

Minutes of weekly Plan meet of 3 Sep 2014

1. FE & OF related :

1.1 Detailed design doc / ITR -- pending for long : from 20 Aug & before (SSK/BAK) :

(i) OF Rx system to be completed (Satish Lokhande) : first version has been circulated -- some improvements and additions suggested (e.g. to give reason for 10 dB attn, to give comparison with expected values from SFA report; to mention some precautions and practical issues during assembly etc). Update version was ready and SSK was to check if it has been sent or not.

==> no updates since SSK not present.

(ii) OF Tx started; first draft is ready and should have been circulated by now. for both, docs are with SSK waiting to be cleared and circulated for comments.

Note : the Tx design doc may have only blk diags for now, without full details, till a paper is ready (!); need status update to see why it is stuck !

==> no updates since SSK not present.

1.2 Update on results from test range -- pending from 20 Aug & before (HRB/GSS/SSK) :
Reorganised into the following issues :

(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.

Tests done on c6 with feed having shortened support legs of the cone (instead of shortened stool) -- comparison of results for 1180, 1280 (default) and 1380 :

1280 & 1380 show slightly better sensitivity at low freq (250-400) but at higher frequencies they match with 1180 (which is quite flat throughout freq range);

agreed to try for 1480 to see if there is a monotonic behaviour; also compare with simulation results of GSS. See also 2.1(ii)(c) below. Consolidated results tend to

show that the latest level at 1180 height does show a slightly better response; a final confirmation is needed about the optimum performance from the measurements;

agreed that FE team to go over all the available measurements and produce a

consolidated summary to check if 1180 or 1280 gives the best result; confirmed that adjustable stool will not work for the current 325 MHz face due to welded nature

of existing stool -- need a discussion with HSK about this; also confirmed that we can't go below 1080 by further cutting the support legs of the cone; agreed with HSK

to reproduce one more adjustable stool (in about 2 weeks time) with modifications learnt from present experience. To check status of various items above.

==> not yet converged; need to check details with HRB.

(ii) calculation (based on reference paper) of the expected deflection & comparison with measurements to check if there is significant loss of sensitivity -- GSS to

develop 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 drop

for 0.5 lambda offset) wrt curves from Kildal paper was confirmed; for GMRT specific case of 250-500, efficiency factor as a function of freq over the band, using the

data for the measured feed pattern, was implemented -- after correcting error in the code, better result (9.9 dB vs 11.6 dB expected) was achieved; further, a realistic

phase response (instead of 1.0) was included by reading data from a file; results (reported on 19th Mar) showed better match between measured and expected deflections

for the 250-500 system : 327 -- 12.8 dB vs 12.4 dB; 400 -- 12.8 dB vs 12.2 dB;

450 -- 12.4 dB vs 11.4 dB; 500 -- 11.2 dB vs 11.0 dB (some re-work needed for lower frequencies?); computed results (based on change in efficiency due to shift of phase

centre) show likely drop in sensitivity by about 1.4 dB from 250 to 500 -- this is now to be folded into the net sensitivity / deflection curves made by GP.

Present action items :

(a) GSS has sent a table at 5 MHz steps to GP, it appears that the table has only 4-5 points across the band (from measurement values); GP has done interpolation and has got a curve that falls off with increasing frequency, but has been asked to keep the efficiency constant below 250 -- this need to be understood and resolved; final curves for 250-500 still appear to show a bit of mismatch at the edges of the band. see details in agenda item below.

(b) GSS is working on plans to extend this to 550-900 system -- waiting for some of the lightning protection work to be completed, to get measured values from test range. ==> for (a) agreed that filter is giving the present cut-off and a more realistic measure of efficiency of feed is needed; GP to use the RL curve to get this and see what result it gives.

(iii) Comparison of computed results with measurements for 250-500 band : initial results for good antennas at 250-500 (other than C6) with default height of 1280 (and for C6 with reduced height of 1080) showed that computed values are actually better at high freq end for 1080, which is different from the observations which are showing droop at high freq for 1080 (in conflict with first results reported above); computed results, which were for 1180 to 1480 in 4 steps, were extended to 1080 & 980 and 1180 was found to give the best response (note : this is for a particular value of ph centre based on range measurements); computations were extended to much smaller values (down to 580 mm) and latest results show a peak in the response around 580 o 780 (!), which are in sharp contrast to the experimental results which were carried out in the range 1080 to 1480 mm and showed optimum performance around 1280 mm -- this needs closer scrutiny of the simulation code and experimental results. Phase efficiency computation has to be linked to the aperture efficiency computation (NRAO's eff. program, modified for GMRT specific paramters) -- this work is ongoing, alongwith Sougata (likely to take 4 weeks -- till mid-Sep); to check if this is on track. ==> work in progress; can check after 2 weeks.

(iv) status of phase centre checking for ver1 550-900 CDF and CSIRO feeds -- new results with VVM set-up, after installation of new encoder + notch filter for mobile band, showed :
for ver2 550-900 CDF : 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). Further, results for dipole v2a and v2b with cone v2 show that the degradation of pattern with frequency is worse for v2a than with v2b; radiation pattern measurements have been done with 50 MHz step & using CW signal; comparison with simulation results is awaited (also earlier note from HRB needs to be discussed); phase centre of ver1 550-900 CDF and CSIRO feeds needs to be done. ==> was waiting for test range to be ready.

(v) improvements to test range -- ongoing exercise :

(a) better mechanical alignment -- under discussion with Inteltek (proposal was due around 2nd July) -- no response from Inteltek (likely to give up on them).

(b) set-up was re-installed after better protection circuit for encoder against lightning (home made surge protector using 30 V transobs), including better grounding scheme, and improved corrosion protection (including better water proofing) -- to check if it is now fully functional and feed tests can resume.

==> some additional water-proofing work was required; limit switches not working --

will get looked into this week; may be ready to start by next week.

==> Regular status check after 2 weeks, when some of the above may have converged.

1.3 Comparison of measured & expected sensitivity curves -- from 20 Aug (SSK/GP/HRB): scheme for (re)calculation of expected values across the broad bands to be finalised (and added to measured curves) : curves now being done with constant QH value and with variation of T_{lna} with freq incorporated; model for the main BPF has also been put in : the deflection peak now matches fairly well across the band, but the curve rise and fall at the edges of the band was not quite matching; follow-up action to be discussed :

(i) for 250-500 : it appears that the discrepancy on the high freq side is not really significant (seen only for a couple of antennas out of 10); discrepancy on LF side is still there and may be due to holding efficiency factor constant below 250 ? high freq side could be due to absence / presence of 540 notch filter -- confirmed that this edge matches with the BPF response; hence, the slightly higher cut-off at 250 MHz seen in real-life is likely to be due to feed efficiency -- this needs to be checked.

==> action to be taken by GP for using RL curve as a first order measure (as noted earlier)

(ii) possibility to try it for Lband to be explored -- information gathered has been started : feed pattern (efficiency) at 3 individual freqs is available, and measurements are now available for 5-6 frequencies (?); agreed to work with the 3 pt data and do simple interpolation and see what kind of curve is produced. To check status of this.

==> no progress as of now, but work will resume.

==> Regular follow-up after 2 weeks.

1.4 Total power detector for FE & common boxes -- from 20 Aug & 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 (Galli-52 instead of Sirenza); feed-thru vs connectorised arrangement also resolved; after lab tests (including monitoring via MCM channel) in FE and common box, sample units installed in C4 FE box and E2 common box. Current action items being followed :

(i) for common box : data from 2 units installed on E2 showed basic things working ok: first round of testing showed 11 dB deflection (12.4 dB expected) on Cass-A; later on Crab, getting 5.5 to 6 dB (6.6 dB expected); flat-top on-source waveform to be understood -- likely to be due to quantisation of step size of detector levels (to check rms vs least count?); script / SOP created for automated running of tests; for results from tests, see next item.

==> tests are running ok now with only control room personnel involved and hence issues relating to SOP can be closed.

(ii) for FE version : 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; first units (on C4) showed problems -- traced to incorrect mapping of channels etc.; new units (batch of 20) that were assembled showed unexpected change in detector o/p due to grounding problem which was corrected (manually) for 10 units and final PCB for mass production was modified for this change; latest situation and action items:

(a) for RC time constant : main aim is to check and ensure that some appropriate RC integration is in place at o/p of the detector; some feedback from vendor, but not

fully satisfactory; existing ckt has 10k series resistor (as per data sheet); measurements done in the lab show some kind of a curve with rms changing inversely with increasing time constant, but the results are not repeatable from day to day, indicating some pick-up in the circuit or the measurement tool; needs to be checked carefully. Current status : agreed to put 1 s time constant in all the PCBs.

(b) 9 antennas with FE power monitor installed; test data recorded for 8 antennas; out of these, signals seen for only 3 antennas : C13, C11 & S4 (both pols); some sign of life in E6 and something on W4 (very noisy / weak); deflection on Cass-A is about 10-11 dB (bit less than expected); flat nature of curves understood as least count limitation; simultaneously CB signal is being monitored, but working CB monitor is only on C13, E2 & W4 -- all of these are showing deflection; some sign of "memory" in holding a stale value in FE monitor (all antennas at same time!) -- confirmed with Ops group to be due to combination of cycling of FE monitoring (being turned off when at a source transition) + the fact that cold sky off source is quite far away from the source (!); also, first order correlation with 30-1 data has been done -- GP to produce some results / plots for this.

==> two sets of new data have been taken (3 and 6 hrs long); analysis of this will help answer some of the problems of repeatability of working antennas, status of partially working antennas (as seen in first data set) and correlation with 30-1 data (which is TBD even for first data set); possibilities for automating the data reading and analysis and plotting also discussed -- GP to try some of these ideas. All these data sets also have temperature monitoring (for all of these antennas, as well as for a few others of 130-260 etc).

(iii) 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; assembly of 5 sample new units gave some problems : old vs new flux (resolved); 10 units assembled and tested; 4 nos consumed in the lab in spare common box units; 6 are available; agreed to leave status quo till some units are consumed in CB units coming down for repair; to check plans for mass production and installation for FE systems.

==> for CB it is still status quo; for FE, 20 PCBs had been made and all are used up; new order for full quantity (~ 300 PCBs) has been ordered.

(iv) status of ITR, which was ongoing, but was halted pending above problems : agreed to resume the work now; need status update on this.

==> "work in progress" i.e. yet to start.

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

1.5 Spares for L-band feeds -- from 20 Aug & before (SSK/ANR) : we have 32 feeds, 2 not working (1 dismantled for making drawings of new feed) due to electronics failures -- these are device failures (including some new ones?); now some LNAs have been successfully assembled by Gopi and C3,W1,E2 & E5 have been fitted with these and found working ok. Also, one spare feed has been assembled and installed on W1 and working fine. Current action items :

(i) to update about status of feed on W1 and see if this matter can be closed : not yet confirmed whether deflection is less than expected or not -- to cross-check with JPrakash about performance of W1 and report back; this is pending for long.

==> VBB to be asked to sit with JPrakash and get the answer.

(ii) spare LNAs : Agreed to have at least 5 LNAs ready and available as spares :

10 nos of LNAs had been assembled, tuned and made ready; these have all been used up now. Action items :

(a) new order for amplifier device needed to make sure enough spares available in future -- order has been placed; local supplier, so expect delivery by first or second week of August.

(b) the assembled devices may be having some possible problem with bias point -- it was found that LNA is drawing unusually lower supply current, even when 'gain' & 'T_noise' are normal; LNA is being investigated (may need re-tuning?) -- no progress in understanding low deflection of new LNAs; retuning is not helping -- increasing the bias current leads to oscillation. FE team has no clues about the problem; can wait for new batch of devices above and also check OMT etc for any problems.
==> new batch of devices has come and work is underway to put in the circuit and test.

(iii) 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; design files had been obtained and were being checked by GP and ANR : model files to be converted to match simulator used by us; also ultralam2000 was used and that is not available in the market now; work is ongoing; component models in software had to be downloaded; agreed to simulate it with ultalam2000 and make sure that ckt works ok; and then concentrate only upto 2 GHz and change the substrate to RT 5870 which is easily available; first round of simulation on ultralam2000 ongoing -- results may come soon; then will go to RT 5870...; need status update.
==> first step is not converged yet; may need to discuss with ANR about it.

(iv) finalisation of plans for having total of 8 working spare feeds -- from mechanical to electronics :

30 antennas have working Lband feeds; 31st was assembled back after being dismantled for making the drawings -- this was completed and installed on W1 (#31 is now in the regular 'maintenance cycling' of feeds); 32nd is there in Pune wshop and can be shifted back after assembling by mech group and then fitted with the electronics; 3 new feeds were made in 1st round of work; all 3 are in Pune wshop and have been tested for RL with probes; but 2 of them have wrong size of horn and needs to be replaced; all 3 need new covers as old ones were not suitable (may be done in workshop, but not decided yet); in addition, 3 more feeds from Akvira have come : OMT + horn + cover ; also 2 horns have come and can be fitted in the 2 older feeds. Hence, total of 8 spares can become available. Note that weight of 3 latest feeds is 18 kg more than earlier feeds (72 vs 61 kg) -- this has been accepted as 'fait accompli'. Following issues need to be resolved currently :

(a) to check status of feed #32 -- agreed that mech group should assemble and send to GMRT -- has been sent, alongwith newly assembled press-fit probes, but not clear if full unit is available, or only partial (!) -- needs a status update.

(b) plans for assembling and making completely working feeds to be discussed; 3 feeds after powder coating have come to GMRT (3 others are ready for inspection in Pune); FE to target making ready one feed per month; however, new issue about mating and alignment of probe has cropped up -- press fit (old schme) vs threading (new scheme) mechanical problem -- agreed that we can go back to the old scheme of "push-pull" on one feed at Pune for checking and then retrofit all 6 units; meanwhile one new unit at GMRT can be checked for alignment; 3 sets of old (press-fit) probes being made -- almost ready to go for silver plating; one person from FE lab needed for soldering of these when assembling in the 3 feeds still at Pune; need status update on this.

==> no updates.

==> Regular follow-up on all items after 2 weeks, except for some checking on a few of the more urgent items.

1.6 Testing of LBand wideband systems on 30 antennas -- from 20 Aug (PAR/SSK/SN) : (to maintain a proper log of action taken on individual antennas during these tests and debugging activities) Main tasks / issues are as follows:

(i) stability of power levels -- can be checked with existing data (also can this be coupled with regular program for monitoring in the control room?); some new data had also been taken in June and results had been summarised : C08 & W01 CH-2?? shows ripples at the OF RX output; S04 and E02 show RFI type lines; E06 shows RFI lines in CH1; need status update on follow-up on these matters; new data from 1 July for 14 antennas looks quite decent; two RFI lines : 1070-80 likely to be airport radar, other ~ 1280 likely to be due to GPS. C2 has new OF system without attenuation control hence data is not good; C2 work is still pending as some of the concerned persons are not available -- SSK to check and expedite the same; RFI to be followed-up separately; new data set from 8 Aug for 18 antennas in rx room (taken manually) was discussed : useful data; brief discussion shows the following issues :

(a) RFI lines clearly seen near 1030 and 1090 : interrogation at 1030+/- 3.5 from airport and response from aircraft at 1090+/- 5 with width of about 20 MHz. RFI team to try for some statistics with dedicated monitoring set-up.

(b) FE team to follow-up on the following :

some antennas with poor deflection overall

some antennas with deflection changing over the band -- less at high frequencies

some antennas with poor on/off bandshapes

few antennas with ripple or large slope across the band.

==> attn control work completed on C2; C8 & W1 had ripple which is gone now; to check what may be the possible cause for this; use some of today's test time to see if pointing offset can explain deflection changing over the band, in addition to usual cross-check of antenna performance; some data has been taken with log periodic antenna set-up for checking Radar RFI at 1090 MHz, but had not been analysed as yet (can move this item to RFI, under a category of spectral line RFI sources).

