identified :

(i) a form had been prepared for use in the survey and had been discussed in detail and agreed that it is suitable for use; need to finalise plans for entering existing data into this form : one possible candidate had been identified -- to confirm if this is worknig out or not.

==> not started yet.

(iii) plans for starting survey asap with 2 teams (with extra manpower), lasting for one month, using SoI maps, form etc, to be finalised : 1st week of April was agreed as the start date -- check if this is confirmed by both sides; vehicle requirement (2 nos) to be discussed with admin, as well as accommodation request of DIC members; one more engineer needed for the job has been found? To check which of the above are fnalised and can be closed.

==> no significant updates on this.

Regular follow-up after 2 weeks.

#### 4. Operations :

4.1 Development of M&C software -- from 19 Feb & before (JPK/RU/SN/NGK) :

(i) plans for EPICS testing : one Rabbit card + one PC104 card with associated details and code given to TCS for PoC work; simple set-up of PC + EPICS talking to Rabbit (with our native protocol), to be set-up in our lab also, so that first version from TCS can be tested in our lab. Need status update on this.

==> one version has been installed and beginning to test with drivers on one m/c; now installing on Miltech PC, will need one more Miltech PC for the core m/c; will start installing TCS software version by 10th Mar and PoC 1st phase testing will also start happening at TCS lab. 17th-20th : formal visit to TCS lab for testing of the PoC ver (formal milestone, including evaluation report); after that testing at GMRT till 27th. Closure report by end-Mar.

(ii) plans for modbus learning & testing : simple set-up of PC + Rabbit card with modbus for "hello world" level -- first tests to be done alongwith item (i) above.

==> not yet tried, but could happen soon alongwith other developments.

(iii) follow-up on interface of FE with new M&C system -- Naresh + Charu and Sougata have started work on this; will have full set-up of FE + Common box, but will start with M&C of common box using Rabbit card : initial h'ware connectivity

may not be too much work as 32 lines have to be mapped to 16 lines on interface card; low level software for bit pattern setting may be enough to demonstrate basic connectivity; after that, packaging will be the issue. Team had reached the point where able to set bits using the set-up of Rabbit talking to interface card; need status update on the work.

==> bit pattern from MCM to interface card coming out as expected; after that, the signal does the desired downstream cards (e.g. band selector card) -- looks like the correct bit pattern is not being set -- needs some further investigation.

(iv) plans for populating a few (5-6) antennas with Rabbit card (with or without PC) for testing. C3 and C6 have been completed, and moving to S3, W3 + C8, C11 (only PC104 required) for prototype testing : instead of S3 & W3, S2 & S4 have been populated, but S2 was giving some problems -- need status update.

==> S2 OF problem is still there as some signal is not reaching there -- PAR will resolve it shortly.

(v) plan for PoC testing : PC to PC104 on one eth port; PC to PC between ABR and CEB (for 2 level SACE); PC to Rabbit in GAB with PC to PC in CEB. to check status.

==> Master SACE PC in CEB; connect to Slave PC in ABR via switch + PC104 connected to same switch; at CEB connect Master SACE to GAB Rabbit direct or via another slave or via the PC which currently talks to the GAB Rabbit? To check the final scheme and also availability of all the hardware required.

==> Regular follow-up on all items after 2 weeks.

#### 4.2 Identification of appropriate ethernet switches for antenna base (and GAB)

-- from 19 Feb & before (SN/PAR/BAK) : Ops group to work with Comp team and RFI group to plan for trying some of the 16/24 port switches for antenna base use :

(i) need discussion on results from the tests to decide future action (see also 3.2)

(ii) plans for BE teams need for switches in GAB system (in receiver room) :

agreed to use 8-port switches for now though they are worse in RFI than the 24 port ones tested for antenna base use, and take a final decision later on; same for the SMPS power supply-- 2 nos ok for now; need some discussion on this matter, for long-term planning.

==> Regular follow-up after 2 weeks.

#### 4.3 Planning for proper space utilisation for new equipment at antenna base --

from 19 Feb & before (SN/CPK/RVS) : long-term plans for proper utilisation of the space at antenna base. Follow-up on 14 Aug discussion on first report : 2nd report has been generated and detailed discussion took place on 5 Feb.

Summary and action items are as follows :

(a) Doing a careful re-analysis of the total load (alongwith individual team members) and separating peak load (e.g. switch on load) from sustained load etc in table 2.

(b) Agreed that peak load requirement (e.g. in-rush current) can be balanced out by synchronised delayed switching on of different units -- this is already implemented to some extent at present.

==> some discussion about current load of ABR system -- agreed that it could be capped at 4 A (though present supplies are drawing only 0.7 A -- may indicate leaky caps which should be checked); similarly, OFC + FE supply needs to be check (0.5 vs 3) and new MCM system (PC + Rabbit) ; did a quick run through the other numbers and came up with a tentative suggestion that 5.1 A can go up to 8 A (and hence 10 A is a safe limit) -- this is 2.3 kVA and hence it means 3 kVA is more than enough; to confirm with individual groups and come back.

(c) New power consumption estimate to be made & final UPS capacity to be matched to it.

(d) Diagrams showing rack utilisation to be rechecked for consistency (including some adjustments for antenna to antenna variations?)

(e) Existing servo FPS units can be left where they are; if isolation transformer can

be moved out from the rack, then space in that common rack is enough for all growth plans of FE and OF systems; this leaves some empty space in ABR rack bottom that can be utilised for further growth of telemetry system; all new servo growth to be accommodated in the servo racks (or in-situ replacement of existing units); with this, there should not be a crunch for space, but a careful relook in the updated report will help clarify the matter.

(f) the new UPS can have the isolation transformer(s) integrated into it, without increasing its footprint (only height may go up); UPS can be located in the space between the ABR and servo racks -- this has been done in one antenna with the new UPS and can be checked for suitability; final configuration of the UPS can be decided once the load calculations have been refined.

==> also, to check space occupancy of new BLDC servo system vis-a-vis old one.

(g) extraneous items in the surrounding of the racks (electrical fittings etc) can be relocated, as far as possible, to make it convenient for people visiting for work.

(h) report to be updated for relevant items from (a) to (g) above.

Some of the relevant, action related items discussed (vis-a-vis the updated report that has been circulated to all GCs, alongwith a request to help with load tests and measurements) -- to follow-up on action from these.

==> some of the issues discussed above and power and space related items can be revisited after 2 or 4 weeks.

4.4 New, improved Miltech PC -- from 19 Feb, 22 Jan and earlier (CPK/SN/PAR) : 2 units of Miltech PC with two changes (more screws on panels + panel mount pwrline filters instead of chassis mount) under order by Ops Group : to check status of delivery.

==> to check with Miltech and confirm the status.

Discussion on NRR control machines... combining functions into fewer control PC etc; ... also some errors in running of the M&C system for GAB -- to be brought back as agenda !

## 5. Back-ends :

5.1 GPU corr (GWB-II) : release of 4 node, 8 input, 200/250/400 MHz version -- from 26 Feb & before (SHR/SSK/BAK) : (NOTE : GWB-I is existing released system !) : agreed to make 4 T7500 nodes with C2050/C2075 Fermi GPUs + remaining 4 T7500 nodes as host machines (to take care that these are the ones that transient pipeline uses presently so that sharing is possible); this should have ALL basic modes : total intensity and full polar IFR modes; IA + PA BFR modes with process\_psr pipeline attached; full GUI support; to come up in trial code section without affecting the presently released mode.

(i) issue of jump in start time seen for some runs and possible solution for the same : agreed to run some tests with IMH and operators to make the system fail to verify the cause and then confirm and make sure that SOP is updated; meanwhile, to check if ack facility is available in initdas so that system can wait till the ack comes before exiting the initdas command -- need status updates.