(ii) large (~ 14-18 dB) slope across 400 MHz (e.g. C13, W1, S2...) to be checked and resolved -- can this be checked with the last set of data that has been taken?

new data above does not show any major slope or ripple for the 14 antennas; to wait and watch for a few of the new data set (to be available next week) and then take a final call on the matter -- see results above.

==> see above.

(iii) ripples and funny bandshapes to be characterised and compared with antenna base measurements to try and identify source of problem and fix it : see results above.

==> see above.

==> Regular follow-up after 2 weeks.

1.7 Characterisation of recommended attenuator settings for different bands -- from 20 Aug (SSK/VBB) :

(i) values had been given for Lband, 250-500, existing 610; only 130-260 / existing 150 was pending -- some tests are still being done to verify the values before releasing (for 150 / 130-260 systems) -- need current status.

==> work is still ongoing due to difficulties of getting antenna etc, but number may be around 9,9 -- may converge by next week.

(ii) also, need a discussion 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 too large? first, to confirm if it is 10,10 and 4,4 for full-band and sub-band; second, to redo tests again and confirm present status and then decide about discussion on this topic. DVL to repeat the tests and confirm the performance; tests have been done; waiting for results from DVL.

==> email update from DVL stating that recommended values of attenuation are 4,4 for all sub-bands, and 10, 10 for full band; and 9 dB for 610 -- not clear if these are results from tests.

(iii) FE team to test the power levels at OF o/p and cross-check against SFA values : for 250-500, this has been done and results incorporated in the updated SFA report; for Lband the exercise is ongoing; antenna to antenna variation is still an issue for Lband; still pending, but can be done now, as Lband is relatively stable now ==> this has been done by Ankur in a report back in July -- this was discussed and suggested to add a few refinements of the statements used (for 250-500) and add an explicit entry in the table; for L-band to compare for each sub-band using the realistic cable loss value for each sub-band -- this can then be done for 250-500 also, if found significant. Updated version of the report to be produced with these modifications.

(iv) also, at 1390 some antennas have an extra 10 dB gain stage; appears that there are only 2-3 antennas which don't have this modification?; one of them is S6 which is being done now; 1 or 2 others may be there -- needs to be confirmed; meanwhile, APK's notebook has been found and shows that ONLY 12 antennas have 10 dB stage; but VBB thinks that more have it... finally, agreed to do in-situ band shape measurements for all 30 antennas to infer if 10 dB stage is present or not -- for those with broadband link, it can be done in rx room; VBB will take this up shortly; need status update; work in progress; VBB may have results by next week.

==> measurements have been done, appears that only 4 antennas may be without the modification -- VBB will send a summary, alongwith the evidence shortly.

==> Regular follow-up after 2 weeks.

1.8 Filters at different stages of receiver -- from 20 Aug & before (SSK) :

2 main categories of switched filters are needed : (a) switched filter banks inside FE boxes and (b) switched filter banks in rx room; these are being designed using the new switches : 2, 4, 8 way switches with different possible configurations; a third application of these switches is for designing the monitoring set-up in rx room. Current action items are as follows :

(i) for rx room monitoring work : note that all these circuits are connected to the monitor ports of the OF system; first design required higher isolation for highest freq of operation and hence new design was done; ckt for 2:1 and 4:1 versions now ready & tested -- 25 dB isolation achieved; changes from 25 to 17 dB with frequency for 8:1 switch -- now getting improved rejection : better than 25 dB below 1 GHz; goes down to 16 dB above 1 GHz; the leakage between the signals with this switch is still unacceptable; now trying another switch which terminates the unused inputs while selecting the desired input -- device is to be ordered; indent had been placed; quotations have come; order may be placed shortly.

==> folder is in progress; order has not yet gone.

(ii) for rx room switched filterbank : prototype system was almost ready for testing; need updated block diagram of the prototype system; to see if first results from

integrated testing are available; also, need to check about space in rx room for housing these units; also check plans for installation and testing of the 1650 MHz LPF units alongwith the above; everything is ready and will be tested shortly -- should have happened by now; need status update.

==> tests have been completed; a report needs to be produced characterising the performance.

(iii) 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. Agreed that formal email sent by FE team to control room is sufficient and that Nilesh can take action based on it to update the webpage (Nayak to confirm the same with Nilesh) -- it has been formalised and we can follow for some time to see how it turns out. The specific case of C11 FE box (versus C13 box) came up as a case-study; reinforced the need that there should be a clear, well defined way of testing and informing control room about the release of any new item.

==> no specific action here right now.

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

1.9 Finalisation of PCBs and chassis for various notch filters -- from 20 Aug (SSK/ANR): Different kinds of filters with different PCBs (some common) and different chassis (again, some are common) are needed. Further, various filters are in varying stages of acceptance and mass production. To keep track of matters globally, agreed that FE team to produce a spreadsheet giving details of all the notch filters presently being used, alongwith the type of PCB, total # required, total # available (and where used at present), and plans for procurement; and similar columns for chassis; first version of the spreadsheet has been done, and some feedback has been given; to check current status of this.

==> Ankur has been working on this and will be circulating an updated version soon. To check status again after 2 weeks.

1.10 Follow-up on 550-900 MHz band filters -- from 6 Aug, 23 Jul & before (ANR/SSK) : Comparison of product obtained from ICON with in-house effort and finalisation of plans : technical comparison of individual filter responses showed in-house design to be slightly better; tests with integrated unit using new PCB showed insertion loss increases to 3 dB now and some change in slope on higher side; complete chassis and full integration done and tests repeated to make detailed comparison with ICON results -- showed performance is very similar except for some out of band bumps (at 30 dB level) and slightly slower roll-off ; tried with AC coupling capacitors (no improvement); new board fabricated which after retuning gave much better roll-off; meanwhile, some realistic cost estimates for in-house production vs getting things done by ICON were made, and it was concluded that ICON option will be much more expensive; sample PCBs from Argus and Shogini had been obtained -- first test results (without chassis) showed ~ 5 MHz shift in 2 sub-bands but better roll-off; final plots showed same IL but the higher sub-bands having slightly shifted centre and widths which cross the main BPF upper cut-off; hence, agreed to retune the filter in-house and get modified versions done with Shogini quickly and then take a final decision; current status and action items :

(i) new PCB from Shogini works all-right; complete system with chassis is available for one poln; to assemble second poln unit with existing older PCB + new chassis; agreed to defer further development and integration to the point when the new FE box is ready.

==> no action here till new FE box work is taken up.

(ii) to review the cost estimates for mass production in preparation for final decision : updated estimates : 32000 for 2 PCBs is the dominant cost; total is about Rs 41,000 per antenna (compared to Rs 90,000 by ICON); hence, agreed to go ahead with building our own design; meanwhile, reduced wt chassis (700 g less) has been ordered (2 nos) to workshop, on lower priority; agree to wait till chassis comes and final layout for the new FE box is decided before going for mass production; PCB material is in hand; switches needed are in hand; so may not be a major problem for mass production. To check current status of this.

==> still waiting for the chassis due to some issues in workshop.

==> Regular follow-up after 2 weeks.

1.11 New filters for Lband -- from 6 Aug, 23 Jul & 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. Detailed results for the main BPF shows that the BW is slightly less than existing BPF : 500 MHz (965 to 1465 MHz), instead of 590 MHz (890 to 1500 MHz) -- this gives better rejection to mobile band signals, but has implications for final usable BW of L-band system; furthermore, an improved notch filter has been designed for the 850-950 mobile band (-60 dB vs -45 dB at 900 MHz), alongwith a LPF for cutting off the 1800 mobile band has been designed -- 3 dB cut-off freq of 1650 MHz. The matter was presented to the users in Friday meeting on 9th May, and it was agreed to generate a note about this proposal, for clearance in the GSG. Current action items are as follows :

(i) to finalise the GSG note : ANR has sent the modified version after first round of feedback; YG to finalise and circulate to GSG.

==> TBD shortly.

(ii) new BPF + notch filter to replace existing filters in FE box; LPF to be put in common path (CB or antenna base?) -- to be confirmed.

==> confirmed that LPF will be at antenna base as a common facility for all bands.

(iii) plans for implementation : to do is as a case-by-case replacement 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. 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;

==> PCB + chassis for new BPF ready for 40 nos (30 antennas + 10 spares); for the new notch filter, 60 nos had been made (PCB + chassis) of which 30 have been used in existing system (waiting to order more); can start on Lband, once the formal go-ahead comes.

(iv) sub-band filters can be taken up at even lower priority later on.

==> still at simulation design level; can discuss next time if we have the resources to go into this.

==> Regular follow-up after 2 weeks.

1.12 FE power supplies at all antennas -- from 16 Jul & 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; by March 2014, all antennas had been upgraded to have independent FE supplies. Remaining action items are as follows :

(i) 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.

==> still on hold, as per agreement.

(ii) 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, after space allocation plan at antenna base has been finalised.

==> to check and clear this.

==> Regular follow-up after 2 weeks.

2. RFI related matters :

2.1 RFI tests of ethernet switches for antenna base & GAB -- from 20 Aug & earlier (SN/BAK/SSK): Testing the available switches for RFI & plans for design of RFI box for ethernet switches : sample units from Cisco, HP, Dlink and DELL had come and were tested for RFI -- conclusion from final report was that D-link is much better than others (but it is 2x more expensive than next best option of CISCO -- by Rs 20K); also, use of shielded CAT5 cable provides significant improvement; later, during March-April 2014, tests were done with RFI enclosures (with mounting of filtered and shielded adapters, eth cables, AC pwr line filter, shielding for fan etc); results looked very good : isolation is about 70 to 35 dB from 100 to 1400 MHz; also, good improvement is seen with switch + shielded CAT5 only (without box); both CISCO & D-link work equally well in shielded enclosure, but CISCO is slightly worse when only shielded CAT5 cable (without enclosure) is used as it has more number of discrete lines in that configuration. However, it is now clear that it is not possible to use this 24-port switch in GAB; hence, CISCO can be selected as the final version for antenna base, alongwith the shielded enclosure -- agreed to go ahead with this.

Pending action items are as follows :

(i) to confirm that final report of the tests has been circulated : there is a draft report of 12 May 2014 circulated in early June; to confirm if any changes are needed or not and accordingly finalise the report -- PAR to check existing document and see if any parts need to be updated or not and circulate a final report.

==> email update from PAR : updated version of report to be read by end-Sep.

(ii) to finalise plans for mass procurement of the switch for antenna base usage.

==> see under Ops group.

2.2 Follow-up on UPS RFI -- from 20 Aug & earlier (SSK/PAR/RVS) :

UPS units from Ador were found to be the most suitable : 2 nos of 3 kVA was purchased, tested for RFI & cleared; units are in use in C9 and C10. Updated RFI report has comparative statements quantifying the repeatability. Further, 2 nos of 4.5 kVA units were also ordered with Ador, with option of 2 single phase o/p with different isolation transformers (3 + 1.5 kVA); units were delivered but failed the RFI tests -- lots of discrete lines seen; Ador had taken the units back for modifications -- finally, modified version of Ador 4.5 kVA was tested and preliminary results are quite good; report for this has also been circulated. Current pending action items:

(i) to finalise plans for going with 3 kVA unit from Ador as the final choice :

can we order 10 nos of these as a starting option? RVS has received budgetary quote; need one more confirmation at C10 about the current drawn by servo to fix the split

at o/p of the UPS (total cost per antenna may turn out to be around 2.x lakhs) -- to check current status of relevant items; servo current issue was resolved; to check status of order for 10 nos of 3 kVA units from Ador.

==> clarification from Patil (on behalf of electrical team) : indent for 10 nos to be raised now. Item can be shifted to under item 3.3 below.

2.3 Discussion relating to Industrial RFI survey -- from 20 Aug & before (PAR/SSK) : revised docs (from 2009 and 2012 discussions) had been circulated by RFI group and were discussed in 5 June 2013 meeting (is the document too exhaustive?); new survey planned with main aim to generate updated database which will be useful to pinpoint likely hotbeds of RFI in the industrial areas in addition to finding those without NOC; after months of planning and discussion with DIC, was finally conducted during 23-27 June with 4 teams; covered Ambegaon and Junnar talukas ~ 40-50 villages in each; ~ 40-80 working industrial units (large number are closed down or never existed!); follow-up actions 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; about 70% of existing data had been entered into this form; agreed that this activity would be superseded with making a database of equipment and NOC record for the existing industries found in the survey; this data entry now completed for all 3 regions : Junnar, Ambegaon and V-K industrial estate; some highlights from the database : of the total list, a significant number of industries are closed down, and another significant factor are no longer traceable; about 1/3 of the original are still working (ignoring poultry which is about 1/4, but is considered RFI-friendly); to cross-check the list against the ones which have NOC (nothing much can be done for those operating without NOC, except to add to our database and inform them about informing us for changes) -- this is happening now.
==> email update from PAR : database for Junnar + Ambegaon is ready; follow-up action to be initiated.

(ii) single phase welding machines in use, which are hard to account for -- to check with DIC for advice about it; based on the survey results, identify areas where one would like to go and quantify the level of RFI -- agreed that this will be taken up with DIC when sharing the database from the survey (around 20th Aug); to start looking at these, starting with the big units.
==> discussion to be taken up with DIC when presenting the report.

(iii) during the survey, some units which are likely to be important from RFI point of view, are to be studied in detail later on -- some work can start in parallel with completion of database, beginning with the bigger units; may need 1-2 ultra sound dishes, as the existing 2 are barely functional now (check status of order of these); can also look into IR thermal cameras.
==> email update from PAR : some RFI measurements of industrial units in Junnar area have started.

(iv) To see if DIC can be requested to issue a letter to all those active industries who don't have NOC.
==> discussion to be taken up with DIC when presenting the report.

3. Operations :

3.1 Identification and procurement of appropriate ethernet switches for antenna base (and GAB) -- from 20 Aug & before (SN/PAR/BAK) : Ops group to work with Comp

team and RFI group to work out scheme for getting appropriate 24 port switches for antenna base use (2-layers, manageable); CISCO make was finalised after the detailed RFI testing was over (see item in 2.x); current action items :

(i) to finalise plans for procurement of CISCO switch : 3 more such switches (in addition to the 1st sample unit) are in hand (total of 4); agreed to by 32 more in one bulk order (may be 10 k each)

==> no updates -- SN to send email update.

3.2 New, improved Miltech PC -- from 20 Aug and earlier (CPK/SN/PAR) : Two units of Miltech PC with two changes (more screws on panels + panel mount pwrline filters instead of chassis mount) were under test : conclusion was that PC ok from all aspects. Pending action items :

(i) agreed to initiate the purchase of 10 nos of the final version above -- indent had been raised for 10 nos (including some spare accessories?); to check current status of the PO.

==> no updates -- SN to send email update.

3.3 Planning for proper UPS & space utilisation for new equipment at antenna base -- from 20 Aug & long before (SN/CPK/RVS) : long-term plans for intallation of final UPS system and proper utilisation of the space at antenna base. Follow-up on 14 Aug 2013 discussion on first report : 2nd report was generated and detailed discussion took place on 5 Feb 2014; successive follow-up & final agreement on way forward (alongwith updated report) reached c. May 2014.

Some highlights are as follows :

(a) Regarding electrical loads : power drawn by different sub-systems estimated carefully, alongwith actual sample measurements on a few different antennas, for both existing systems as well as upgrade systems; effect of in-rush current at switch on also considered; total current requirement of 10 A for the ABR systems + servo control electronics found to be sufficient; hence 3 kVA UPS is adequate; agreed that, if needed, 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. Final load requirements have been carefully checked and tabulated in the updated report.

(b) Regarding electrical wiring : agreed to have separate isolated supplies for (i) servo drive system (without UPS) (ii) servo control electronics (with UPS) and (iii) ABR electronics (with UPS); one common 3 KVA UPS with split o/p (2 KVA + 1 KVA for servo and ABR respectively) each with its own isolation transformer is the ideal solution; the new UPS can have the isolation transformer(s) integrated into it, without increasing its footprint (only height may go up); updated wiring diagram has been produced by RVS in consultation with SKB and others, and is available alongwith the updated report.

(c) Regarding space utilisation : new 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 appears to work ok; 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);

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. Most of these issues have been captured in the updated report.

Current action items :

New, updated report has been produced. This item can now be taken to the logical conclusion : net outcomes can be summarised and follow-up action to be finalised.

Main list of actionable items :

(i) there was an issue raised about extra current requirement for servo due to

(a) stow on UPS? (b) core losses in the xmer

Agreed in discussion with servo (S. Sabhapathy) that stow on UPS is not required at all as it does not make any sense; also core losses in existing servo isolation transformer (in control electronics) is not an issue. Agreed that 1kVA isolated UPS supply is sufficient for servo. This matter can be CLOSED NOW !

==> no further discussion on this took place; matter can be taken as closed.

(ii) ordering of 10 nos of UPS; budgetary quote has been received;

see earlier agenda item.

==> indent to be placed shortly.

(iii) a closer to final wiring diagram for servo + ABR is needed

new wiring diagram circulated by RVS -- can check for any comments or suggestions and then incorporate as the updated wiring diagram; modified wiring diagram has been prepared by electrical and shared with servo (4th August) -- awaiting response.

==> still waiting for response; Patil to check with Bagde about it.

(iv) minor relocation of items on the wall of the shell : this is been tried in one antenna.

==> it has been done in C0 and electrical team is ready for doing on C10.

(v) making one antenna as a prototype or model where all the configurations are made as per the recommendations : C8 or C11 -- to be identified. agreed that C8 and C11 are not suitable, and selected C10 as the model antenna -- some work has been done on this : 3 kVA UPS is installed, but feeding power to ABR only; servo to make arrangement to shift PC104 load to UPS; switch boards / extension boards have been shifted to safe level. In addition, some work at C0 : 4.5 kVA UPS, with 2 isolation transformers, is installed with ABR rack connected on it; PC104 to be transferred shortly; relocation of elec boards is pending.

==> Patil will check with Bagde about shifting of PC104 to UPS for C0 and C10.

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

4. Back-ends :

4.1 Documentations :

(i) Detailed design doc -- from 20 Aug & before (BAK) : analog back-end was being done by Hande : 2nd version had been circulated in April. Next level of document going down to chassis level is to be made ready -- chassis level doc will take about 2 months; can be deferred to then?

==> end of September is feasible; can be taken up after 4 weeks.

(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; GWB first version (by Reddy + Irappa) has also been circulated; authors are working on a second version with additions -- this should have been circulated by now; need to discuss contents and decide follow-up action. Modified version has been circulated; to discuss and finalise

next step; ITR issue can be closed now; some discussion to try to move to a point where a publication can be done -- this needs to be followed up appropriately within the team and a summary plan brought up for discussion; check status of this.
==> can take up next time for a more detailed discussion.

==> Regular follow-up after 2 and 4 weeks.

4.2 : Power supply for GAB : from 23 Jul and before (NDS/BAK) : Two options are possible : linear vs SMPS. Agreed to produce comparison note with all pros & cons. Meanwhile, a few SMPS units can be bought, as the cost is very small. Still waiting for comparison note ! -- it was in internal circulation, waiting for Ajith to give his comments; comparison report has been generated; pros and cons are in terms of convenience (and price) vs RFI properties; agreed that present set-up of 30 ant GAB (with 5 spare SMPS supplies on order) can run for 6 months or so; final decision can be taken later on. 4 of the 5 units have come and these can be made ready and then we can have 4 racks with SMPS and 4 racks with linear / CVT supplies -- to check status of this activity.

==> situation of 4 racks of each kind has been reached; can wait for ~ 1 month and revisit the matter -- need to define objective criteria for comparison. To take up after 4 weeks.

4.3 Power equalisation schemes for new back-ends -- from 20 Aug 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 now checked and this needs to be done for each channel; basic power equalisation algorithm has been tested ok with 4 antennas; now working for larger number of antennas; SOP has been done; agreed to do a comparative study of this scheme with the GWB-based scheme to see if there are any differences or pros and cons.

==> first part of the test has been done : do GAB power equalise and look at GWB bandshapes -- looks like they are not equalised very well; to check the results and quantify; also complete the loop by doing GWB power equalise and checking GAB o/p.

(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:

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

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

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

Sanjay has completed the core coding; a wrapper is being done by SRoy; to be taken up for discussion.

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

(4) 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; detailed discussion has taken place between SRoy, BAK, SSK and YG on 14Aug2014 -- main conclusions and action items are as follows :

(a) attenuator values : aim is to check if measurements match with specs (within +/- 0.25 dB); initial test results for 3-4 units (at one epoch) had been reported by BE team (found acceptable); pending items (for BE team) are :

to check the constancy of the values across the band;

to repeat the tests for varying i/p power levels with constant o/p power;

to repeat the tests on different epochs to verify constancy with time;

to work out plan for calibration table for each attenuator (after above results).

(b) requirements document to be updated to reflect the outcomes of the discussions e.g. better clarity about the 3 modes of operation etc. -- SRoy to produce updated version.

(c) SRoy to test the recently added feature of saving attenuation values to file.

(d) self data (from correlator data stream) to be saved in shared memory ring buffer of ~ 30 mins depth for further processing tasks to work on (should also work off a recorded lta file) -- SSK to work with NSR to get this implemented. This should lead to a sophisticated total power monitor tool.

(e) to further develop the relevant routines that read the data and process to achieve the desired results -- SRoy to build from the basic routines available at present, with participation from NSR.

(f) testing of bandpass shape (ampl and phase) for different values of attenuation :

==> for (a) BE team may have some results by next week; need some updates from SRoy; need some discussion about tasks for NSR for (d); for (f) 6 out of 7 antennas showed less 5% percent and 5 degrees change in ampl and phase over 5 dB change in attenuation.

==> Regular follow-up on all items after 4 weeks.

4.4 GPU corr (GWB-II) : release of 4 node, 8 input, 200/250/400 MHz version -- from 27 Aug & before (SHR/SSK/BAK/DVL/YG) : (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. Action items :

(i) testing of GWB-II interferometry mode with different OF attenuation values to check variation of correlation coefficient -- DVL + YG to provide an update. It looks like working ok now, with the sig gen LO. To confirm if working ok with the new, modified synthesiser mode; results from sig-gen versus synthesiser have been found to be consistent at 1280 MHz (marginally better than GSB); however, 1390 synthesiser scheme needs to be confirmed; it looks like that this may be resolved now (maybe due to setting problem, when it defaults to 10 MHz reference)? but some problems noticed with other sub-bands of L-band) -- needs some clear follow-up, including combined testing of attenuator levels -- DVL to organise these tests; update needed about the conclusion from these tests. pending, waitin for DVL to be back...

==> some updates from DVL's email : 1170 appears to be OK; need to complete the checks for 1280 and 1390 subbands and clear the matter. DVL to test and report back the status.

(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; PA mode completed and tested; phasing implemented & tested;

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) there appears to be a problem in the PA mode : integrator & square law detector are in opposite order -- SHR has understood the problem and needs to fix it; can include some generalisations, including provision for 4 beams ?
- (b) GUI changes for flexible phasing to be checked with SHR & NSR -- YG and others to test and report back -- can be closed after one more round of user tests.
- (c) float to int conversion logic has been implemented for scaling but needs a cross-check -- user controlled scaling factor has been provided; updated SOP also provided; need user feedback about the functioning and then check if it can be closed.
- (d) beam mode still working with fixed channel and time factors -- need to be made general purpose; this should have been completed by now -- SSK has got the code changes done; needs to be verified and released.
- (e) availability of psr_mon / pmon on nodes 53 and 54 for recorded data is there; for shm attach needs some work; this is still pending -- to be done along with (d) above.
- (f) multi-subarray capability yet to be implemented (also to check about possibility of 4 beams)
- (g) header for beam mode data : to be taken up in the present situation and incorporated alongwith the PA mode; to discuss further to see if it should be introduced at the time when sub-array is being tested -- pending.

==> (a) is almost fixed and needs a bit more testing to release; (b) & (c) need a bit more testing for clearing -- can happen this week (d) is ongoing -- fixing other das chain problems in the process (max chans of 2048), may hit a limit of 16k chans; for (g) the work required at das chain level is yet to be done.

(iii) spikes in channels that are power of 2 : this problem needs to be discussed, understood and fixed. SHR has started looking at it, but no clear clues yet. may help with test using digital noise source; effect is seen in packetised corr also; now checking offline with raw voltage data acquired through Roach board, and with digital noise generated on Roach board; KDB has digital noise source + GWB spectra now running and some of the issues can be investigated; testing with noise generated in digital domain does not appear to show the problem. not clear what is the best thing to do now. SHR believes it is in ADC, but need a bit more thinking... a different ADC in the same slot or something else? some tests to be tried for one of four output of ADC? trying to see if selecting only 1 channel of ADC provides any clue? ==> no updates for now.

==> Regular follow-up on all items, either 1 or 2 weeks later.

4.5 GPU corr (GWB-III) : next gen system -- from 20 Aug & 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) 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); some changes in the overall stream organisation of the code to get better overlap between data transfer and computation and also less number of times that global memory is accessed inside the MAC -- shows ~25% improvement for 32k chan and 64 input mode. 16k channels is

20% and much less for 8k channels. pending action items :

(a) looking at XGPU code (with Pradeep & Vinay of nvidia) -- there is some progress in these efforts -- XPGU work is showing ~20% improvement; last round of testing with variable gulp size remains to be done to see if any further improvement is possible.

the above efforts have reached a logical end point; new aspects are being looked at by the joint team as part of further work on optimisation. any updates?

(b) trying sample PA beamformer code to estimate load etc. -- will come when PA beam mode is released in GWB-III -- to confirm that load is less than 7% for both beams?

old estimates are for C2050, ratio may change on K20 -- fraction of time for beamforming is 6% for K20. To discuss further plans, including taking up with nvidia.

(c) from all the tests done so far with nvidia, it looks like the full correlation job will not fit in 16 GPUs (though a couple of optimisations that can be tried are still pending); hence, we need to start planning for 32 GPUs : 2 K20s per host, or double-GPU card, or 32 host machines; agreed to try a test where 2 GPUs on one host machine is used to test the correlator code is portable -- need some discussion on this aspect.

==> for (a) need to get input from Vinay on the latest set of tests tried out; for

(b) need to wait for the new numbers for the modified PA code and then look into further optimisation; for (c) set-up with 2 GPUs is there on 4 of the 6 nos 620

machines -- so tests can be done on this when the code development reaches that stage.

(ii) other improvements in code :

(a) issue of net_sign[] flipping (LSB/USB modes of correlator) to be resolved : needs some change in GPU & DAS code; for GWB-II, it was agreed to not fix this problem in GWB code, and a patch was provided for LTA files -- this has been done and tested ok; to fix the code ab initio in GWB-III; pending for now.

(b) 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: 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; existing proposed option is fine and for other things like turning RFI rejection or Walsh modulation on/off, writing to registers in powerPC would work all right -- can take a final conclusion and close the matter?

==> (a) to be taken up a bit later; for (b) to start working towards implementing scheme in GUI for taking additional parameters that allow different bof files to be loaded; agreed that these flages need not go into ltahdr but can go in the user log as setting parameters (can also be there in gpu.hdr).

(iii) to start testing 400 MHz BW mode -- how best to conduct these tests? the hardware (nodes + FPGA boards, i/o wiring, power cabling etc are all ready; changes in the main code to handle 4 bits etc have been done (?), but some pending tasks were there : 2 x 10 Gbe has to be integrated with the correlator code; proper delay correction for 4-bit mode needs some changes; also choice of which 4 bits to use needs to be decided -- right now it is set for 4 MSbits; handling of 4 bits in main code is now completed; 2x10 Gbe integration with correlator code also done; delay correction 4-bit mode under test; all the above are tested with noise generator i/p; 16 input 400 MHz 4bit just fits (no room beamformer!); tested with pseudo DAS interface, using 3 host machines; need some software updates in DAS chain to handle more than 2048 channels; to start planning for interfacing with real online system and see where the bottle-necks may be; agreed to start porting improvements from the optimisation work with nvidia

into the GWB III code from next week onwards; meanwhile, one test run with real online can be tried to see if there are any stumbling blocks.

==> no updates on this; agreed to test with the real online; also agreed to hold work on beam modes for GWB III till final optimisation of FX on K20 is established.

(iv) 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 ("cyber", "cool" + one more?) -- to try and finalise after one more round of discussions including RVS (also, check new vendor Jyoti Tech); as an interim, 2 nos of cyber racks ordered with President. Current action items :

(a) 3 nos of half-height racks are made ready for immediate use for GWB-III -- two nos are populated with the 4 new nodes each, the other has 8 Roach boards; clk and input cabling to be finalised (need current status); host nodes to be kept separately; the final configuration should be ready for test soon. check status of these items.

(b) For the 2 President racks : one is being modified for GSB related nodes (spares) -- this is ready now, waiting for riser cards for the spare nodes (to be moved in during MTAC); 2nd rack being modified for trying an arrangement for special cooling (with help from mech group) -- being tested outside and will go inside corr room for detailed tests shortly; need status update.

==> for (a) no real change, except that new machines have come and the system can be reconfigured to final version with 8 compute nodes and 3 host machines + 1 spare

(b) 2nd rack for cooling is now ready for first set of tests with 1 kW load and increasing slowly... still waiting for the riser cards for the other rack.

(v) purchase of 4 new host machines for GWB III : to decide configuration of host machines (disk i/o to be kept in mind) within next few days; also to check if SSD is a viable option now for recording of data. Investigation shows that SSD vs SATA has pros and cons; it may be possible that one class of server may be there that supports both; to check if we can shorten this process by choosing basic server that meets the requirements using SATA disks -- to confirm final choice of units being ordered and status of the procurement : 4 nos of T620s (2 nos have 16 TB and 2 nos have 4 TB disks); order has gone; due by end of Aug; can check to speed it up a bit. To start thinking about the next phase and how many compute machines we should buy now; GSJ to check if delivery is on track; discussion on new compute machines can be had a bit later...

==> 4 new machines have come just today (!).

==> Regular status check on all items, after 2 weeks.

4.6 Procurement of accessories and other hardware required for GWB systems -- from 20 Aug and before (BAK/GSJ) :

(i) 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 only party quoted -- in last stages of clearance for placing the order; 20 nos of CX4 cards have come and being tested; to confirm that this order is enough to meet our long-term requirements; Agreed to produce a formal note about the situation for long-term -- first draft circulated by GSJ. Agreed to relook at the spares requirement without counting the units already being used in the existing systems and buy more if needed; issue is coupled with what we want to do with existing packetised corr unit -- to take this up for discussion in the near future.

==> agreed to leave the PoCo and pkt corr in place and get enough peripherals to meet the requirements.

(ii) new purchase of Roach boards etc : 12 nos of Roach1 + 16 ADCs and 4 nos of Roach2 have come; test bench for Roach1 board is getting ready; need discussion about plans for testing of Roach2. Roach1 test set-up ok; 10 boards cleared, 2 are not booting over network -- work ongoing to test; for Roach2 : need to check if we need to buy add-on mezzanine card; also software environment needs to be upgraded -- this is ongoing; had agreed to check the standard procedure for Roach-2 testing on casper and check what peripheral items are needed; also Matlab-Simulink upgrade is ongoing (to get status of that) and for Xilinx software it needs to be initiated.