==> no further on this at present.

(ii) update on code for providing basic beam modes : new version with separate kernel (outside phase shift kernel) for beam formation has been developed (compute load is 7% increase on 2050 GPU); IA mode tested on pulsar signal : addition of 7 antennas in single pol at 610 MHz with 200 MHz LPF -- to test with different

setting in pmon to check S/N effects; process\_psr pipeline has been completed and released; first version of SOP has been released;

Pending action items :

(a) user tests to be carried out to check the functioning (YG to look into this)

==> test data is being looked at.

(b) all the GUI features are implemented, except for sockngetcmd option which is being done manually -- to check plans for this.

==> sockngetcmd may also have been integrated -- to check and confirm.

(c) plans for phasing algorithm and PA beam mode : phasing has been implemented and tested (SSK); work on PA kernel is ongoing (SHR) -- kernel has been done and needs to be tested;

==> PA mode is currently under testing.

(d) header for beam mode data : to take up the matter for discussion.

==> to be taken up in this situation and incorporated alongwith the PA mode.

(iii) modification GUI for supporting new modes, as well as having support for code in trial branch -- GUI v1 for GWB-II has been released; v2 with beam modes fully incorporated to be released soon? first version of this has been completed and is available (but not released) -- can it be done now? Is the SOP ready?

==> mostly all done?

(iv) spikes in channels that are power of 2 : this problem needs to be discussed, understood and fixed.

==> nothing has been done on this yet.

==> to followun on relevant items one week later.

5.2 GPU corr (GWB-III) : next gen system -- from 19 Feb & before (SHR/SSK/GSJ/BAK) :

New improvements needed for finalising the design for the full 32 ant, dual pol system : 4 new DELL machines are in the rack and wiring + cabling is complete, running with analog noise source; new code with 2 x 10 Gbe I/ + improved logic for assigning specific threads to each core + env variables is completed (tested for 200 MHz / 8 bits and 400 MHz / 4 bits, 16 inputs and working ok with no pkt loss); ongoing action items :

(i) longer length of FFT (more than 2K channels) : a particular solution has been worked out that requires doubling the sampling rate... needs to be discussed.

==> this needs to be resolved.

(ii) improvements in GPU code using K20 card (SHR/SSK) : cross-check on FFT code (done and can be closed); calibrating MAC performance vs data reshuffle load (done and no further improvements look possible; can be closed); pending action items :

(a) looking at XGPU code (with Pradeep of nvidia) -- walk through with Vinay (nvidia) had been done -- need to check if there is any progress on this after recent meeting.

==> to follow-up with nvidia.

(b) trying sample PA beamformer code to estimate load etc. -- need status update.

==> will come when PA beam mode is released in GWB II

(ii) to start testing 400 MHz BW mode -- how best to conduct these tests? all changes in the main code to handle 4 bits etc have been done in GWB-II and now need to be ported to GWB-III and tested; need a discussion on this.

==> no updates here.

(iii) Layout and racks (GSJ/BAK) : layout diagram to be updated and long-term plan for racks to be initiated; 3 different kinds of President racks discussed -- to try and finalise after one more round of discussions including RVS (also, new vendor Jyoti Tech); meanwhile, agreed to get 2 nos of cyber racks on urgent basis -- to check status of order/delivery; also assembly of new GSB nodes in half-height rack to be confirmed (using old rack from East Campus).

==> 2 nos of cyber racks getting ready to order; for the "cool" racks, not much response from President; more response from Jyoti Tech; need to follow-up a bit vigorously; half-height rack is getting readied.

(iv) procurement of accessories like network cards, disks, cables etc to be looked into -- 20 nos of CX4 based dual 10 Gbe cards to be purchased -- these are compatible with T620, may give some trouble with R720 (for 2 GPUs).

==> indent submitted and may be in enquiry stage.

(v) new purchase of Roach boards etc : follow-up on status of order -- expected date of delivery was given as June ! GJS to follow-up with Mo Ohady about this.

==> discussion ongoing with Mo for 8 vs 16 weeks.

(vi) purchase of 4 more T620 machines & 8 K20s : status update on these 2 orders where delivery is expected in March ?

==> T620 machines have come; K20s delivery is 15th March. To start looking for rack space for mounting etc...

==> Regular follow-up on all items after 2 weeks.

5.3 Walsh modulation : prototype set-up on Roach board -- from 19 & 26 Feb (SCC/BAK): plans of BE team for implementing prototype scheme -- basic unit for switching using sq wave signal from GPIO pin tested ok; was put in main PoCo correlator and was being tested; walsh waveform delay functionality has been added now and can set delay from 1 to  $2^{32}$  clk samples (!); with this, variation of correlation with delay has been tested; to generate final plot showing this behaviour; confirm if issue of factor of 2 between expected and measured delay has also be understood; detailed follow-up action to be finalised.

==> reminder to generate the plot; factor of 2 matter can be closed; to aim for one algorithm for hunting for the peak and detecting; can also think of a test case of showing cross-correlated signal goes away with modulation with square wave in one channel. Regular follow-up after 2 weeks.

5.4 Testing leakage, coupling and correlated noise in new back-end chain -- new item from 5 Feb (BAK/YG/++) : detailed tests had been done by Vikram Jaiswal (with SSK, SHR and YG) and report has been circulated; follow-up action item discussed between SCC, BAK & YG : for GAB systems, some follow-up action for testing the leakage has been initiated; need a more detailed discussion for actions for the GWB FPGA & GPU subsystem; procedure for testing to be done with GWB-II release modes to be clarified and tried out.

==> checking to see if earlier results can be reproduced -- working as expected; plus some new tests showing a few other things -- to be checked and takne up for discussion. Regular follow-up after 2 weeks.

5.5 SFP testing of final unit -- from 26 Feb and before (KDB/BAK) : SFP+ side working fine for both Cu and Opt; XAUI CX4 side is still flaky -- may still be marginal in timing. Update required from new tests after fresh inputs from vendor. Follow-up with MTE for PCB details and then with Vitesse -- not making progress; on SFP side everything is working; on CX4 side, 1 m is fine; 2 & 3 m work for some kinds of cables. To decide whether to pursue further or close the matter as it stands with a clear summary of what works and what does not? to discuss & finalise.

==> agreed that this can be closed and that we can live with 1 m length restriction from Roach board to converter box; to check with MTE about exchange of materials and information to close the matter. Regular follow-up after 2-4 weeks.

5.6 RFI filtering -- from 26 Feb (KDB/BAK/YG) : to add the first version of the real-time RFI filtering block (after some modifications) into the packetizer of GWB-I (in one input out of two with different options like replace by median or

by constant or by digital noise source sample or clip to threshold via s'ware registers) -- basic tests done; to try with real antenna signal split into 2 copies and check both self and cross outputs; to report about performance of the same, and then to look into optimisation of resource usage.

==> no updates at present; test will be done shortly, with follow-up after 2 weeks.

5.7 Next-gen time & frequency standards -- from 5 Feb & before (NDS/BAK) :

(i) brief update from BE team from visit to NPL was provided in last discussion; waiting for detailed report to be circulated

(ii) plans for follow-up action

==> summary regarding maser options already circulated in email; report will only give results for testing of Rb.

meanwhile some problem with Rb locking of one unit; remote help from Europe to try out diagnostics.; also to check about spare unit at RAC and unit at 15m for use in case of emergency when 2nd unit is to go for repair. Regular follow-up on all items 2 weeks.