==> all 12 Roach1 boards are now working and 16 ADCs also tested; for Roach2 : mezzanine card needs to be initiated; Matlab-Simulink is on order; Xilinx upgrade needs to be looked at.

==> Regular follow-up after 2 weeks.

4.7 Testing leakage, coupling and correlated noise in new back-end chain -- from 20 Aug & before (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 taken up for discussion; new tests show significantly different results for cross-coupling for GAB+GWB; this needs to be understood better -- confirmed that these tests used sig gen LO, whereas earlier tests used synth LO; maybe separate tests for the analog system can be done -- these have been carried out now, and results can be discussed; new report has been circulated that also shows significantly reduced coupling; agreed to repeat the original, user level tests done by YG & VJ to see if things are different now ; agreed to try the ADC noise input and north pole sky tests and see what results come out; need status update.

==> sky test with north pole and noise at input to GAB have been done; need to be interpreted carefully, in comparison with the earlier results; also to complete the test with noise at ADC input. Status check after 2 weeks.

4.8 Walsh modulation : prototype set-up on Roach board -- from 20 Aug & before (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 (done?); to aim for a robust 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; Walsh pattern being put in the Roach2 : ok, as very few slices are needed; issue of accuracy of the oscillator being used in the Walsh generator; what about synchronisation of starting?; Identified 3 possible action areas for work:

(i) to complete the Walsh modulate and demodulate set-up in the lab -- almost ready.

(ii) to optimise the hunting algorithm;

(iii) to demonstrate cancellation of unwanted signals in ADC card and/or GAB

Some mismatch between the CPLD waveform and FPGA waveform for the Walsh signal; now resolved and all FPGA generated waveforms (which use the CPLD logic; different from the original EPROM scheme) are matching. Now need to run a test where pattern from external source can be synchronised to the pattern generated in the FPGA -- this requires being able to hunt and correct for the unknown delay ! A few different

aspects of this discussed; SCC to try out and report the progress.

SCC is finalising the block that will allow max delay of 500 msec (for 128x4 msec Walsh length) with a resolution of 5 nsec (FPGA clock); to check status of this.

==> getting close to completing the delay circuitry -- may be able to test it next week. To check the status again after 2 weeks.

5. Other items :

5.1 New python assembly design -- from 6 Aug (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 dicussed 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 :

(i) modified E6 design with hinge-like support to be put on one central square ant -- short-term solution -- ready to be installed and tested : FE team to check status and identify "weak" antenna for this work : proposed to put on C4; now installed on C4; to watch the set-up on C4 and do periodic inspection for checks of (a) damage to hose (b) hose clamps (c) water entry etc -- first inspection 2 months from now to be done by mech and fe teams; status quo holding; next check can be after 2 months (around mid September?). holding status quo; inspection to be scheduled by end of this month / early next month.

==> planned to be done soon.

(ii) IGUS cable wrap -- new technology prototype to be developed and tested on quadripod; also option of hose without wire impregnation -- long-term solutions.

1] hose without wire impregnation

2] Entire hose assembly under procurement (long-term solutions).

Quotes for both items received : item 1 is Rs 10k for 10m (4 antennas);

item 2 is 60k each -- will try on the quadripod test range;

quotation had been received for one of each; order has been placed for one of each and delivery due date is this week -- to check status; delivery is expected in first week of August; need status; item has been shipped (from Bangalore); should be in hand soon.

==> items have been received; will be doing test on quadrupod behind lab building.

==> Regular follow-up after 2 weeks.

5.3 Fabrication of 6 spare L-band feeds -- from 20 Aug & before (SSK/HSK) :

Order to Akvira for 3 nos (with enclosure) + 2 extra horns. Hence, total of 6 feeds will be ready + 1 dis-assembled unit + 1 old feed at Pune -- so total of 8 spare feeds will become available.

Feeds inspected at Akvira site - many corrections / suggestions for improvements have been made [e.g. improved probe mount : press-fit vs. screws; M4 -> M5; etc]; delivery expected (after these modifications) by end-March'14; one assembly made ready at NCRA w'shop and sent to GMRT last week; 3 sets have been delivered at GMRT; fabrication of 3 enclosures is under process; and procurment of 3 enclosures is in progress; 3 new feeds after powder coating had come to GMRT; there was some issue about the thickness of the plate used for mounting connectors and some in-situ modifications have been done on one of them and it is found working ok; pending clearance for the other two; and decision needs to be taken for the 3 new ones not yet delivered -- these are complete and ready with the vendor, except for the finalisation of the

above plate. The enclosures have been received -- will be shifted after inspection is done; work on conversion to press fit type from screw type is being looked into (see earlier action item under FE).

==> email update from HSK : probe with press type and screw type deliver to FE group for further tests; no updates on other aspects. Follow-up after 2 weeks.

5.4 Improved software for work requests -- from 20 Aug and before (HSK/SJ) :

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? Aagreed to try and get this done in-house with Joardar -- can be taken up after completion of ongoing tasks related to electrical -- to confirm plans and status : work not started yet; needs a discussion with Joardar -- it should be possible to take up the job now, as electrical task is over; to check if this is underway now -- dialogue is underway between HSK and SJ on the matter; to check if this going smoothly now; agreed to start after 15 days after completion of honour roll related work; no progress on this; YG to discuss with concerned parties and take up the matter; work in progress; to check about possible date of delivery.

==> email update from HSK : work ongoing, basic structure ready, first version could be available shortly.

5.5 Status of new CSIRO feeds : from 20 Aug & before (ANR/JNC/HSK) : 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.

recently it has been discovered that a major change in the design /drawing required to maintain alignment between different sections [using guide-pins etc]; how to proceed further needs serious discussion about alternate options.

HSK to try some new ideas to see if a solution can be found e.g. liquid Al layer to cover ? additional coating of Al paste being looked at as a possible option; follow-up after 2 weeks.

==> no update.

=====

Minutes of the weekly Plan Meeting of 10 Sep 2014

1. FE & OF related :

1.1 Documentation : follow-up on level 2 (ITR) -- from 27 Aug & earlier (SSK+team):

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

(a) power monitor (Gaurav) -- rough draft ready, was waiting for conclusions from FE box testing -- first version was to be ready by 26 Mar; was held up for latest issues to be resolved and incorporated; was supposed to resume by 30 Jul 2014; GP yet to pick it up -- to check latest status.

(b) 550-900 main + sub-band filters (Imran) -- first version has been circulated; was discussed : document looks quite good; a few simple suggestions : changes in the abstract; add IL in requirements set; make sure proper references are quoted; list of annexures in TOC; some details about intermediate steps and learnings from the same. To check if changes have been made and updated version is ready or not.

(c) temp monitor (VBB) -- work had started (after new 250-500 FE box (v2) installation); to check status of this.

(d) following to be taken up later : spares for 1420 feed -- pending; to be taken up after temperature monitor (above).

==> (a) is still work in progress; (b) most of the changes have been done and new version will be circulated shortly; (c) not yet complete; (d) kept pending for now.

(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.

This can be taken up for discussion now as 250-500 filter ITR is done and 550-900 is on-going; for the 250-500 filter, a paper has been submitted to IEEE by Sougata & Anil -- reviews have come for this (needs some improvements, including some more mathematical treatment); and follow a well defined practice for others.

no news about the 250-500 submission yet; also discussed about filling the fields for reviewers on cover page (for ITRs).

==> modifications to the paper under progress;

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

1.2 OF system NTR -- from 13 Aug & earlier (SSK): can this be initiated now, leading to a journal paper publication?

Agreed to take the first draft of what was done for the MWsky paper and build on the OF section of it towards a first draft of NTR / paper. To check status of this.

==> updated version of ORx sent by SSK; OTx will come shortly; then one can talk about NTR / paper ! Quick discussion on ORx doc : it is somewhat brief, but probably adequate -- needs to refer explicitly to other docs which have supporting details; a few other changes mentioned -- to be done, and updated document to be circulated. Check status after 2 weeks.

1.3 Noise temp & gain vs temperature for new LNAs -- from 27 Aug & before (VBB/SSK):

Variation of gain and T_{sys} with temperature : tests show new 250-500 LNA 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); repeatability has been tested ok with 2nd round of experiment.

Results from testing of 130-260 LNA show about 35 to 40 deg K variation in Tlna over 0 to 60 deg and 0.6 to 0.8 dB (drop) in gain with increasing temp.

Results for 550-900 LNA : about similar 35 to 40 deg K change in Tlna with 0-60 deg change in temp, and gain change is 0.04 to 0.36 dB -- results obtained for two epochs for both cases and found to be repeatable.

Current action items :

(i) These constitute a nice set of measurements; now need to understand what may be the cause : what is the expected variation for the device (same is used in both stages of all the 3 LNAs) and what is the expected sensitivity to bias point variations with temp -- these issues need to be looked at in some detail now.

Agreed to verify measured values against the data sheet specs; check for bias pt variation with temperature (empirically) and compare with data sheet; also try Lband amplifier, if time permits; this was agreed to be taken up now..

==> still no progress on this due to other pre-occupations -- will take it up in next week or so. To check status after 2 weeks.

1.4 Installing temperature monitors in front-end and common boxes -- from 13 Aug (VBB/SSK) : scheme for fitting two temp monitors (one for LNA, one for FE box) for tests on bench, followed by antenna tests and installation: lab test with manual readings had been done (showed 15 deg temp difference between LNA body and FE box (open)); work was 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.

Meanwhile, C4 & C10 now also have dual temp monitors in FE box, and C13 has monitor in both FE & CB -- some tests had been done but data obtained was not sensible : looks like there are unresolved issues in the wiring of the existing common box units that prevents expected connectivity for the final monitoring in control room to be realised ! Agreed to select a few antennas (maybe W1, C13, E2) for proper monitoring after resolving the issue, and for the rest, keep putting the temp monitors and maintain a log for which ones the online monitoring is working and on which channel -- later, whenever common box is taken for maintenance or upgrade, the wiring can be corrected. (same argument applies for power monitor also).

Action items :

(i) work had been started on 2 antennas : C13 & E2 both channels temp monitor is now available at online output (fixed for C13 one ch FE and both chans in CB, and E2 both chans in CB); agreed to try getting data with control room help using the SOP for these 2 antennas. Also, some data had been collected for 6-7 antennas; to check if results are available from the combined expt for temp and power monitoring of two weeks ago. GP had started looking at the data (as well as new data taken recently) -- status update needed.

==> 2 sets of data are waiting to be analysed; discussion about converging of techniques for basic data handling and visualisation -- FE group to look into this.

(ii) Also, to check if present version of SOP needs to be updated in order to make it adequate for operators to run the tests by themselves; to try and book some slots and ask control room to run the SOP and take data; SOP has been updated and operators have tried it by themselves; to check data quality and decide if things are ok; waiting for results from the data that has been taken.

==> still pending to converge.

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

1.5 Testing of 130-260 system -- from 27 Aug & before (HRB/GSS/SSK/NK) :

Current action items are as follows :

(i) follow-up from present analysis results (by FE team, NK, as well as PMQC) : results from new round of interferometric tests by NK now available -- sensitivity of W1 reported to be significantly lower compared to that of C10 : to check if this has been resolved now. The FE box for W1 was replaced (alongwith the dipole); fresh observations can now be taken; to confirm if PMQC and other basic tests give good response for both the antennas; one more measurement has been done; 235 feed deflection is still less by 2.5 dB or so -- to discuss and decide follow-up action; yet to be done -- SSK to check and report back.

==> still pending.

(ii) To check if third feed for 130-260 is ready to installation on antenna : no matching wideband FE box is available; agreed to try and put it in place of the 235-610 feed in one antenna and use the existing 235 MHz band receiver for doing the test -- FE team will come back with which antenna can be used (eg. S3) and also check the new feed on the bench; due to oversight, wrong sized hole (needed 90mm vs 80mm) implemented in the third feed received; has come back from Pune workshop after correction; now needs a dipole (as original one put on W1) -- confirmed that dipole can be repaired without much problem -- agreed to go ahead with this in S3 by next week -- need status update if completed or not? after lot of discussions back and forth, agreed to put the feed on 150 face and change the 150 FE box with 235 FE box and carry out the tests; this means that regular 150 MHz observations will not be possible with this antenna. Should have been completed last week -- need status update on this matter.

not yet done; can be tried this week. Will get done on E2 or S1 (instead of S3).

==> not yet done due to a combination of other jobs, weather etc; can be attempted this week, depending on situation.

==> Regular follow-up after 2 weeks.

1.6 Mass production of 250-500 FE sub-systems -- from 27 Aug & 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).

Ongoing actions are as follows :

(i) proper storage for the spare feeds to be resolved. Space had been identified; to check if all spare feeds are now safely stored (where?) -- SSK to work with ABJ to explore CP Shed #1 and Gufa Shed; work to clear space in CP shed will start soon... ==> agreed that feeds may not be practical to put there (except dipoles), feed cones can stay outdoors; open shed behind OF lab can be cleared by moving stuff from there to CP shed; and shielded cage could be resurrected in that space (to be looked into).

(ii) characterisation and testing of installed systems (using data from May & before):

Main tasks are as follows (FE team to maintain a proper log of action taken on individual antennas during these tests and debugging activities) :

* stability of power levels and bandshapes to be checked from weekly plots for the available broadband antennas; bad antennas to be taken up for correction.

* antenna sensitivity to be checked from on-off plots generated from the data; bad antennas to be taken for investigation e.g. E6 was found bad in earlier tests and even after many changes (including change of dipole) the problem was not fixed -- to check current status of this.

Failure rate of new FE system : about 1 per 2 months over the past 5-6 months(?) -- what are main reasons : oscillations? device failures? loose connections?

Specific action items are as follows:

(a) W4 showed oscillation : appears to be related to how input is connected -- this appears to be a somewhat selective process where some particular combination of QH + dir coupler + LNA works better(!) -- can try on the bench with different QH units connected to same LNA in new set-up to check stability and also check by trying the new scheme and connectors for the directional coupler; this issue can be left open for some more time till some evidence gathers about performance of new arrangement of QH + dir coupler + LNA. New arrangement is in place on C11 and C13 now; can wait for some time to check performance and then decide on this matter.

(b) to check if new data is available and what results are seen from it : monthly reports available since last 2 months, which includes interpretation also -- to see if some conclusions / trends can be identified from these; also, waiting for data from July. To check if new updates are there and can be discussed.

==> new data set from August circulated by Ankur; discussion can be summarised as follows :

-- specific failures traced to improper connections, cabling etc : some are found and fixed.

-- some antennas showing slightly lower sensitivity than the best ones -- need to be followed to understand the cause;

-- some antennas show ripples and unstable behaviour in on off and deflection plots which need to be characterised and understood

-- some antennas show RFI (mostly military aircraft) -- but need to watch out for other possible sources and catalog and inform.

-- to check validity of satellite RFI warning set-up in control room.

(iii) plans for sub-band filters for 250-500 MHz system -- results from sample units 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, but insertion loss is better; all lab tests with manual settings using patch card + old MCM card were done successfully, and sample units assembled in the new FE box put on C13; meanwhile, a new, integrated unit that is more compact has been developed : one chassis with 4 filters in it + separate chassis for the switch was tried, but final design is 2 filters on one PCB and hence 2 PCBs in one chassis; following are the pending action items :

(a) prototype PCB for this had come and was under test : appears to be working, except small difference in 2 pols; maybe due to unit to unit variations?; agreed to check with the vendor (Argus) to see if the issue can be resolved -- one more PCB has been given to Argus to make with stricter tolerance (less than 10%) to see if that fixes the unit to unit difference problems (Shogini is unable to meet the specs; 2 nos chassis for 250-500 MHz filter had also come; latest update : the PCB made by Argus had an error in the Cu etching -- looks like they may also be having problem meeting 4 mil requirement; Sougata is working on tuning that sub-band filter to change to 4.5 mil (only for lowest sub-band, others are giving repeatable performance) -- this could lead to some loss of BW (~ few MHz); new PCB will get done by next week; will need to look at the results and then decide; was waiting for response from Argus and for completion of the new design using 4.5 mil track spacing; need status update.

(b) switch PCB (20 nos) are available, along with sample chassis -- to decide what is to be done for mass production -- agreed that first it will go to 1 antenna; if found acceptable, then to mass production; compact v2 installed on C11 & appears to be working fine (tests completed); report expected in a week (06-Aug-14) -- agreed to check against the performance of the new box and take call -- waiting for one more round of testing of sub-band selections to conclude if new compact scheme is fine.

==> still waiting for report on 2nd round of testing of VBB.

(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. total of 8 antennas now completed (including C13 with new FE box); for the last 4 antennas, combined BPF + TV notch filter has been used; pending action items :

(a) 2 more antennas (S4 & W4) remain from original set of 10 -- these are completed; to decide follow-up action; confirmed that original set of v0 is for 10 antennas and all are completed; #s 11 and 12 are C11 and C13; hence, this topic can be closed.

(b) status and plans for mass production of 175 & 540 filters & chassis -- 100 nos of 175 filter PCBs had been procured and chassis work was ongoing at w'shop in small batches; for 540 filter, PCB and chassis are common with satellite notch filter (70 nos & 60 nos are in hand, respectively); further 100 chassis is on hold as team was trying to reduce the size of the chassis (for both filters) for use in FE box; narrower PCB and chassis for 540 filter in 250-500 box (to reduce size and wt) was ready) -- is to go in the next gen FE box. Also, combined BPF + 175 notch filter PCBs into one chassis; old PCBs are valid for BPF and both TV filters; new chassis needed for BPF + 175 notch combined unit, & for 540 notch filter -- work is underway on these; FE team to come back with current status and plans for PCBs and chassis for these filters for all 30 antennas; quick look at the new spreadsheet by Ankur -- suggestions to add a few more features, including columns for long-term planning, and adding some dates for the short-term planning; work ongoing for modification of spreadsheet -- will come back shortly; also, 50 nos of BPF + 175 notch is getting done as part of mass production.

==> waiting for updated spread-sheet to be circulated; mass production of 50 nos + is ongoing (can be split into separate items).

(v) status of other auxiliary items :

(a) current version of noise source, power splitter, directional coupler etc : units were tested before putting up in C13; but in-situ tests showed as not working -- power level (deflection) of the noise was not sufficient; finally traced to faulty (unequal distribution) functioning of power divider module; different approach (using resistive components) seems to work fine (equal powers on both channels of ~ 4.5 dB for E-Hi cal; no need to reduce coupling from 20 dB); to confirm the final values of noise deflection being obtained from antenna tests with new system on C11 & C13; also, additional issue of 5 dB slope over the band (due to coupler) and 4 dB due to noise source -- these need to be optimised.

(b) change in the layout of noise module -- to try and reduce the 4 dB slope (and also increase the noise power slightly?), reduce temperature sensitivity etc : more compact PCB with constant current source, shorter track lengths etc) is almost finalised and will go shortly; will be ready to testing after 4 weeks or so. To check status.

(c) 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); may get done with CB power supply testing; new design of supply has been done and PCB has been ordered. To check status of this.

==> (a) is still waiting new round of test results from C11 and when C13 is ready; (b) PCB has not yet come back (c) again PCB not come ==> ANR needs to talk to Techno Circuits about the issues and work out (long-term) solution !

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

1.7 Final version of 250-500 FE box -- from 27 Aug and before (ANR/SSK/HSK) : modelling showed that existing size of box is not adequate (inspite of double deckering of chassis); deeper FE boxes are needed -- 15 cm longer box was made (wt

of new empty box was 15 kg) after mech group 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. One such bigger box was populated as a prototype and put up on C13 and is under test; meanwhile, FE team has gone back to a compact design and layout that makes everything fit in the original FE box size; action items :

(i) first new box (bigger dimensions) was supplied by w'shop, integrated by FE and put on C13, with mixed results : basic things worked ok, but filter cascading needed a change, power & temperature monitoring also had issues, noise firing showed problems etc. This box was brought down for repairs, modifications and improvements, and was to go back to C13 -- need status update on this, including plots showing the new results for all aspects, including Walsh function test.

Walsh not working problem found (cable had come loose) and box now fully tested and ready to go back on C13 with matching wiring etc with C11 box. Can do a careful comparison of bench test results of C11 and C13.

data from C11 : waiting for antenna availability to improve; C13 should go up soon.

==> still waiting for last round of tests; C13 has not yet gone up, but will happen soon, as all tests on the ground have been completed.

(ii) increased size and weight of prototype new box makes it unwieldy to handle at the focus and is a potential problem; FE group has worked on compacting the contents to try and shrink it back to the old size, with minimum increase in weight : some of the smaller units have been integrated into single units; milled chassis have been replaced by plate+rail chassis wherever possible; ver2 box has everything fitting inside the original box (now 19 kg, down by 9 kg) : mechanical assembly completed; RF cable routing and DC wiring work completed; new RFCM card added; box was under testing in the lab (including thermal cycling inside the chamber); to check if tests completed and box is ready to go on antenna (which one?) it is to be added and the box finalised for testing in the lab; 'ver2' now installed on C11; testing completed; report circulated, taken up for discussion -- looks good, except for a few minor suggestions for improvement -- to check if final version is ready. box has been up there for almost 4 weeks. no problems reported except for the fringe problem due to wrong filter settings (to confirm if this has been resolved). Walsh has not yet been tested -- to check plans for this. After the final set of test results, to take a formal decision for acceptance for mass production (meanwhile, FE team can start planning for mass production). -- waiting for results from 2nd round of testing.

==> still waiting for last round of test results from VBB; meanwhile, item can be rewritten.

(iii) choice of reflective paint for the final FE boxes needs to be made : a few different options are available (ref : APK, HSK) -- need to decide which one to try and methodology of the tests to be done.

one round of tests with one kind of paint had been done long time ago : to circulate the results and also plan further tests with few other brands, in consultation with venodr and APK.

results from previous tests were not meaningful; new scheme can be used on this box; additionally, to ask for 5 new boxes; also speed-up the process of identifying possible paints and getting samples (by HSK); get ready for testing a set of boxes with different paints using parallel measurement scheme...

==> shells of 10 boxes (meant for PS) are available -- 6 to be used for making 2 nos of 250-500 FE, 1 nos of 130-260 FE, 1 nos of 550-900 FE and 2 nos of common box; inside plates need to be done -- correct drawings need to be identified;

reflective paint of 2 brands (one by APK, one by HSK) will be tried on 2 empty shells -- issue of clash with powder coating needs to be understood.

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

1.8 Status of improved 500-1000 MHz CDF -- from 27 Aug & 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 : 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 ?; lab test results available for 'dipole v2b + cone v1 combination' ? to be done on C10 right now (after taking down 750 kildal feed) and then matter can be resolved. 2nd FE box was ready and tested and waiting to be installed; box is ready to go on 2nd antenna (which could be C6) once the new adjustable stool is ready. still pending; would like to use the second stool on Lband face on C1, for 250-500 testing.

==> not happened yet as FE box not free; can be done once C13 system is put-up.

(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 had sent a response but it had not been tried as PC is down right now. To report if this is possible now.

==> no updates.

(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 (the same can be compared for the test range pattern measurement results for the two feeds?)

==> not discussed.

(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 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. New adjustable height stool was made ready by workshop and tests were done with v2 cone + v2 dipole feed -- to report the summary from this, and plan follow-up action items; also to complete the same tests with v1 cone + v2 dipole; 5 readings taken but then servo and GB problems in C10 had stopped the work; initial set of results using Crab discussed -- the basic performance of deflection vs freq (610, 700 & 800) and stool height appears to be similar to v2 cone + v2 dipole (though data are a bit noisy) -- may be less sensitive to stool ht at the higher freqs ? Agreed to do a deflection test on Cass-A at 1060 stool ht and then do a beam shape measurement on Crab for both the feeds.

==> latest update from deflection tests : 30-1 on-off deflection test on CassA shows deflection less by 2.5 to 3 dB : need to cross check this with a full RF dump at OF o/p -- can be tried today evening; beam shape data has also been taken; also to complete the deflection across band plot for Crab;

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

(a) design Kildal ring feed at 750 MHz using v2b dipole -- 14 dB RL achieved (over what BW?) -- first results from sample unit (tried on C10?) appear to show improvement by 2.8 dB at 750 MHz (compared to v2b dipole + v2 feed design) ! To circulate detailed results, including on-off plots after rechecking, including comparison with CDF at different heights; HRB has circulated the results -- to take up for discussion. (to try small variation in height to find optimal position and then review the status). This feed is back on C10 now, but without any height change?

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

(c) design Dual-ring feed 550-900 MHz (initial BFRs can be made for 650 & 800 MHz) -- waiting for above items to complete.

to try Kildal with height change on C10 stool after cone-dipole tests are completed.

==> no progress on this one.

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

1.9 Releasing existing 610 MHz system as part of the wideband upgrade -- from 27 Aug (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;

(i) to carry out 2nd round of interferometric tests to characterise the performance; YG & DVL to report on this. data taken just before MTAC was corrupted by ionospheric scintillations; new data taken one week ago showed problem of low correlations in GWB; waiting for new, reliable data set to be taken;

(ii) meanwhile, 3 more boxes with broader filters + notches (x2 channels each) have been prepared and put on C4, S2 & E2; to check current status and decide follow-up.

To summarise, 2 antennas (C8 & C12) in one channel; 3 antennas (C4, S2, E2 in

both channels); to check (a) availability of filters (b) manpower for doing the job and (c) requirement from users for improved filtering requirements and then decide future course of action;

agreed to complete 5 more antennas to complete 8 nos; waiting for filters; 10 filters of each kind (BPF + 2 notch filters) are ready; first box is getting ready; after that, it will be a cyclic process to install on the antennas.

==> there was a problem with new lot of 26 nos of BPF -- 10 MHz shift; now corrected adhoc by using conformal coating on the PCB; meanwhile dialogue with Argus is on to understand the cause of the problem; now one box is getting modified and may go up by next week (agenda item to be rewritten somewhat). Regular follow-up after 2 weeks.

1.10 Design of new RFCM card (v2) -- from 27 Aug & before (SSK/Imran/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 (alongwith 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. Later, 5 monitoring points were added to the existing card, tested ok. Plan was to enhance the design of v1 by explicitly adding the monitoring facilities & full compatibility with new MCM card so that it can be used in all FE systems. A prototype version of the v2 PCB was designed, sent for fabrication, assembled, tested and incorporated into one Lband feed (which is now on W1) -- it still has some unresolved issues about bringing out the TTL lines and to take in the 8 monitor points; appropriate connectors need to be put for this and new PCB (v3) designed and sent for fabrication; 12 nos had been fabricated and received and were being assembled and tested; all cards tested and found ok, but not yet integrated into a box -- agreed to test the card in next Lband feed being made ready; can also be tested in one FE box that is connected to common box that is being tested with new Rabbit card; after that it can be taken up for mass production (~ 120 cards may be required in the long-run) ; report : first draft is ready, and 2nd version is underway.

==> Lband feed from C3 is under refurbishing -- will get new v3 RFCM card (may go to C1); similarly in one 327 box that is under servicing right now; also need to put in the test set-up that IER is working on right now; report status : revised version is in progress; may be ready in 2 weeks. To check status after 2 weeks.

1.11 Next Gen Common Box -- from 27 Aug (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 -- ANR to check if block diagram is ready for circulation; still pending !!! -- Sougata to circulate the blk diagram -- was displayed, but needs to be circulated !

==> blk diagram presented (finally) -- basically looks ok, a few modifications suggested to blk diagram and layout diagram; Sougata to update and circulate.

(ii) plans for interface card to meet monitoring requirements to be studied (alternative is to go to Rabbit card directly?) -- BSCTL card was identified to have additional monitor points which are already being used for power monitoring and need to do the same for temp monitoring and make available 2 spare monitor points; this will work for both old and new MCM card ! modified BSCTL card is

working fine (already in use in E2 for both temp and power monitoring) and only two jumpers are needed on the PCB -- agreed that this can be made into a SOP to be carried out for any common box that comes down. SOP is still awaited !

==> SOP is almost ready but hasn't been circulated yet (Sougata).

(iii) plans for integrated power supply card -- being looked into by Imran; expected to be completed in 1 week (23-Jul-14); given for fabrication, will take 2-3 weeks (13-20 Aug- 2014); design has been done; card has been ordered; waiting for arrival. ==> still waiting as discussed above.

(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); FE team has worked out a plan for integrating the Rabbit card inside, which requires to swap the interface card to the other side of the box, and to ease the wiring issue, the centre plate needs to be cut into 2 pieces; some issues about stacking of power detector with broadband amplifier need to be addressed; integrated power supply card is included in this scheme; media converter added to allow for additional capability of fibre connect from top to bottom (as an alternate to shielded eth cable or serial link on RS485); action items now :

(a) to take one old common box, get new plates made, put dummy boxes and work out the wiring scheme : mechanical items are completed for the sample box but final wiring is yet to be completed.

(b) to confirm about the link from antenna base to top : eth over OF vs eth over Cu vs serial link over RS485 -- confirmed that the options are : eth over OF and serial link over RS485; to check plans for providing these options.

==> (a) still waiting (for VBB to be free) for wiring to be done; (b) agreed to provide standard RS485 connector for serial link; for OF link, suggestion by OF team is to mount the OF to eth converter unit independently outside the common box (on the chassis) so that maintenance of common box does not cause problems.

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

1.12 Calibration scheme with radiator at apex of antenna -- from 27 Aug & before (SSK/PAR/SRoy/DO/YG): Current set of issues being tracked are as follows :

(i) testing of dynamic range of old vs new electronics with parallel set-up on 2 antennas, C4 (new electronics) & C1 (old electronics) -- 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;

First round of tests were done on C0 and C1 (both old electronics); C4 was first antenna with new electronics that was tested (in Dec 2013) and informal / short report is available; W1 is the antenna identified for testing repeatability on new electronics in addition to repeating on C4 itself (though it has old common box). Summary of new results : sensitivity and 1 dB compression point results look ok; stability of ampl and phase response need some interpretation; fair amount of new data is available which needs to be studied and the summary understood and then taken up for discussion -- this was done, and conclusions about 1 dB compression point are reasonably clear; can have an exercise to compare with results from signal flow analysis results. For the ampl and phase varn with antenna position, the results and conclusions are not very clear, but there appears to be some indication

of the variations; a more detailed study with a couple of concrete follow-up options may be considered; need a follow-up discussion on this; agreed to complete the 1 dB compression point comparison with SFA; to repeat tests on either C0 or C1 to check validity of old results -- need status update.

updates from results extracted from the analysis : 1 dB compression point values shown for C4 and C0 (new and old) show 7-9 dB change between old and new electronics; there is a hint for frequency dependence with reducing improvement at higher freqs; agreed to check with 20 MHz steps of CW radiating signal for both these antennas, in the range of 250 to 500 MHz.

Results replotted to show ampl, phase and elevation vs time on same panel -- there is clear anticorrelation of phase with elevation; for ampl, things are not so clear; for phase there may even be some frequency dependence in going from 150/400 to 1250 MHz. to try the test for broadband response alongwith n/w analyser; also give a copy of the data to SRoy to try plotting ampl/phase vs elevation directly.