6. Other items :

6.1 New python assembly design -- from 26 Feb (HSK/SSK) : FE group wants the python configuration in E6 to be adopted for all antennas -- this needs to be discussed with mechanical group and finalised; FE and mech have discussed about plans for modified python assembly that will give additional protection to cables; mech group had circulate a short note on their view of the matter, alongwith photos; this was discussed and existing vs E6 system was compared; Action item : two approaches : (a) modified E6 design with hinge-like support to be put on one central square ant -- short-term solution (b) IGUS cable wrap -- new technology prototype to be developed and tested on quadripod -- long-term solution. Need update on these from mech group.

==> (a) sample assembly is ready to install on one antenna of choice (tbd with FE)

(b) item under procurement (budgetary quote has been received) + sample of hose without wire impregnation under procurement (as replacement for existing hose).

Regular follow-up after 2 weeks.

6.2 Coexistence of 50-90 MHz RRI feed with 250-500 CDF on same face of turret -- from 26 Feb and before (HSK) : Mech group to check for possible solutions and report back, after looking at the drawings (awaited from RRI). Update from mech group about reverse engineering for making the drawings -- mech group has circulated a brief note : discussion showed that it is not compatible with 250-500 CDF (either cone has to be truncated or its height has to be raised by 30 cm to avoid conflict) -- may work with 550-900 CDF; mech group to try a solution for co-existence with Lband feed. Agreed to make a prototype that is matched to Lband and try -- HSK to take custody of the dipoles.

==> dipoles removed from 2 antennas have been collected (slightly damaged, but can be repaired); will shift reflector to Pune workshop for testing with Lband feed there.

Regular follow-up after 2 weeks.

6.3 Problem of access to FE boxes with 500-1000 CDF feed -- from 26 Feb & before (HSK) : Update on new solution being designed by Mech group -- tested in situ and found working ok; agreed to use this for present; for future where bigger and heavier boxes will come into play, mech group will think of an improved solution, including an option for removing one feed and bringing the stool inside the basket;

quick status update from mech group, with detailed follow-up later on. Action items agreed upon : first to check with new heavier box and see if existing solution is practical; if not, then to work on new options.

==> test not yet done with new, heavier box; meanwhile, a few alternative options are being explored by mech group, with target of 1800 mm height for boxes with max weight up to 150 kg (?) -- to be discussed. Regular follow-up after 2 weeks.

6.4 Fabrication of 5 spare L-band feeds -- from 26 Feb & before (SSK/HSK) : drawing has been made in consultation with mech and FE but still waiting for signature of SSK (!) -- to be cleared today given for manufacture; order to Akvira for 3 nos (with enclosure) + 2 extra horns. Hence, total of 6 feeds will be ready + 1 dis-assembled unit -- so total of 7 spare feeds will become available. Matter is still stuck because of finalisation of drawing ! should be closed by now : matching with drawing to be done by mech group and FE team together certify that it is ok, and no further changes needed; Need current status from mech group.  
==> email update from HSK : drawing "finalised" (but not signed yet!); final list of changes and modifications agreed upon by both sides; request for one more feed cover from FE group -- to be outsourced to Akvira. Regular follow-up after 2 weeks

6.5 Design of RFI enclosure -- from 26 Feb & before (HSK/PAR) : (see item 3.2) inputs for front panel design given to R. Lolap for completion of drawing; prototype was to be fabricated in w'shop, but is now outsourced (?) -- getting ready for placing order (somewhat excessive cost due to all-machining design -- ok for prototype unit, but different solution can be looked at for mass production) -- to expedite the delivery as much as possible : order has been placed; delivery of 2 nos expected by end of Feb (on request) -- need status update on this.  
==> 2 nos delivered to NCRA Stores on 3rd Mar; should reach GMRT by later this week. Regular follow-up after 2 weeks to check status and decide next step in this work.

6.6 Effect of increase in size and weight of FE boxes -- from 26 Feb & before (HSK/SSK) : Mech team to circulate existing drawing of turret to see how a longer FE box can be accommodated; and to do a first calculation about impact of weight increase which can be 50% for each FE box : capacity at turret; static & dynamic loading capacity of feed gearbox etc. First draft note was expected last week -- HSK and team to update status of the same.  
==> calculations have been done and conclusion is that extra moment etc are within design limit of gear box; report to be circulated shortly (laptop disk crash problem). To recheck the status after 2 weeks.

6.7 Jobs at TIFR + other work requests -- from 26 Feb and before (HSK/SKG) :  
(i) update on status of our jobs at TIFR -- check status after collecting 120 nos: last set of 60 nos (bonus amount) still waiting in the pipeline -- no clear response coming from TIFR; agreed to forget this for now and go ahead with our own effort via outsourcing to industry.  
==> no update on this.  
(ii) other miscellaneous chassis items need to be taken care of by mech group, as long as they are in the official list of orders.  
==> 50 nos required by FE team are being done in w'shop now.  
(iii) to review the current process of taking job orders for better facilitation of the tasks with end users like electronics groups.  
==> YG discussed offline with HSK : to look to fill the lacunae in the process with maybe new development of in-house version.  
Regular follow-up after 2 weeks.

=====

Minutes of Plan meet of 26 Mar 2014 (follow-up of some pending topics from different areas) :

1. Documentation related :

1.1 Detailed design doc -- pending for long : from 12 Mar & before (SSK/BAK) : follow-up on subsystems to be converted :

(i) OF Rx system to be completed (Satish Lokhande) : first version has been circulated -- can be taken up for discussion.

(ii) OF Tx to be started.

==> no updates as nobody from OF section present today; items (including discussion of OF Rx report) can be deferred to next week.

1.2 Follow-up on level 3 (NTR) -- pending for long : from 19 Mar & long before (SSK): to check status of report on design of OF system -- SSK to try and couple this with work on paper for MWSky -- SSK aims to have first version (covering all of FE) ready by early next week. URGENT !

==> email updated from SSK saying needs 1-2 more days; can take up next week.

2. FE & OF related :

2.1 New LNA for 130-260 system -- from 12 Mar & before (VBB/SSK) :

(i) Variation of gain and  $T_{sys}$  with temperature : tests show new LNA (250-500) has ~5 to ~55 deg K varn in  $T_{lna}$  for variation of 0-60 deg K in env chamber, and gain change is ~ 0.2 to 0.3 dB -- confirmed with new test that waits for temp to stabilise after giving 10 deg steps (tests are now done with one monitor in contact with the device and one in the box, alongwith chamber temp monitor); follow-up action items now agreed upon are :

(a) repeatability was tested ok with one more experiment; next task was to test the 130-260 LNA, followed by 550-900 (and then Lband LNA).

==> no updates as VBB was on leave for past few weeks;

(ii) scheme for fitting two temp monitors (one for LNA, one for FE box) for tests on bench followed by antenna tests : lab test with manual readings had been done (showed 15 deg temp difference between LNA body and FE box (open)); work ongoing to study online data from 3 antennas : W1 (130-260 FE box), W4 (250-500 FE box) and E2 (common box) was tested ok, and some long duration (8 hr) tests have been carried out on W1; need some data on W4 and E2; also 24 hr test to be done when no GTAC obs is on (e.g. Wed night) to get simultaneous reading on all 3 antennas for follow-up. Also, C4 & C10 now have dual temp in FE box -- to check data taken from these for the performance; some tests had been done but data obtained was not sensible and one attempt sitting with the operators appeared to be needed to check and clear the SOP; to check if there is a programming 'bug' /error in MCM (based on data from C4 & C10)].

==> SOP issue not yet resolved; not clear if the bug related issue is for temp monitor or power monitor -- VBB to resolve the items as early as possible and report back.