Current action items :

- (a) plans for updated, detailed reopr.
- (b) to check the change in 1 dB compression pt against SFA numbers.
- (c) to repeat on another antenna with new electronics and one with old : W1 had been identified, and work for RF cable and antenna mounting related arrangements was completed and tests were to be done -- to report status of these.
- (d) to check meaning of results from other wavebands that have been done.
- (e) to get the plots done for the variation with antenna position (elevation etc) and then work on interpretation -- some of this has been done.
- (f) to give a copy of the data to SRoy for a more detailed analysis.
- (g) later, to move to finer aspects of variation with time (see item (ii) below).

(ii) SRoy has done the basic calculations but needs to cross check against the beam width of the feed to estimate the amount of deflection / shift between feed and transmitter at apex required to produce the measured change in signal level.

Test done by Subhashis by rotating the feed : power falls by a factor of about 4 with about 600 counts from the 0 reference position (-700 to +200 arcmin range) : fitting a gaussian to the voltage pattern (asymmetric) gives a HPBW of about 21 deg (about 15 deg for power pattern); this gives about 2 deg for 0.5 dB change in power. SRoy to refine the calculations (including other antennas) and also check Raybole's new report on this matter and summarise for a discussion.

drop in power is 4 sec out of 20 sec ==> 15 deg is 3 dB beamwidth (ok with other test of SRoy); ==> about 2 deg for 0.5 dB change; if converted to lateral shift of the feed, it may be close to 1 m -- to check alternative interpretation about rotation about feed axis by the require angle. not clear if the matter has been resolved or not; SRoy has circulated a first draft note; agreed to discuss during the meeting of 13 Aug; meanwhile, SRoy to circulate a drawing to illustrate the geometry. both documents have been circulated, and a discussion is required...

==> original tests on C0 & C1; later on C1 vs C4; now on C0 (with old antenna) vs C4 (with new antenna). to cross-check when new common box was put on C4. to get comparison plots for C4 with old and new radiator antenna. new tests with sweeping of RF to check 1 dB compression points with finer resolution over the band -- some tests done and data is being analysed. pending with SRoy for making the plots.

==> some discussion about the analysis done by Subhashis : whether lateral translation of feed converted into an angular shift is enough? does the transmitter beam pattern make a difference? how much rotational offset of the feed would produce the same

change.

(iii) deployment of new broadband antenna : suitable unit (from Aronia) has been identified and ordered : 2 nos with slightly different freq coverage are there -- looks like will work from 100 MHz to few GHz (hence OK for our use); one unit mounted at C4 and tested with broadband noise source covering all GMRT frequencies; found to work ok to first order, but there are some frequencies where there is loss of power -- being studied; also, tested with varying power levels of noise source and data is being analysed; first version of report has been circulated; few points raised are : why 1 dB compression pt changes dramatically for some of the frequencies e.g. 327 vs 393; issue about plotting amp, ph vs elevation instead of time -- SRoy can help in converting the data; to check consistency of results with earlier for same frequency; then check change in ampl and phase response for other freq; to check the angular pattern of the new antenna and compare with the earlier dipole antenna that was used -- to check what has been done and discuss the new results.

==> Routine follow-up after 2 weeks (agenda item needs to be rewritten more concisely)

1.13 Walsh switching arrangement in FE -- from 27 Aug & 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) -- agreed to try and couple this with the new test set-up at W1; agreed that CW test can be done to check functioning of modulation scheme when other tests are done at W1; FE team tried 4 antenna test including C13 but could not get a definitive answer; appears that the problem was due to improper test cable used at antenna base; new cable with all cores connected was made and used; further, it was found that Walsh eeprom IC has been removed from all antennas by BE team -- restored in W1 now and tests to be completed and reported: this looks like working satisfactorily for a first round testing. To go to next step of getting the signal to receiver room and check on oscilloscope (one pol can still be going to the VVM at antenna base); 2nd step will be to talk to BE team and get the end to end test going. Antenna base tests completed (instead of C04, done at W1 - why ?); demodulation at receiver room not done yet; further, Walsh switching has been tested on C4 with astronomical source : loss of correlation happens when Walsh is turned ON (need to understand upper and lower bit in Walsh); next step is to match it with the demodulator in the back-end system.

summary : radiation test from apex done at W1 to show that Walsh switching is happening; astronomical source test done with Walsh on-off at C4; in addition C11 and C13 are Walsh-ready and should be tested in similar manner; after that, to take up discussion with back-end team about extending test to demodulation side...

==> item not discussed. to take up for regular follow-up after 2 weeks.

2. RFI related matters :

2.1 RFI from different spectral lines -- from 27 Aug and before (PAR?SSK) : this covers RFI from TV signals (from cable to terrestrial systems + boosters), aviation and radar systems, police wireless and such like :

(i) TV lines : Cable TV leakage could be bigger problem than boosters etc? : tests were done to see how much is this leakage as a function of frequency etc, but no clear evidence was found; 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 :

generate list of all the terrestrial TV transmitters in neighbourhood (with large enough range) and their frequencies, and to check which ones are expected to affect us : updated document shows about 17 transmitters around GMRT area listed -- based on information gathered from DD personnel and web. Not all of these are seen by GMRT antennas (some are very low power ~ 10 to 100 W, including UHF transmitters); the list of ones seen at GMRT is 11 transmitters : 2 of them are at same freq : Junnar and Sangamner; all are analog TV transmitters, except Mumbai DTT (digital transmission at 471 MHz) -- its signature is not clear. Following points came up : lines are there, not at very strong level, but the level appears to vary from antenna to antenna in an unpredictable manner; agreed to use data from RFI monitor as the basis of a catalog that can give the relative strengths of these lines and other lines (as seen at CEB).

==> not yet started.

(ii) civil aviation related lines -- these may be of 2 kinds : airport radars (e.g. near 1090 MHz?), and transponders on aircraft (and counterparts at airports?) -- these are generally at lower frequencies (TBC). Some further details: near 1030 and 1090 : interrogation at 1030+/- 3.5 from airport and response from aircraft at 1090+/- 5 with width of about 20 MHz.

Aim : to draw up a comprehensive list of known / expected lines from civil aviation related activities near GMRT.

==> work ongoing to characterise this, but not seen in log-periodic; to check with omni-directional antenna system.

(iii) any other sources of spectral line RFI : e.g. police wireless etc -- need to be discussed and characterised.

==> work ongoing with omni-directional antenna

(iv) Overall plan to characterise all the lines using the RFI antenna to be discussed.

==> work ongoing with omni-directional antenna system.

==> To follow-up after 2 weeks.

2.2 Radiation from CAT5 cable -- from 27 Aug & 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; tests had been completed, and report showed not much change in radiation level with and without shielded CAT-5 cable in conference room (!) -- maybe dominated by RFI from other equipment in the room? Agreed to move ahead by extrapolating from the results of testing of Miltech + switch : to try and estimate the cost of material and labour (time) for changing to shielded cable + connector in all the unshielded rooms of the building; discussion on 16 Jul : table of inventory of un-shielded cables currently in use (94 copper lines); total length ~ 1200 metres; procurement of shielded cable to be initiated; data has been submitted by RFI team, and an updated document has been circulated; needs a discussion to decide the course of action.

about 900 m cable (3 rolls) + crimping tool need to be ordered (enough connectors are available); total investment is about Rs 1.7 lakhs : agree to go ahead with this. To check status.

==> indent ready; to check status after 2 weeks.

2.3 Effect of military satellite RFI in 243 band -- from 27 Aug & 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 : to try a test where filter is inserted in the path (for 2 antennas) -- done for E2 & C6 and check effect on other bands (610 and Lband); need to decide if we want this filter in a switchable mode (at FE box or Rx room) or permanently in the path or not at all ! does the answer depend on the strength of the signal? not clear... trial results on one channel of C6 was to be circulated for getting feedback...

(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. One control expt has been done with SNK -- results for tests done by pointing to the satellite (and tracking for some time) show increase in total broadband power of about 12-15 dB on the strongest satellites (others are weaker) -- this leads to harmonic at ~ 500 MHz also visible; further action items :

(a) to try to increase OF attn or other steps to see if harmonics can be controlled; and to see how far to move from satellite to bring down harmonics and main power -- data appears to show evidence that FE is saturating (harmonics are seen) because adding OF attn produces no change, whereas moving away does produce a change;
(b) to check with SNK about releasing the alarm related feature to control room -- no updates (may need to discuss with Ops Group).
(c) finally, we need to quantify : at what angular distance do the signatures of non-linearity (harmonics) show up. Agreed to try for a plot that shows power in the RFI band as a function of angle from the satellite; and also to quantify when the alarm turns on.

==> (a) confirmed that FE saturates (b) SN to check with SNK (c) to do the finer experiment to find the angle range that avoids saturation.

==> Regular follow-up after 2 weeks (may need to rationalise this agenda item)

2.4 RFI testing of LED lights for GMRT labs & building -- from 27 Aug, 30 Jul, 29 Apr, 26 Feb, 12 Feb & 20 Nov (PAR/SSK/RVS) :

Electrical group has indented for 5 W lamps + X Watt tube lights (after samples had been tested for RFI and cleared) -- delivered units had 5 W and 7 W lamps and latter found to generate RFI (not to be used at GMRT); mass installation done and tested; agreed to install in canteen as first location; tubelights were to go through mass installation testing before clearing for use; tubelights (50 nos) also failed the test; hence, only 5 W bulbs found suitable! plan was to keep the 5 W bulbs installed for about 6 months and then check for RFI and take a final decision about bulk purchase; agreed that it is time to test the lamps that were installed in the canteen; new tests have been done and results look ok. Hence, clearance for mass procurement can be done. Update from RVS : 30 nos of the original 50 nos of 5W LED lamps can be now installed in corridor and lab areas. Indent can be raised for additional quantities. To check status of this.

==> need plan update from electrical; follow-up after 2 weeks.

3. Operations :

3.1 Mass production of shielded box for MCM cards -- from 27 Aug & before (SN/CPK/HSK): RFI test report of Akvira vs Physimech showed Akvira is better and this has been selected. Testing of new MCM card in shielded box, with final configuration was done and report was very positive, and it was agreed that Ops group can now go ahead with mass production of this shielded box:

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. Ops group to start looking at the work required (parts list, jobs to be done, items to be ordered etc) and make a plan. Ops group needs to continue the dialogue with mechanical and also open the dialogue with RFI team to get the inputs : drawings, bill of material, identifying list of vendors etc. To aim for 60 + 10 shielded boxes. RFI specs provided to Operations group; mechanical boxes at work order stage (to be outsourced); enquiry for components in ~ 2 weeks (30-Jul-14); to be available in 3-4 months; to confirm present status and schedule long-term follow-up accordingly; work requisition has been given and enquiry may have been sent : for 70 nos, with one prototype to be delivered first, and batch-wise delivery. To check status and decide long-term follow-up plan.

==> folders in process; new vendor is L1; order should go shortly. To check status after 2 weeks.

3.2 Mass production of shielded box for switch enclosure at antenna base -- from 27 Aug and before (SN/CPK/HSK) :

detailed RFI tests show that the shielded enclosure appears to be working quite well; RFI team has handed over the information and material to Ops Group for initiating mass production; last round of confirmation to finalise the drawings has been done; Ops group has started on the work requisition for this box (as well as the box for the Rabbit card), in cooperation with mechanical group; current target is for 35 nos of these shielded enclosures; work requisition has been given (for 35), with one prototype to be delivered first, and batch-wise delivery; and is also in enquiry stage; to check status and decide long-term follow-up plan.

==> same as above; to check status after 2 weeks.

3.3 Interfacing of FE with new M&C system -- from 27 Aug & earlier (SN/NS/CPK) :

Naresh + Charu & Sougata + Rodrigues were working 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. Action items:

(i) appears that the basic set-up is now working, and tested (by Rodrigues + others); basic difficulty of communicating via Rabbit to FE appears to have been resolved with demo of some commands by Rodrigues et al; to check if all the available commands can be exercised; 2-3 basic control commands have been tested; monitoring commands (6-7 FE + CB monitors need to be tested; a report has been produced by Rodrigues; follow-up discussion with telemetry team and Rodrigues to be organised by Nayak; to discuss outcomes from the above actions to be taken up; one round of discussion has taken place; CB was being made ready in FE lab for test set-up (to be reserved for telemetry testing related work); basic plan has been worked out by SN with IER and others. To check the status of the activity.

==> appears that the basic tests have been done; most commands tested and cleared; some problems with bypass mode and RF on/off -- getting fixed; Walsh cmd not yet activated; monitoring tests yet to be done. to complete these and then work with issues related to eth vs serial port tests and also packaging of Rabbit inside the common box etc. SN to talk with SSK and come back with a plan.

(ii) to decide the set of high level commands for FE system; for many of these Naresh already has the placeholder to accept the commands and action to be taken has to be programmed, in Rabbit software -- this is to be initiated.

Code for existing commands of common box have been done; can check for new commands in upgraded system and then move to FE box -- this should be nearing completion now -- can check status and see if it is completed satisfactorily; agreed that Naresh should send a note about the set of high-level commands being implemented, this has finally been circulated; not clear if it really implements high level commands that were expected; also how to include Walsh needs some thought; need to discuss these items in detail and include in testing plan.

==> after some discussion with FE and Ops group, agreed to take this up for a detailed discussion next week.

3.4 Development of M&C software -- from 27 Aug & before (JPK/RU/SN/NGK/SJ) :

(i) taking up EPICs based PoC version for putting additional functionality : basic loading (and unloading) of the EPICS has been done successfully on the machine; now need to connect Rabbit card and test existing PoC software and then go to the new addition to be done; Naresh and Yogesh to coordinate about putting the Rabbit card in the lab. Joardar and Yogesh have made a fresh installation of the software (under Debian linux) and demo software is working fine; ready to start work on OF system end for integration and testing -- first test with Rabbit card (with v2 subsystem) done successfully; need the test jig to be shared with telemetry lab, as well as the "subroutine" for setting the appropriate bit patterns (both were arranged for); agreed to develop the software first for OF attenuators; to check status of the progress on this.

==> not discussed.

(ii) plans for modbus learning & testing : simple set-up of PC + Rabbit card with modbus for "hello world" level -- no updates, as not get enough time; could keep it on low priority.

==> not discussed.

(iii) plans for tasks for next phase of work for new M&C software : architecture definition and UI definition tasks are on; to check current status of the activities to see if there are any bottle-necks or difficulties; also, some broader issues (raised by JPK) need to be discussed in a wider forum.

==> not discussed, but some of the wider issues to be taken up next week.

(iv) M&C software in-house : next round of tests were underway -- tests done with switch + rabbit card at antenna base and used for commands and monitoring of the OF system -- this path is cleared. now testing with GWB corr at first level by interfacing to existing dassrv structure and environment; webpage based display done; some routines in astropy added; some additional code added for diagnostics purposes - to be completed by 30-Jul-14; Santaji has built web based monitoring temp/wind/3-phasepower etc; tested ok.

==> not discussed.

(v) in long run : is dassrv needed or not?; whether metadata and other related information may change the details of the interface to the backends; to look at pros and cons including sync of multiple correlators etc -- could generate a note about various aspects, including future possibilities. JPK to take up discussion with RU (may involve SSK also as needed) -- can this be addressed in the arch design study; automated starting of correlator may also be an issues...
==> not discussed.

(vi) common hardware requirements to be taken up for discussion -- to see if these (along with other common issues) can be taken up for discussion in a joint session of all interested parties -- to try and organise a joint discussion during the week of 10th Sep.
==> to be scheduled on Thurs 18th in the afternoon.

4. Back-ends :

4.1 Documentations :

(i) Detailed design doc -- from 27 Aug & before (BAK) : analog back-end was being done by Hande : 2nd version had been circulated in April. Next level of document going down to chassis level is to be made ready -- chassis level doc will take about 2 months; can be deferred till end of September.