(iii) mass production of temp monitoring system : since enough number of cards

are now ready, agreed that temp monitor can be installed in any FE or CB box that goes up on an antenna (e.g. 250-500 being modified for notch filters etc) and a list to be maintained and updated by FE team. List was to be made ready by FE team and shared with Nilesh to update the webpage where upgrade systems information is maintained.

==> information has been sent by Imran to Nilesh; FE group can cross-check the following webpage : [http://www.gmrt.ncra.tifr.res.in/~gtaclog/ANTENNA\\_STATUS.HTML](http://www.gmrt.ncra.tifr.res.in/~gtaclog/ANTENNA_STATUS.HTML)

(iv) planning for long-term implementation : ~ 300 temp monitor units will be needed for full GMRT -- 25 units ready; 50 more can be done with available items; indent for balance number of components has been raised; same needs to be done for the PCBs.

==> for components, quotation has come and order can be placed soon; PCBs can be done under cash purchase -- to be initiated soon.

==> Regular follow-up on all items after 2 weeks.

2.2 Mass production of 250-500 FE system -- from 12 Mar & before (ANR/SSK) : 15 antennas have the new feed installed (remaining feeds are kept in storage) and 10 antennas have been fitted with the broadband FE box (with 2 spare units).

(i) testing of 15 installed feeds : FE group has been doing weekly plots & results, and deflection plots have been added to these : some data had been taken for C6 (showed different lines in each poln -- RFI or internal?) & S2 (noisy bandshape -- effect of TV line?) : color grey scale plots discussed -- there are clear signatures of TV line(s) at 175 and 540 + one more around 220 (this needs to be checked) + military satellite + a few occasional bursts of RFI; further tests with feed at focus and pointed elsewhere show evidence for (a) different kinds of lines (b) harmonics of military satellite when antenna beam directly pointing to it etc... -- agreed to try an expt with 2 antennas -- feed at focus in one and feed pointing up in the other and record for 24 hrs as sky drifts by : this has been pending for a long time !

==> regular on-off plots to be checked with Ankur and sent for March; for other issues, need updates and discussion with PAR.

(ii) status of testing and installation of FE boxes : ten antennas fitted + 2 spare units ready and tested :

(a) update on procurement of standard connector -- samples had come (now the main delivery of 100 nos of male & female has also happened) and modified units had been received from w'shop -- to check if this has been tested in env chamber (was waiting for integrated unit with LNA+temp monitor).

==> this test has been done, including 12 hr long run with 4-5 thermal cycles. this matter can be closed.

(b) meanwhile a sample box has been installed in C4 and appears to be working ok; need confirmation of testing of power and temperature monitors etc.

==> temp monitor no update; pwr monitor is having some funny problem where power levels are not stable with time -- random fluctuations, not correlated between the two poln channels. Also, new units being assembled (for batch of 20) are showing unexpected change in detector voltage upon connecting input cable etc. -- to check against one unit from the older set of 4 units that were made.

(iii) plans for sub-band filters for 250-500 MHz system -- update on testing of sample units and results from these to be discussed; updated report with all 4 sub-bands over plotted showed roll-off is a bit slow on the higher freq side compared to existing L-band sub-band filters; insertion loss is better; agreed

to put up one or two units in antennas and check the performance : all lab tests with manual settings using patch card + old MCM card were done successfully, and following were the pending action items :

(a) to discuss with Ops group about command for sub-band selection in 325 MHz system and see if the same can be tested in the lab. -- commands have been made ready & inserted; has been agreed to test when it goes on antenna.

==> no status update.

(b) 2 units to be made ready and integrated in final FE box and tested : waiting for integration to complete and testing to start.

==> this has been done (see below for testing).

(c) to check long-term plans for integrated unit : one chassis with 4 filters in it + separate chassis for the switch looks like the option -- design has been done and PCB has been ordered -- to check status of this.

==> final design is 2 filters on one PCB and hence 2 PCBs in one chassis; prototype PCB for this may come in a week or ten days; switch PCB (20 nos) is available, but sample chassis came with a problem that is being rectified and will come in a week.

(iv) plans for notch filters in FE box for existing 250-500 antennas : aim is to put 540 & 175 TV notch filters in all 250-500 FE units that are currently installed. For 540 (lumped ckt) -- one set was installed in ch 1 of 2 antennas (S2 & W4) in receiver room, and performance was found OK; units installed in 3 antennas (C4, C10 and W1) and ready for 3 more; 80 PCBs in hand for 540 filter, alongwith 12 nos of chassis; 60 more chassis have been requested; 50 nos of 175 filter PCBs are expected shortly; pending action items are :

(a) status of installation in further 3 antennas to be updated -- C6 completed; next one should be ready?

==> this is work under progress for 2 boxes (for 2 antennas) -- may take one week.

(b) plans for completing the job for all 250-500 antennas -- this is URGENT : to check availability of materials etc for these.

==> all items for 4 more antennas are available -- need to be assembled; need for one antenna in next 10 days or so.

(c) status and plans for mass production of 175 & 540 filters and chassis -- 100 nos of 175 filter PCBs had been procured and chassis work was ongoing at w'shop; what about 540 filters?

==> for 175 filter, chassis needs to be confirmed from w'shop; for 540 filter, email update from Ankur : 2 nos are presently ready for use; components for 40 units in hand; 70 common PCBs (for TV and satellite notch filters) and 60 chassis (common for 540 & satellite notch filters) are available.

(v) status of other auxiliary items :

-- noise source, power splitter, directional coupler etc : sample unit has been assembled / integrated on the bench; integrated noise on/off testing on bench yet to be done; integrated in new FE box; waiting for integrated testing.

==> no new updates.

-- post amp : Hitite 740 new stock for 30 antennas available; to check if post amp has been tested with slow rise power supply (no progress, but SSK wants to keep it on the agenda).

==> no new updates.

-- power monitor : status update on the older scheme with Galli amplifier : it is working ok now; feed-thru vs connectorised arrangement has been finalised; first 2 units have gone up in C4 FE box (any results?); plans for new units to be put in the new FE box -- 20 PCBs have come; chassis to be borrowed from those for common box work; 10 dB couplers have been ordered (!)

==> see above for details of problems encountered

-- temp monitor : to check plans for final integrated testing in FE box -- some tests have been done on C4 (results?); C6 to be tested next (?)  
==> no new updates  
-- walsh switching arrangement to be made ready and tested (with old RFCM card): completed?  
==> completed on the bench and waiting for tests in new FE box -- can be closed.  
  
==> Regular follow-up on all items after 2 weeks.

2.3 status of lab integration of final version of 250-500 box -- from 12 Mar and before (ANR/SSK/HSK) :  
modelling shows that existing size of box is not adequate (inspite of double deckering of chassis); deeper FE boxes are needed -- 15 cm has been added (wt of new empty box is 15 kg); mech group has confirmed that this is ok (present depth is 468 mm, can be increased to 700 mm; also, rear member in the cage can be removed to further increase depth); also total weight of populated box will go up by a significant amount.

(i) one new box has been supplied by mech (2nd unit is also ready with them) and is being integrated by FE; action items :

(a) work on integration of units into the box : semi-rigid cables work was completed and DC wiring should have been completed by now -- update on this is needed.

==> this is completed.

(b) RF testing to start -- to check when this is happening

==> testing is ongoing; main problem being encountered is (random) failure of the 4:1 and 2:1 switches (on same PCB and chassis) -- needs to be understood; agreed to continue the rest of testing in a physical bypass mode.

(ii) estimate of total weight of populated new box is ~ 27 kg (!) -- agreed that it is too heavy (e.g. unwieldy to handle at the focus); plans for weight reduction :

(a) integrate some of the smaller units into single units : being tried for subband filter (see item 2.2(iii) above); agreed that integration of dir coupler + splitter + noise source could be lower priority as this will not save much weight.

(b) some of the chassis can be converted to plate+rail chassis (instead of milled) will also reduce cost and time of manufacture -- to confirm that all the filter chassis can be done in this manner (including the integrated filter bank).

(c) to discuss with mech about other things that can be done to reduce the weight of the box itself -- ANR to give feedback from discussion with HSK.

==> detailed discussion with HSK has taken place and mech group has to come back with their suggestions -- need update from HSK.

==> Regular follow-up on all items after 2 weeks.

2.4 Next Gen Common Box -- from 12 Mar (ANR/SSK) : Like 250-500 FE box, final version of Common Box needs to be assembled and tested : final power & temp monitor (are in hand), interface to Rabbit card (work in progress), design of new RFCM card (work in progress), new arrangement for power supply distribution; action items to be looked into :

(i) FE team to make a list of changes and produce a block diagram showing all the units to be incorporated -- to check if block diagram is ready for circulation;

==> ANR to take it up.

(ii) plans for interface card to meet monitoring requirements to be studied (alternative is to go to Rabbit card directly?) -- need update on status of this.

==> no updates as persons allocated busy with other activities; may be able to start now.

(iii) plans for integrated power supply card (lower priority, as it is mostly for neatness of arrangement)

==> no work done on this.

(iv) whether new box will be needed or old one can be used? -- agreed that old box should be used, except for issue whether new MCM card can be inside or needs to be outside the common box (the former option would be preferable) -- this needs to be checked once work on interfacing to new Rabbit card reaches some level of maturity.

==> pending for now.

==> Regular follow-up on all items after 2 weeks.

2.5 Design of new RFCM card (v2) -- from 12 Mar & before (SSK/Ankur/Sougata) : RFCM card (v1) was built as part of generating spares for Lband system and fully tested for all control functionalities -- for Lband, as well as for 250-500 FE box (along with patch card); it was agreed that since this RFCM card can not do monitoring (without further changes), old RFCM card + patch card will be used for present in the new FE box; will upgrade later to new RFCM card with monitoring capabilities included. Action items :

(i) adding monitoring points (about 5) to existing card : Imran & Sougata have identified 4 points and trying to get 2 more from monitors for unused or rarely used control bits; appears that total 8 points are now available? to check status and see if this has reached final stage.

==> there are 8 monitor points available on the old (and new v1 card) ! now need to design basic tests to make sure that all these points are functional and then redo the PCB to utilise these points.

(ii) enhance design to ver2 by adding monitoring facilities & full compatibility with new MCM card so that it can be used in all FE systems. To report status of this and discuss possible timescales for completion. If modified v1 card is enough to meet the requirements, then v2 can be delayed suitably? To discuss and finalise plan of action.

==> if item (i) concludes successfully then that new PCB will be the v2 card and will be the final, common version for all usage.

==> Regular follow-up on all items after 2 weeks.

2.6 Status of improved 500-1000 MHz CDF -- from 12 Mar & earlier (HRB/GSS/SSK) : there are 3 different versions of dipole (v1, v2a, v2b) and 2 versions of cone (v1, v2) in trial phase; 3 test feeds have been built using these :

ver1 : dipole v1 + cone v1 : RL is OK, deflection is not good & falls with freq

ver2a : dipole v2a + cone v2 (mesh?) : RL is good; deflection is OK & flat with freq

ver2b : dipole v2b + cone v2 (solid?) : RL is v. good; deflection is good but not flat

Follow-up action items are as follows :

(i) simulation results for different combinations of the above were carried out and discussed in detail : it appears that dipole (rather than cavity) is dominant for deciding the RL behaviour (and also H-plane taper?); cone appears important for E-plane taper; best results for RL and good beam pattern match over large freq range appear to be for dipole v2b (triple sleeve) with cone v1 (66 deg).

To discuss the possibility of testing dipole v2b + cone v1 combination in lab and on antenna. Was waiting for v2b dipole to be free (or new one to be ready), and for 2 nos of FE boxes to be ready; need status update on this !

==> dipoles are in hand but not tested yet as at least one FE box is needed : agreed to modify 2nd CSIRO box for this purpose (on a temporary basis) and also

modify one of the old 610 FE box to accommodate the new circuitry (?)

(ii) simulation results for denser mesh case (higher order basis functions): new simulations are with finer planes rather than higher order basis functions; this needs to be confirmed; also, 50 MHz shift that is seen needs to be understood; also explore default number of current elements in simulation (from 19 Dec meet); discussion with WIPLD indicates that increase in PolDeg may make a difference; tried with some changes in values of PolDeg related but no change in the results is apparent; to contact WIPLD to see if they have a case study that exemplifies these effects and then decide the future course of action.

==> WIPLD has sent a response but can't be tried as PC is down right now.

(iii) there is noticeable difference in simulated and measured RL curves which needs some study also (it appears that agreement was better for 250-500 CDF?); to check if new simulations make any difference or not.

==> no updates.

(iv) to do deflection tests for ver2 with a rigid stool design (and with finer adjustment of the focus distance, if needed) and then bring down the ver2a feed and replace with normalg 235/610 feed (or with v2b dipole + v1 cone combination?). unit from test range has been got and it has been put on C10 alongwith ver2 cavity at 1480 stool height -- deflection is down by 2 dB (uniformly) compared to 1280 stool height and beamwidth has increased to 50' (from 46'-47' earlier); tests have now been done with 1180 stool height and results need to be discussed. Also to do the test of comparing power levels for cold sky (with feed) with the level for FE terminated.

==> shows same deflection at 610 ; maybe slightly better deflection at higher freqs but certainly reduced beamwidth (which is now closer to the 44' seen for the existing 610 feed); agreed to try with 1080 ht by either new stool or reducing supporting member ht of 2nd cone that is available in Pune.

(v) to compare deflection and beamwidth results for new feeds with old 610 system -- first round of results were shown and are quite useful; extension to later data shows stable behaviour for Aug to end Nov at 47 arcmin (when ver2b with 1280 stool was there); after Nov 2013, beamwidth results are not optimal (this is ver2a dipole with ver2 cavity at 1480 ht) -- agreed to change with ver2b dipole alongwith either ver2 or ver1 cavity at 1480 and compare results. This can be folded into item (iv) above.

==> see above and remove this one if found redundant!

(vi) to compare RL measurements for ver2 dipole in ver1 cavity (and vice versa?) was waiting for C10 feed to come down -- see item (iii) above -- this is done now (?) and can be rechecked when v1 cone is mated with v2b dipole (was held up because of lack of ver2 dipole). Should be done by now.

==> see item above and remove this item if found redundant !

(vii) any new ideas? discussion of 19th Dec came up with following action items:

(a) get 2 more v2b dipoles fabricated -- work underway, need status update UREGNT!  
-- this should be completed now? can be closed if completed.

==> this can be closed.

(b) design Kildall ring feed at 750 MHz using v2b dipole -- work ongoing; status to be confirmed; also to produce plots for the RL and E-H plan patterns from the simulation, to check the available bandwidth.

==> should come from workshop in the next week or so.

(c) try simulation of CDF250-500 scaled by factor of 2 (including with different dipole sleeve combinations) -- maybe after (b) is done; status update needed.

==> not tried yet.

(d) design Dual-ring feed 550-900 MHz (initial BFRs can be made for 650 & 800 MHz)

-- waiting for above items to complete.

==> not attempted.

==> Regular follow-up on all items after 2 weeks.