(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; GWB first version (by Reddy + Irappa) has also been circulated; authors are working on a second version with additions -- this should have been circulated by now; need to discuss contents and decide follow-up action. Modified version has been circulated; to discuss and finalise next step; ITR issue can be closed now; some discussion to try to move to a point where a publication can be done -- this needs to be followed up appropriately; agreed to have a discussion on this topic with the team and send a follow-up plan. To check if this is ready and can be discussed -- not much movement; agreed to be ready for a detailed discussion next time (10 Sep).

==> no updates; can discuss tomorrow; regular follow-up after 2 weeks.

4.2 Analog back-end : LO setting related issues -- from 27 Aug & before (BAK) : The following remain to be resolved :

(i) problem with LO setting using FSW resulting in reduction of correlation (compared to LO from sig gen) -- understanding is that 10 MHz being used as reference was at the edge of the locking range; shifted to 105 MHz based reference generator; user level tests were still showing some problems with channel 2 (175 pol) of 1390 band (?) and also with some of the other sub-bands of L-band; upshot appears to be that system does not power up properly and needs a manual setting to get started, after which it takes commands from control room and works properly; meanwhile, the long-term solution requires the new online system to send the appropriate command as part of sequence after power-on -- Naresh has been trying this, but has not yet succeeded. some tests tried by Jitendra + Naresh, but did not succeed; may need more changes in the code on both ends, or better interface. To check current status.

==> no progress so far, need some more time / effort from Naresh; BAK to check with SN. Follow-up after 2 weeks.

4.3 Analog back-end : completion of 30 antenna system -- from 13 Aug, 30 Jul & before (BAK): 16 antenna system completed (from cabling from OF to cabling to corr wall panel);

24 antenna system also released (mid-April 2014); and now 30 antenna system has also been completed (July 2014). Pending action item :

(i) long-term plans for power supply and ethernet switches to be discussed : for power supply, discussion is as before; ethernet switch : there may be a complication about accommodation 24 port switch in terms of space and layout; 8-port switch was tested for RFI (with and without shielded CAT5 cable -- old 2013 report + new Jul 2014 report) and it is clear that there is some RFI even after shielded CAT5 cable is used. Possibilities for shielding box for 8-port switch discussed; BE team to check about space for putting a shielded box around the 8 port switch; Hande and Raybole have discussed the matter and it is agreed to try and design a shielded box that allows the switch to occupy a 1U slot in the backside of the GAB racks. To check status. ==> Raybole is working on design of shielded box;

(ii) appropriate attenuator settings for Lband & 250-500 done; 610 band was being finalised -- updated table had been circulated; few iterations were done and a more accurate updated table for 16 antenna system has been circulated; also, agreed that BE group will do monthly monitoring and report the status (for all the 3 bands) -- regular monitoring was to be started in May 2014, but took some time to get organised; montly reports will come regularly from June onwards. To discuss how to handle interpretation of the results and iterations to change the attenuator settings for future, as there are evolving changes happening in the FE systems. One round of measurements has been made and set-up is reasonably stable (may need a PC to be arranged?); will take some more time till regular monthly monitoring data can be meaningfully discussed. Any change in status? ==> PC has been arranged; need to start the regular monitoring now.

(iii) status of work for having i/p side RF filters : plans with FE group for sharing mass production units; agreed that FE group will share the designs of the filters, provided BE team is ok with the performance specs; ok to include BE requirements in order of PCBs and components by FE group (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. BE group to make its own design for the final PIU, including their choice of 8:1 switch etc. This is looking like one PIU with existing chassis for 4 (or 5?) BPFs (one for each main band) + 1 straight through path, using 2 nos of 8:1 switches; agreed to go ahead with single chassis plan for the main 5 BPFs + one switch; second switch and other sub-band filters to be put outside, within the PIU. Can use two subbands from Lband and 250-500 for the present for testing effect of sub-band selection -- this may need a separate series of tests to be done. Agreed to get the PCBs from FE group (supply the board to them) and then check the integrated filter performance against the single filter. Prototype unit is ready using existing chassis in one PIU (tight packed) -- will be testing shortly.

Current status and action items :

prototype unit using existing PCBs with chassis has been assembled in the PIU and tested in-situ; now making own chasses to fit the PCBs in the PIU comofortably; can happen in one month; will have direct path + one 100 MHz LPF path + main band filters for each band, with one 8:1 switch; BE team will buy the substrate board and give to FE for getting the PCBs and will buy their own components to populate the PCBs they will receive. To confirm status of various items and clear the way forward. ==> last para is all valid (agenda item to be rewritten accordingly); first sample home chasses unit in one month from now. To check status after 2 weeks.

4.4 GPU corr (GWB-II) : release of 4 node, 8 input, 200/250/400 MHz version -- from

2 Sep & before (SHR/SSK/BAK/DVL/YG) : (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. Action items :

(i) testing of GWB-II interferometry mode with different OF attenuation values to check variation of correlation coefficient -- DVL + YG to provide an update. It looks like working ok now, with the sig gen LO. To confirm if working ok with the new, modified synthesiser mode; results from sig-gen versus synthesiser have been found to be consistent at 1280 MHz (marginally better than GSB); however, 1390 synthesiser scheme needs to be confirmed; it looks like that this may be resolved now (maybe due to setting problem, when it defaults to 10 MHz reference)? but some problems noticed with other sub-bands of L-band) -- needs some clear follow-up, including combined testing of attenuator levels -- DVL to organise these tests; some updates from DVL's email last week : 1170 appears to be OK; need to complete the checks for 1280 and 1390 subbands and clear the matter. DVL to test and report back the status.

==> no significant updates; work is in progress.

(ii) testing of GWB-II in dual pol interferometric modes : some tests initiated by DVL + YG to check total intensity and full stokes mode -- to update about the results, and also plans to update the SOP etc about these modes.

==> same as above.

(iii) 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; PA mode completed and tested; phasing implemented & tested; 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) there appears to be a problem in the PA mode : integrator & square law detector are in opposite order -- SHR has fixed and last set of tests remain to be done before releasing.

(b) GUI changes for flexible phasing to be checked with SHR & NSR -- YG and others to test and report back -- can be closed after one more round of user tests.

(c) float to int conversion logic has been implemented for scaling but needs a cross-check -- user controlled scaling factor has been provided; updated SOP also provided; need user feedback about the functioning and then check if it can be closed.

(d) beam mode still working with fixed channel and time factors -- need to be made general purpose; this should have been completed by now -- SSK has got the code changes done; needs to be verified and released.

(e) availability of psr_mon / pmon on nodes 53 and 54 for recorded data is there; for shm attach needs some work; this is still pending -- to be done along with (d) above.

(f) multi-subarray capability yet to be implemented (also to check about possibility of 4 beams)

(g) header for beam mode data : to be taken up in the present situation and incorporated alongwith the PA mode; to discuss further to see if it should be introduced at the time when sub-array is being tested -- pending.

==> for (a) all changes and tests are done; need to release changed software; not much change from last week for other items.

(iv) spikes in channels that are power of 2 : this problem needs to be discussed, understood and fixed. SHR has started looking at it, but no clear clues yet. may help with test using digital noise source; effect is seen in packetised corr also; now checking offline with raw voltage data acquired through Roach board, and with digital noise generated on Roach board; KDB has digital noise source + GWB spectra now running and some of the issues can be investigated; testing with noise generated in digital domain does not appear to show the problem. not clear what is the best thing to do now. SHR believes it is in ADC, but need a bit more thinking... a different ADC in the same slot or something else? some tests to be tried for one of four output of ADC? trying to see if selecting only 1 channel of ADC provides any clue? ==> trying the one ADC approach to see if it shows clean spectrum.

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

4.5 RFI filtering -- from 27 Aug (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. tests completed with GWB-II and being planned for BOTH channels; bit of discussion and agreed to see if a time domain test using either corr self powers or 2 IA beam signals can be tried; some tests with varying sigma have been tried on antenna signals and results need to be summarised; fresh tests & analyses have been circulated (awaiting feedback); data taken with pulsed noise source [offline input]; new results that were circulated were discussed; agreed that the basic scheme appears to be working ok; to try 3 versions of the scheme, with different options for the statistics.

compilation for 4, 6, 8 bit inputs is available; utilisation (for one analog channel) : 41%, 19% and 17% (for total design) for 4 K window; agreed to produce a fixed BOF file with RFI filter on in 1 channel of each ADC (4 out of 8 antennas) with fixed replace with zero for 3 sigma clipping; check status of the work.

==> tests to see if there is some biasing by digitally splitting the antenna signal. Regular follow-up after 2 weeks.

4.6 Power and cooling requirements for projected back-end systems -- from 27 Aug and earlier (GSJ/BAK/RVS/YG) : some modifications have been made and some tests have been done and preliminary results circulated -- to discuss these and plan further activities; some specific action items :

(i) scheme for monitoring of processor temperature to be refined -- for the main compute nodes : new package for temp monitoring requires slightly different version of kernel than what is used on the main GSB nodes; new kernel was installed on a few nodes and following 2 issues had come up : new kernel on 2 compute nodes may have been causing the buffer loss problem (new kernel was rolled back to the old one); and for the current kernel on gsbm2, the high time resolution mode did not work (gsbm2 kernel was rolled back to the previous version that was there); for the first matter, follow-up was to do a controlled test -- node18 and 19 test was repeated and some degradation of performance confirmed; agreed to put new kernel on ALL the GSB nodes and test again : 3-4 hours' data collected with all nodes with new kernel; analysis shows a few occasions of buffer loss; comparison with normal GSB kernel shows that it doesn't show buffer loss; agreed to try new kernel once more; also to check for possible causes of buffer loss with new kernel (discuss with Sanjay).

tests done with 16 and 32 MHz 256 channels tending to show statistical difference in buffer loss -- TBC more carefully.

==> not discussed.

(ii) to add temp monitoring package on all GWB nodes : to check if this is feasible and has been done or not -- agreed that this can be done easily and that we should implement on all the GWB-II and GWB-III nodes. To make a list of machines which have it and then put it on all the machines; to reuse the earlier code for logging the data, plotting it, and also to add an option to generate a warning if the value exceeds some threshold; to think about a real-time version of the warning algorithm. ready to run on GWB -- agreed to go ahead and test; to think about long-term monitoring tool that shows the temp of all the GWB nodes.

==> not discussed.

==> To be followed up after 2 weeks.

4.7 Next-gen time & frequency standards -- from 23 July & 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 draft (maser report already circulated) complete report has been circulated today -- need to schedule a discussion.

not much progress; need to follow-up and discuss within the group also...

==> not discussed.

(ii) plans for follow-up action :

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; Rb unit being sent for repair -- will come in 3 months. Standby arrangement : to use the 2nd unit from RAC (without Rb which had gone bad earlier) and try with a spare Rb unit. To check status of this; vendor has confirmed that unit has gone faulty and agreed to replace. repair work is done and item is getting shipped; sould come in 5-6 weeks.

==> not discussed.

==> YG to discuss with BAK and arrange suitable follow-up.

=====

Minutes of weekly Plan meet of 17 Sep 2014

1. FE & OF related :

1.1 Detailed design doc / ITR -- pending for long : from 3 Sep & before (SSK/BAK) :

(i) OF Rx system to be completed (Satish Lokhande) : first version has been circulated -- some improvements and additions suggested (e.g. to give reason for 10 dB attn, to give comparison with expected values from SFA report; to mention some precautions and practical issues during assembly etc). Update version was ready and SSK was to check if it has been sent or not.

ORx was discussed last week and some suggestions for changes were made -- updated version to be produced shortly;

==> no fresh updates this week.

(ii) OF Tx started; first draft is ready and should have been circulated by now. for both, docs are with SSK waiting to be cleared and circulated for comments.

Note : the Tx design doc may have only blk diags for now, without full details, till a paper is ready (!); need status update to see why it is stuck !

==> still pending for SSK to complete the integration.

==> Regular follow-up after 2 weeks.

1.2 Update on results from test range -- pending from 3 Sep & before (HRB/GSS/SSK) :

Reorganised into the following issues :

(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.

Tests done on c6 with feed having shortened support legs of the cone (instead of shortened stool) -- comparison of results for 1180, 1280 (default) and 1380 :

1280 & 1380 show slightly better sensitivity at low freq (250-400) but at higher frequencies they match with 1180 (which is quite flat throughout freq range); agreed to try for 1480 to see if there is a monotonic behaviour; also compare with simulation results of GSS. See also 2.1(ii)(c) below. Consolidated results tend to show that the latest level at 1180 height does show a slightly better response; a final confirmation is needed about the optimum performance from the measurements;

agreed that FE team to go over all the available measurements and produce a consolidated summary to check if 1180 or 1280 gives the best result; confirmed that adjustable stool will not work for the current 325 MHz face due to welded nature of existing stool -- need a discussion with HSK about this; also confirmed that we can't go below 1080 by further cutting the support legs of the cone; agreed with HSK to reproduce one more adjustable stool (in about 2 weeks time) with modifications learnt from present experience. To check status of various items above.

==> agreed to try on one CSQ antenna (C6?) by removing the Lband feed, shifting the cone-dipole with new stool to this face and using the existing 250-500 FE box on it.

(ii) calculation (based on reference paper) of the expected deflection & comparison with measurements to check if there is significant loss of sensitivity -- GSS to develop 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 drop for 0.5 lambda offset) wrt curves from Kildal paper was confirmed; for GMRT specific case of 250-500, efficiency factor as a function of freq over the band, using the data for the measured feed pattern, was implemented -- after correcting error in the code, better result (9.9 dB vs 11.6 dB expected) was achieved; further, a realistic

phase response (instead of 1.0) was included by reading data from a file; results (reported on 19th Mar) showed better match between measured and expected deflections for the 250-500 system : 327 -- 12.8 dB vs 12.4 dB; 400 -- 12.8 dB vs 12.2 dB; 450 -- 12.4 dB vs 11.4 dB; 500 -- 11.2 dB vs 11.0 dB (some re-work needed for lower frequencies?); computed results (based on change in efficiency due to shift of phase centre) show likely drop in sensitivity by about 1.4 dB from 250 to 500 -- this is now to be folded into the net sensitivity / deflection curves made by GP.

Present action items :

(a) GSS has sent a table at 5 MHz steps to GP, it appears that the table has only 4-5 points across the band (from measurement values); GP has done interpolation and has got a curve that falls off with increasing frequency, but has been asked to keep the efficiency constant below 250 -- this need to be understood and resolved; final curves for 250-500 still appear to show a bit of mismatch at the edges of the band. see details in agenda item below.

(b) GSS is working on plans to extend this to 550-900 system -- waiting for some of the lightning protection work to be completed, to get measured values from test range.

==> (a) GP has taken RL curve and is incorporating in the code; (b) test range is not yet working.

(iii) Comparison of computed results with measurements for 250-500 band : initial results for good antennas at 250-500 (other than C6) with default height of 1280 (and for C6 with reduced height of 1080) showed that computed values are actually better at high freq end for 1080, which is different from the observations which are showing droop at high freq for 1080 (in conflict with first results reported above); computed results, which were for 1180 to 1480 in 4 steps, were extended to 1080 & 980 and 1180 was found to give the best response (note : this is for a particular value of ph centre based on range measurements); computations were extended to much smaller values (down to 580 mm) and latest results show a peak in the response around 580 o 780 (!), which are in sharp contrast to the experimental results which were carried out in the range 1080 to 1480 mm and showed optimum performance around 1280 mm -- this needs closer scrutiny of the simulation code and experimental results. Phase efficiency computation has to be linked to the aperture efficiency computation (NRAO's eff. program, modified for GMRT specific paramters) -- this work is ongoing, alongwith Sougata (likely to take 4 weeks -- till mid-Sep); to check status of this.

==> code is being ported to matlab (?); some issues about input file with the values to be given -- this also needs to be resolved; also, original NRAO C-program can be made to run to give some initial cross-checks.