2.7 Signal flow analysis (SFA) related items -- from 12 Mar & before (GP/ANR/SSK)

(i) SFA for OF system to be discussed, including addition of the scheme of 10 dB attn + 20 dB ampl : results show ~ -20 dBm as 1 dB compression pt; 20 dB SNR at default operating point with default operating pt of -45 dBm input power over 400 MHz BW; this is for 1 dB attn at antenna base and fixed 10 dB attn + 20 dB ampl at receiver end; if OF attn is increased P1b will improve by same amount and SNR will come down by same amount; there is some additional margin by changing the optical fibre operating pt which can increase or decrease RF gain of OF system by +/-4 dB. Agreed to add the SNR as a quantity for -45 dBm over 400 MHz as default operating pt and produce plots of variation of quantities as a function of OF attn value and add to the report -- to check if this is done.

==> no updates.

(ii) plans for SFA of 250-500 system : analysis had started, and some lab tests had also been done; and all data required had been taken; there were some problems in reconciling bench test results with analysis, for existing system -- these are resolved, and first draft report was circulated internally in FE team and some changes were done after the feedback received and updated report has now been circulated; to discuss main results from this and decide follow-up action.

==> useful discussion on the circulated document; a few small improvements and clarifications suggested, including terminology; to update and circulate the final version.

==> Regular follow-up after 2 weeks.

2.8 Walsh switching arrangement in FE -- from 12 Mar & before (SSK/SCC/PAR) : Some tests have been done on the bench by FE group; first draft of report has been circulated.

(i) to devise a simple test using Lband system + radiation from apex to demonstrate the working of the system (on any antenna) -- need update on plans for this : on track for testing in 1st week of Jan? agreed to postpone for some time due to conflicts with other requirements; to decide whether it can be taken up now.

==> no updates; to ask PAR for an email update; follow-up after 1 or 2 weeks.

2.9 FE power supplies at all antennas -- from 26 Feb & before (SSK/ANR) : Some antennas have FE supply (some are home made, some are the original supplies); other antennas use the ABR power supply which can lead to problems of overloading etc; only 5 antennas remain with shared supply and none are upgraded systems.

(i) solution 1 : update on plans for in-house completion of 5 supplies -- ripple has been reduced from 700 to 100 mv on sample unit (with bigger capacitor bank); status of assembly of 10 units, for which boxes have been delivered by workshop.

==> no work on this; still at low priority.

(ii) solution 2 : plans for purchase of off-the-shelf supplies & scheme for usage. Check status of testing and acceptance of units, including RFI properties -- one unit was tested for RFI and found ok (formal report awaited?) : status update on

completing remaining 4 antennas (C0, C9, W3 & W6) and confirmation if this item can be closed.

==> it is confirmed that there are NO antennas where ps is being shared and this can be CLOSED !

(iii) 3 nos of these supplies were diverted to OF system at Rx room -- repeat order was placed for 10 more supplies (total will become 12 nos) -- status update required on delivery.

==> delivery expected this week; to follow-up testing procedure etc. 12 nos to be used as common spares for various needs, including lab use.

(iv) right now about 23-25 supplies are on top and about 5-7 are at the bottom (all the off-the-shelf ones) : to resolve whether it is better to have all supplies at the bottom, or some (in-house) on top and others (off-the-shelf) at bottom? -- FE group is inclined to keep them at the bottom if appropriate storage space is available -- to check about options for this.

==> agreed to fold in the requirement explicitly in the space utilisation work.

==> To check the status of various aspects after 4 weeks.

2.10 OF systems -- from 12 Mar & before (SSK/PAR) : Plans for further systems : 15 antennas installed : C4, C6,C8, C9, C10, C11, C13, E2, E6, W1, W4,W6, S2,S4,S6 plans for extending the wideband OF link to beyond 15 antennas : C12 had been completed as 16th antenna; C14 was to be completed as 17th antenna -- to check status of next antenna in CSQ to be done.

==> exact status not available - need update from OF team; follow-up after 1 / 2 week.

### 3. RFI related matters :

3.1 RFI from TV signals (from cable to terrestrial systems + boosters) -- from 12 Mar and before (PAR/SSK) : Cable TV leakage could be a bigger problem than boosters etc ? : tests had been planned to see how much is the leakage as a function of frequency and then see if operators can be requested to change the frequency or improve their set-up; results on 2 tests to be reported : 1st one at control room of operator and 2nd at some distance away to see which channel and operator is the culprit. Further tests had been done at N'gaon. Present thinking of RFI team is that the lines seen are from terrestrial TV transmitters, rather than cable TV (!) -- likely to be in 175 to 229 MHz range. Follow-up action items :

(i) generate list of all the terrestrial transmitters in neighbourhood (with large enough range) and their frequencies, and to check which ones are expected to affect us -- expanded list has been circulated : 9 channels listed in 130 to 260 GMRT system; + one at 540 + one at 477 (from Mumbai, but not seen); of these 9, one is overlap freq; of remaining 8, two are suspected and 2 are yet to be identified; follow-up is still going on.

==> email update from PAR : no success as yet in getting the information (via email); phone contact could not be established as no number is available.

(ii) to work out a plan for monitoring the GTAC data (30:1 data) for RFI in 325 and 243 band.

==> no updates.

==> Regular follow-up after 2 weeks.

3.2 Effect of military satellite RFI in 243 band -- from 12 Mar & before (PAR/SSK/SN) : follow-up action on testing for saturation effects, decision about appropriate location of switchable filter, possibility about control room (ops group) being able to come up with algorithm for prediction (for user's) :

- (i) filter related action items :
  - (a) report on prototype filter by FE [OF ??] group has been circulated (?); old filter works only up to 1 GHz, and new version has been made that works upto Lband and was getting tested -- to confirm the status of this and see if it can be closed.
  - (b) meanwhile to try a test where this filter is inserted in the path (for 2 antennas) for a short time when 250-500 is selected -- put at ORX o/p in Ch1 of E2 & C6 (does it affect performance at other bands?) -- to check results and decide further action (awaiting user feedback).
  - (c) FE team to make a full list of various filters put in various signal paths as part of upgrade (including for testing) -- this can be put up on the upgrade info page maintained by control room. This is somewhat urgent. To confirm the status (and methodology used) and decide if this can be closed.

==> ANR to check this with Nilesh and resolve (can move it to some other agenda item)

- (ii) Ops group to investigate and come up with algorithm to use in control room, after getting the relevant data from PAR. SN to update on the latest status, including plans for testing the algorithm being developed -- part I which is to make antenna point deliberately to a satellite and verify the effect has been done to first order -- to repeat once and confirm; part II is to produce an algorithm that can give the distance from all the satellites for any given antenna pointing, in units of beamwidth. Control expt is pending for a long time.

==> email update from PAR : control expt has been done with SNK -- RF power was monitored on broad band receiver output; SNK will make a new program changes for alarm settings and one more repeat test will be done; need results from the tests done so far !

==> Regular follow-up on all items after 2 weeks.

3.3 Satellite RFI at GMRT : generalised task force (FE + BE + Ops team) -- new item from 15 Jan onwards (PAR/KDB/SNK/JPK) : aim is to have a combined approach where Ops group can have prediction routine for all known satellites, FE group can help characterise their effects in different uGMRT bands, and BE group can come up with mitigation techniques. To follow-up on the initial discussion of 15 Jan. :

- (i) look at new results from GPS satellite testing
  - (ii) to complete the work for the military satellites and then move on to all the other known satellites. also needs a slightly bigger discussion...
  - (iii) to organise a bigger discussion and see how matter can be taken forward.
- ==> deferred to next week, as relevant members not available.

3.4 Radiation from CAT5 cable -- from 12 Feb & earlier (SSK/PAR): Follow-up on action from 3 Apr 2013 : to install shielded CAT5/CAT6 cable in conference room as trial and finalise the scheme for all other public places in the building: first report has been circulated that combines testing of switches and CAT5 cables; conclusion is that use of shielded cable makes significant difference to the discrete lines as well as to broadband RFI. Agreed to go ahead with controlled expt in GMRT Conf room to quantify the improvement; plan is as follows : put few laptops in conference room to ping some of the servers in main control room via the switch; do the test with and without the shielded CAT5 cable and report the result; will need some help from computer group for making the cable;

RFI ambience test was completed and data collected for Conference Room; RJ45 RFI shielded cables to be made in the OF lab and test to be repeated after installing the cables -- should be done by now. Need update from preliminary tests and plans for completion of the task.

==> email update from PAR : assembly of shielded CAT 5 cable is completed and tests will get done this week in the conference room; regular follow-up after 2 weeks.

#### 4. Operations :

4.1 Mass production of shielded box for MCM cards -- from 12 Mar & before (CPK/PAR/SN/HSK): RFI test report of Akvira vs Physimech showed Akvira is better and this has been selected.

(i) status of ordering 2-3 more boxes from Akvira -- units have arrived and are under assembly and testing -- to check and see if this item can be closed for now.

==> to check with PAR and close the matter.

(ii) testing of new MCM card in shielded box, with final configuration : integration of final system was in progress; 37-pin D-type shielded connector has not yet come -- to test with normal connectors in the interim; problem of fan power supply cards was to be resolved -- borrowed fans from older Akvira unit + power supply card from OF system has been used for present; initial tests have been done (with dummy LED loads?) : same level of shielding as seen before, except when digital I/O lines are exercised (?) -- to discuss the results from these; to update status of supply of shielded connectors.

==> email update from PAR : 37 pin and 15 pin D-type connectors have arrived and withdrawn from stores today and are under assembly (6 pin Dtype for power supply have not been delivered by the party) -- tests should happen soon.

(iii) How to plan for the mass production? Ops group to report on discussions with Mech group and finalise + collect drawings for 2 types of box : with and without provision for SPI port on chassis + 1 serial port on each box; aim to place final order on Akvira. RFI group to complete 2 more prototype units, and then hand over the matter to Ops group. To check if this moving forward or not.

==> drawings are in hand with Ops Group now, but to check if both types are there.

==> Regular follow-up on all items after 2 weeks.

4.2 Development of M&C software -- from 19 & 12 Mar & before (JPK/RU/SN/NGK) :

(i) update on work with TCS (JPK/SN) : current status of PoC phase of work :

(a) PC104 work, GAB control work, test jigs and simulators, lab demo at TCS -- are all of these phases completed?

==> all of these are done, except for lab demo at TCS, which is happening this week.

(b) plans for test set-up in our lab and at C8 antenna using Miltech PC etc : to check final scheme for the tests -- master SACE PC to GAB connectivity and ABR-PC104 connectivity + access to master SACE PC from lab? to check if all relevant hardware and software in place for the tests?

==> discussed pros and cons of different schemes for networking the field environment with the lab and agreed that present scheme ok for now but better to isolate the field network better.

(ii) modbus and related learning & testing : simple set-up of PC + Rabbit card with modbus for "hello world" level -- first tests to be done alongwith item (i) above.

==> to be taken up once the above is tested.

(iii) firming up long-term plans for full system : basic model had been discussed in detail 2 weeks ago -- Ops group to generate note for circulation and finalisation in GSG -- to check if note is ready.

==> note regarding overall status of M&C system has been sent by Ops Group -- to check if it covers this aspect also.

==> Regular follow-up on all items after 1 or 2 weeks.

4.3 Mass production of Rabbit MCM cards -- from 29 Jan & before (CPK/SN/NGK) :

(i) status check on how many cards are ready now (64 were done) and plans to speed up delivery, if needed.

==> 70 cards are ready; rate of progress is ok.

(ii) to finalise plans for how many more MCM cards are needed -- appears that the matter can be closed as per the last discussion : no further cards required, as of now.

==> for time being the number can be left at 120.

==> Regular follow-up after 2 weeks.

4.4 New, improved Miltech PC -- from 19 Mar and much earlier (CPK/SN/PAR) :

2 units of Miltech PC with two changes (more screws on panels + panel mount pwrline filters instead of chassis mount) under order by Ops Group : to check status of delivery. URGENT !!

==> shipping date confirmed to be 27th Mar -- should be here in 10 days or so.

2 of the existing units were having problem : one heating problem due to displaced fan (fixed), another one with eth ports not working -- yet to be fixed; to check again next week or 2 weeks later.

5. Back-ends :

5.1 Documentations :

(i) Detailed design doc -- pending for long : from 12 Mar & before (BAK) : analog back-end was due sometime ago ! Hande had made the first version and was making the 2nd ver based on the feedback received, with target of end February (new end March) -- is it ready now?

==> some inputs still remaining within the group to complete the version till PIU level; next version will go down to chassis level.

(ii) ITRs for analog back-end systems and digital systems to be taken up : analog back-end : Sandeep and Navnath to look into; pkt corr first level has been done and circulated -- waiting for feedback; GPU corr first version (by Reddy + Irappa) was in internal circulation -- can it be released now? Need updates on these items as they have been pending for long !

==> version is circulating and 1st version could be finalised and circulated for ITR level.

==> Regular follow-up after 1 or 2 weeks.

5.2 Analog back-end for 8 antennas and beyond -- from 12 Mar & before (BAK) :

(i) appropriate attenuator settings for Lband & 250-500 done; 610 band was being finalised -- updated table had been circulated; few iterations need to be done and then updated table + report can be circulated by Ganla; now needs to be done to 16 antennas -- measurements had been done and results were to be circulated (cause of change in values being understood)

==> last release was done on 27 Feb and after that lat 8 antennas are being tested.

to see what can be learnt from the 27 feb data.

(ii) status of work for having i/p side RF filters : to confirm plans with FE group for sharing mass production units; to check status of 8:1 switch : agreed that it is ok with FE group to share the designs, provided BE team is ok with the performance specs; ok to include BE requirements in order of PCBs and components (cost sharing to be worked out accordingly); however, BE group to take care of mass assembly separately, as it will be done with in-house manpower by FE group for their filters. Final configuration and design of 8:1 switch has been done as part of finalisation of the PIU, requiring filter chassis etc. (PCB design not final); size frozen PIU being planned...

some sample chassis have been given by FE group; BE team is having some difficulty in integrating them into one PIU -- turns out these are individual sub-band units; to discuss if full integrated unit can be given from FE to BE; also if main BPF filtering enough? at least go get going with?

==> final thoughts : 4 BPF filter chassis (from FE group) + 2 nos of 8:1 sw chassis + one straight through path -- having difficulty in fitting it one chassis; trying to make one integrated chassis with internal partitions for this. can check after one month.

(iii) to check status, plans and timescales for 30 antenna system : 16 antenna system fully completed (from cabling from OF to cabling to corr wall panel); now working on 24 antenna system; dry solder problem circumvented; to check status of completion and release : are all PIUs ready? time scale for testing and release? ==> in final stages of testing -- small gain variations issues in some units; should be fixed soon.

==> Regular follow-up after 2 weeks.

5.3 Power equalisation schemes for new back-ends -- from 12 Mar and before (SSK/NSR/BAK/SRoy): Need updates on both of the following :

(i) option 1 : using detectors in GAB and local feedback loop -- monitoring set-up working; DKN working on code (using algorithm taken from NSR) which was under first round of testing -- detector output saturation, gain adjustment being looked into; need status update.

==> gain was too high, hence saturation; new settings giving proper gain and now this needs to be done for each channel; basic power equalisation algorithm has been tested.

(ii) option 2 : using correlator self outputs and computing gain corrections : basic scheme is implemented & working; more general implementation of a user controlled ALC mode requires the following:

(a) 4 modes of operations had been identified (see MoM of 3 Oct 2013) :

(i) on demand -- this is the current released mode.

(ii) repeatable at some interval specified by the user -- can it be script based?

==> yes (it can be script based);

(iii) automatic, should adjust in response to a stimulus in the input power -- needs a discussion.

==> awaiting discussion;

(iv) should provide a reliable power monitoring scheme -- needs discussion.

Also, issues like logging of results etc to be discussed. Issues related to attenuation value accuracy and setting have been discussed : 5% (0.25 dB) ok; agreed to add median calculation feature; to check if a feature to predict the expected change in attn for a given change in sky direction can / needs to be

added; better option for saving the attenuation values for future use / reference to be defined; agreed to have a document that summarises all of the above and spells out the main requirements (from user point of view) and possible solution options / techniques; main action items :

- (a) to check unit to unit variations of attenuations for a couple of units and if settings are stable -- do the measurements match with spec (within +- 0.25 dB)?
- (b) to check if 1st draft of document is now ready and available for discussion.
- (c) plan of follow-up action to be discussed.

==> Sanjay to discuss with SRoy to sort out any technical difficulties and SRoy to then produce the final requirements document; BAK to move to next level of testing the accuracy of the attenuator settings : take 2 units and repeat settings of different values.

==> Regular follow-up after 2 weeks.

5.4 GPU corr (GWB-II) : release of 4 node, 8 input, 200/250/400 MHz version -- from 19 Mar & before (SHR/SSK/BAK) : (NOTE : GWB-I is existing released system !) : agreed to make 4 T7500 nodes with C2050/C2075 Fermi GPUs + remaining 4 T7500 nodes as host machines (to take care that these are the ones that transient pipeline uses presently so that sharing is possible); this should have ALL basic modes : total intensity and full polar IFR modes; IA + PA BFR modes with process\_psr pipeline attached; full GUI support; to come up in trial code section without affecting the presently released mode.

(i) issue of jump in start time seen for some runs and possible solution for the same : agreed to run some tests with IMH and operators to make the system fail to verify the cause and then confirm and make sure that SOP is updated; meanwhile, to check if ack facility is available initdas so that system can wait till the ack comes before exiting the initdas command -- problem could not be reproduced; what to do next?

==> not clear what was the problem and what could have caused it... may be best to close this for now, but keep it in the back of the mind.

(ii) beam modes in GWB II : new version with separate kernel (outside phase shift kernel) for beam formation has been developed (compute load is 7% increase on 2050 GPU); IA mode tested on pulsar signal : addition of 7 antennas in single pol at 610 MHz with 200 MHz LPF -- to test with different setting in pmon to check S/N effects; process\_psr pipeline has been completed and released; first version of SOP has been released; pending action items :

(a) user tests to be carried out to check the functioning (YG to look into this) -- test data is being looked at; to check and discuss these.

(b) plans for phasing algorithm and PA beam mode : phasing has been implemented and tested (SSK); PA kernel has been completed and first set of tests have been done; to check and discuss these.

==> to check if GUI has support for all the features that GSB phasing GUI provided. also to confirm that phasing works for all the modes : single and dual pol.

(c) finalisation of GUI to support all aspects of beam mode operations.

==> there may be some issues pending -- to be checked.

(d) finalisation of process\_psr pipeline for beam modes, including psr\_mon etc.

==> done for total intensity; full stokes still has work to be done at kernel and process\_psr pipeline level.

(e) header for beam mode data : to take up the matter for discussion : to be taken up in this situation and incorporated alongwith the PA mode.

==> some discussion about this to see if it should be introduced at the time when

sub-array is being tested.

(f) SOP to be made ready.

==> NSR to be asked to update SOP to include PA mode. Also to check the directory structure etc being used by beam mode data acquisition systems.

==> running of GWB II from standby online (for in-house testing) -- needs a special interface to get the project code -- SNK is looking into it.

(iii) spikes in channels that are power of 2 : this problem needs to be discussed, understood and fixed.

==> no work done.

extra item : very useful discussion on future plans towards GWB III -- upshot was that 4 new host machines should be bought urgently !

==> Regular follow-up on required items next week.

5.5 Final online control for GPU corr -- from 12 Mar, 26 Feb, 29 Jan & before (SSK/JPK/NR/DVL) :

(i) status of full GUI compatibility : update on sideband flag support and issue of net\_sign[] to be resolved : needed some change in GPU & DAS code. net sign has fixed in one template version; net\_sign flipping (i.e. LSB/USB mode of correlator) now working, tested with data; needs to be implemented in all the versions of the code.  
==> agreed to not fix this problem in GWB code, but to provide a patch for all LTA files; to fix the code ab initio in GWB-III.

(ii) follow-up on long-term items like provision for control of FPGA and other peripherals (like sig generator) for different modes -- details of existing provisions to be discussed and plans for final configuration to be finalised; this should NOT be an issue in the new release? may need some testing on antenna signals.

==> agreed to identify one PC for control of all the peripherals related to GWB; this m/c can / is interfaced to online via a socket and GUI can send commands via this -- already done for loading of FPGA files, needs to be extended for other applications. Regular follow-up after 2 weeks.

5.6 8 antenna back-end tests and future plans -- from 12 Mar & earlier (DVL/YG) :

(i) to summarise current status of testing of overall GWB performance from the recent tests : which bands are working ok, which are not; list of problematic issues : large phase varn with time seen for some runs of GWB (see item above); corrln coeff varies with level of OF attenuation for Lband sub-bands and to some extent for 610 band also (shows repeatable trend); DVL to update about 250-500 band; some antennas show lower corrln coeff wrt GSB for Lband (and to some extent for 610 also, but probably much less for 325?); RFI occurrence needs a more careful study; stability of self power levels needs to be taken up.

==> phase varn with time for GWB as good as, if not better, than GSB.

cross-corrln on different baselines (vis-a-vis GSB) changes with RF band.

(ii) review of scheme for quick testing of data using analysis script by Sachin.

==> appears to be working fairly well; related SOP can be circulated to all staff at GMRT.

(iii) plans for further testing, including imaging exercise.

==> DVL to choose target fields that are reasonable to attempt.

(iv) plans for running the new GWB back-end in parallel with all GSB observations at Lband, 610, 325 and 243 bands -- to check if this is happening regularly, and if script is in place for some automated analysis of GWB data.

==> can think of adding a feature for solving for antenna gains and phases using rantsol to Sachin's script.

==> regular follow-up on all items after 2 weeks.

5.7 Power and cooling requirements for projected back-end systems -- from 12 Feb and earlier (GSJ/BAK/RVS/YG) : some modifications have been made and some tests have been done and preliminary results circulted -- to discuss these and plan further activities; some specific action items :

(i) fan on and off to be tested.

==> this has been done and change in monitored temp seen clearly when fan is turned on and off.

(ii) scheme for monitoring of processor temperature to be refined -- for the main compute nodes.

==> new package for temp monitoring installed on 9 machines but not on nodes17-32; this is because the kernel used is slightly different; to check if other kernel is also available on these nodes and if so, then boot one node with this and test regular GSB code.

(iii) plans for further testing.

==> to add temp monitoring package on all GWB nodes.

==> regular follow-up after 2 weeks.

=====