(iv) status of phase centre checking for ver1 550-900 CDF and CSIRO feeds -- new results with VVM set-up, after installation of new encoder + notch filter for mobile band, showed :

for ver2 550-900 CDF : 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). Further, results for dipole v2a and v2b with cone v2 show that the degradation of pattern with frequency is worse for v2a than with v2b; radiation pattern measurements have been done with 50 MHz step & using CW signal; comparison with simulation results is awaited (also earlier note from HRB needs to be discussed); phase centre of ver1 550-900 CDF and CSIRO feeds needs to be done.

==> test range not yet working.

(v) improvements to test range -- ongoing exercise :

(a) better mechanical alignment -- under discussion with Inteltek (proposal was due

around 2nd July) -- no response from Inteltek (likely to give up on them).

(b) set-up was re-installed after better protection circuit for encoder against lightning (home made surge protector using 30 V transobs), including better grounding scheme, and improved corrosion protection (including better water proofing) -- to check if it is now fully functional and feed tests can resume.

some additional water-proofing work was required; limit switches not working -- should be ready now.

==> improvements in water-proofing has been done; limit switch functioning still not resolved; needs Ajee to spend some time; will happen next week.

can reorder the agenda items to do test range first and then the dependent items...

==> regular follow-up after 2 weeks.

1.3 Comparison of measured & expected sensitivity curves -- from 3 Sep (SSK/GP/HRB):

scheme for (re)calculation of expected values across the broad bands to be finalised (and added to measured curves) : curves now being done with constant QH value and with variation of T_lna with freq incorporated; model for the main BPF has also been put in : the deflection peak now matches fairly well across the band, but the curve rise and fall at the edges of the band was not quite matching; follow-up action to be discussed :

(i) for 250-500 : it appears that the discrepancy on the high freq side is not really significant (seen only for a couple of antennas out of 10); discrepancy on LF side is still there and may be due to holding efficiency factor constant below 250 ? high freq side could be due to absence / presence of 540 notch filter -- confirmed that this edge matches with the BPF response; hence, the slightly higher cut-off at 250 MHz seen in real-life is likely to be due to feed efficiency -- this needs to be checked -- action to be taken by GP for using RL curve as a first order measure.

(ii) possibility to try it for Lband to be explored -- information gathered has been started : feed pattern (efficiency) at 3 individual freqs is available, and measurements are now available for 5-6 frequencies (?); agreed to work with the 3 pt data and do simple interpolation and see what kind of curve is produced. To check status of this.

==> see agenda item above (also resolve the duplication!). Regular follow-up after 2 weeks.

1.4 Total power detector for FE & common boxes -- from 3 Sep & 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 (Galli-52 instead of Sirenza); feed-thru vs connectorised arrangement also resolved; after lab tests (including monitoring via MCM channel) in FE and common box, sample units installed in C4 FE box and E2 common box. Current action items being followed :

(i) for common box : data from 2 units installed on E2 showed basic things working ok: first round of testing showed 11 dB deflection (12.4 dB expected) on Cass-A; later on Crab, getting 5.5 to 6 dB (6.6 dB expected); flat-top on-source waveform to be understood -- likely to be due to quantisation of step size of detector levels (to check rms vs least count?); script / SOP created for automated running of tests; tests are running ok now with only control room personnel involved and hence issues relating to SOP can be closed.

==> initially, common box data was coming properly, but it was not working properly for FE box -- there was a bug in the script (?) which has been fixed by JPK and new data was taken on 16th and is being analysed. To wait till this data has been verified before closing the matter of the SOP and testing / data acquisition procedure.

(ii) for FE version : 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; first units (on C4) showed problems -- traced to incorrect mapping of channels etc.; new units (batch of 20) that were assembled showed unexpected change in detector o/p due to grounding problem which was corrected (manually) for 10 units and final PCB for mass production was modified for this change; latest situation and action items:

(a) for RC time constant : main aim is to check and ensure that some appropriate RC integration is in place at o/p of the detector; some feedback from vendor, but not fully satisfactory; existing ckt has 10k series resistor (as per data sheet); measurements done in the lab show some kind of a curve with rms changing inversely with increasing time constant, but the results are not repeatable from day to day, indicating some pick-up in the circuit or the measurement tool; needs to be checked carefully. Current status : agreed to put 1 s time constant in all the PCBs.

(b) 9 antennas with FE power monitor installed; test data recorded for 8 antennas; out of these, signals seen for only 3 antennas : C13, C11 & S4 (both pols); some sign of life in E6 and something on W4 (very noisy / weak); deflection on Cass-A is about 10-11 dB (bit less than expected); flat nature of curves understood as least count limitation; simultaneously CB signal is being monitored, but working CB monitor is only on C13, E2 & W4 -- all of these are showing deflection; some sign of "memory" in holding a stale value in FE monitor (all antennas at same time!) -- confirmed with Ops group to be due to combination of cycling of FE monitoring (being turned off when at a source transition) + the fact that cold sky off source is quite far away from the source (!);

two sets of new data have been taken (3 and 6 hrs long); analysis of this will help answer some of the problems of repeatability of working antennas, status of partially working antennas (as seen in first data set) and correlation with 30-1 data (which is TBD even for first data set); possibilities for automating the data reading and analysis and plotting also discussed -- GP to try some of these ideas. All these data sets also have temperature monitoring (for all of these antennas, as well as for a few others of 130-260 etc). To check status of the analysis.

==> automated program for plotting CB, FE power levels (both chans) and 3 temp monitor values (2 in FE and 1 in CB) in one go from a file containing data for X nos of antennas is ready; this has been tested with the above data sets; will be tested on the new data set of 16th Sep and comparative analysis will be done and reported.

(iii) 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; assembly of 5 sample new units gave some problems : old vs new flux (resolved); 10 units assembled and tested; 4 nos consumed in the lab in spare common box units; 6 are available; agreed to leave status quo till some units are consumed in CB units coming down for repair; to check plans for mass production and installation for FE systems.

for CB it is still status quo; for FE, 20 PCBs had been made and all are used up; new order for full quantity (~ 300 PCBs) has been placed -- to check status of this.

==> 360 PCBs (with Techno Ckt) -- status being followed up.

(iv) status of ITR, which was ongoing, but was halted pending above problems : agreed to resume the work now; need status update on this.

"work in progress" i.e. yet to start ?

==> not yet started; waiting for last round of testing above to get going.

==> Regular follow-up after 2 weeks.

1.5 Spares for L-band feeds -- from 3 Sep & before (SSK/ANR) : we have 32 feeds, 2 not working (1 dismantled for making drawings of new feed) due to electronics failures -- these are device failures (including some new ones?); now some LNAs have been successfully assembled by Gopi and C3, W1, E2 & E5 have been fitted with these and found working ok. Also, one spare feed has been assembled and installed on W1 and working fine. Current action items :

(i) to update about status of feed on W1 and see if this matter can be closed : not yet confirmed whether deflection is less than expected or not -- to cross-check with JPrakash about performance of W1 and report back; this is pending for long. VBB to be asked to sit with JPrakash and get the answer -- any updates?
==> no updates yet; SSK agreed to take it up and close.

(ii) spare LNAs : Agreed to have at least 5 LNAs ready and available as spares : 10 nos of LNAs had been assembled, tuned and made ready; these have all been used up now. Action items :

(a) new order for amplifier device needed to make sure enough spares available in future -- order was placed and devices have arrived; were being put into a circuit for testing.

(b) the assembled devices may be having some possible problem with bias point -- it was found that LNA is drawing unusually lower supply current, even when 'gain' & 'T_noise' are normal; LNA is being investigated (may need re-tuning?) -- no progress in understanding low deflection of new LNAs; retuning is not helping -- increasing the bias current leads to oscillation. FE team has no clues about the problem; can wait for new batch of devices above and also check OMT etc for any problems. Need status update.

==> (a) : the devices had come and being tested -- can be closed; (b) old PCBs not easy to use for replacing devices as coils get spoilt and need gold plated wire for which need to go back to the old party (only one new device was put in one of the 3 stages of the LNA and was found to draw the proper bias current); meanwhile, using the earlier batch of devices, two LNAs have been made ready and this is going on C1.

(iii) 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; design files had been obtained and were being checked by GP and ANR : model files to be converted to match simulator used by us; also ultralam2000 was used and that is not available in the market now; work is ongoing; component models in software had to be downloaded; agreed to simulate it with ultralam2000 and make sure that ckt works ok; and then concentrate only upto 2 GHz and change the substrate to RT 5870 which is easily available; first round of simulation on ultralam2000 ongoing -- results may come soon; then will go to RT 5870...; need status update.

==> initial simulations now matching with original results (for ultralam2000); now going for simulations using RT 5870.

(iv) finalisation of plans for having total of 8 working spare feeds -- from mechanical to electronics :

30 antennas have working Lband feeds; 31st was assembled back after being dismantled for making the drawings -- this was completed and installed on W1 (#31 is now in the regular 'maintenance cycling' of feeds); 32nd is there in Pune wshop and can be shifted back after assembling by mech group and then fitted with the electronics; 3 new feeds were made in 1st round of work; all 3 are in Pune wshop and have been

tested for RL with probes; but 2 of them have wrong size of horn and needs to be replaced; all 3 need new covers as old ones were not suitable (may be done in workshop, but not decided yet); in addition, 3 more feeds from Akvira have come : OMT + horn + cover ; also 2 horns have come and can be fitted in the 2 older feeds. Hence, total of 8 spares can become available. Note that weight of 3 latest feeds is 18 kg more than earlier feeds (72 vs 61 kg) -- this has been accepted as 'fait accompli'. Following issues need to be resolved currently :

(a) to check status of feed #32 -- agreed that mech group should assemble and send to GMRT -- has been sent, alongwith newly assembled press-fit probes, but not clear if full unit is available, or only partial (!) -- needs a status update.

(b) plans for assembling and making completely working feeds to be discussed; 3 feeds after powder coating have come to GMRT (3 others are ready for inspection in Pune); FE to target making ready one feed per month; however, new issue about mating and alignment of probe has cropped up -- press fit (old scheme) vs threading (new scheme) mechanical problem -- agreed that we can go back to the old scheme of "push-pull" on one feed at Pune for checking and then retrofit all 6 units; meanwhile one new unit at GMRT can be checked for alignment; 3 sets of old (press-fit) probes being made -- almost ready to go for silver plating; one person from FE lab needed for soldering of these when assembling in the 3 feeds still at Pune; need status update on this.

==> for (a) : unit 32 has come back to GMRT, but cover is not there; OMT and feed have been assembled; newly fabricated push-type probes have been used; RL has been tested; new box/cover is being taken for this -- mounting plates need to be made ready; in terms of electronics, it was found that the sub-band filter ckts spares don't work as one gnd line (for switch ckt) is missing in the films from RRI (!) -- to try with a wire providing the gnding ckt; alternate is to start using the new design (see below). For other updates see item 5.x in mechanical section.

==> Regular follow-up after 2 weeks.

1.6 Testing of LBand wideband systems on 30 antennas -- from 3 Sep (PAR/SSK/SN) : (to maintain a proper log of action taken on individual antennas during these tests and debugging activities); Current set of discussion items :

(i) some new data had been taken in June and results had been summarised :

(a) C08 & W01 CH-2?? shows ripples at OF RX output -- gone now (to check possible cause);

(b) S04 and E02 show RFI type lines; E06 shows RFI lines in CH1; need status update on follow-up on these matters, as well as comparison with newer data.

(ii) new data from 1 July for 14 antennas looked quite decent :

(a) two RFI lines : 1070-80 likely to be airport radar, other ~ 1280 likely to be due to GPS (to be taken up under RFI agenda);

(b) C2 has new OF system without attenuation control hence data is not good; this is now corrected and can be closed after a cross-check.

(iii) new data from 8 Aug for 18 antennas in rx room (taken manually) : useful data; brief discussion shows the following issues :

(a) RFI lines clearly seen near 1030 and 1090 (details in RFI agenda item): RFI team to try for some statistics with dedicated monitoring set-up.

(b) FE team to follow-up on the following :

-- some antennas with poor deflection overall

-- some antennas with deflection changing over the band -- less at high frequencies : to see if pointing offset can explain this.

-- some antennas with poor on/off bandshapes

-- few antennas with ripple or large slope across the band -- to be followed up.

==> new results of 3 Sep data discussed in detail; some classification of problems

and follow-up has been done and some problems fixed (like W4 ch2); first trial with pointing offset has been done; to try again with pointing done at the highest freq; some follow-up has been done for RFI lines also -- 1090 line appears to have BW of 3 MHz or so. Other main line at ~ 1200 needs to be identified.

1.7 Characterisation of recommended attenuator settings for different bands -- from 3 Sep (SSK/VBB) :

(i) values had been given for Lband, 250-500, existing 610; only 130-260 / existing 150 was pending -- some tests are still being done to verify the values before releasing (for 150 / 130-260 systems) -- need current status.

work is still ongoing due to difficulties of getting antenna etc, but number may be around 9,9 -- may converge by next week.

==> work has been done; appears that 6,6 may be the correct value; note will be circulated shortly.

(ii) also, need a discussion 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 too large? first, to confirm if it is 10,10 and 4,4 for full-band and sub-band; second, to redo tests again and confirm present status and then decide about discussion on this topic. DVL to repeat the tests and confirm the performance; tests have been done; waiting for results from DVL.

==> waiting for summary from DVL.

(iii) FE team to test the power levels at OF o/p and cross-check against SFA values : for 250-500, this has been done and results incorporated in the updated SFA report; for Lband the exercise is ongoing; antenna to antenna variation is still an issue for Lband; still pending, but can be done now, as Lband is relatively stable now; this has been done by Ankur in a report back in July -- this was discussed and suggested to add a few refinements of the statements used (for 250-500) and add an explicit entry in the table; for L-band to compare for each sub-band using the realistic cable loss value for each sub-band -- this can then be done for 250-500 also, if found significant. Updated version of the report to be produced with these modifications. To check status of this exercise.

==> measurements are pending; will be completed shortly.

(iv) also, at 1390 some antennas have an extra 10 dB gain stage; appears that there are only 2-3 antennas which don't have this modification?; one of them is S6 which is being done now; 1 or 2 others may be there -- needs to be confirmed; meanwhile, APK's notebook has been found and shows that ONLY 12 antennas have 10 dB stage; but VBB thinks that more have it... finally, agreed to do in-situ band shape measurements for all 30 antennas to infer if 10 dB stage is present or not -- for those with broadband link, it can be done in rx room; VBB is looking into this; measurements have been done, appears that only 4 antennas may be without the modification -- VBB will send a summary, alongwith the evidence shortly. Need status update.

==> VBB yet to compile the results and circulate.

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

1.8 Filters at different stages of receiver -- from 3 Sep & before (SSK) :

2 main categories of switched filters are needed : (a) switched filter banks inside FE boxes and (b) switched filter banks in rx room; these are being designed using the new switches : 2, 4, 8 way switches with different possible configurations; a third application of these switches is for designing the monitoring set-up in rx room. Current action items are as follows :

(i) for rx room monitoring work : note that all these circuits are connected to the monitor ports of the OF system; first design required higher isolation for highest freq of operation and hence new design was done; ckt for 2:1 and 4:1 versions now ready & tested -- 25 dB isolation achieved; changes from 25 to 17 dB with frequency for 8:1 switch -- now getting improved rejection : better than 25 dB below 1 GHz; goes down to 16 dB above 1 GHz; the leakage between the signals with this switch is still unacceptable; now trying another switch which terminates the unused inputs while selecting the desired input -- device is to be ordered; indent had been placed; quotations have come; order may be placed shortly. To check status.
==> order has been placed; delivery date not clear.

(ii) for rx room switched filterbank : prototype system was almost ready for testing; need updated block diagram of the prototype system; to see if first results from integrated testing are available; also, need to check about space in rx room for housing these units; also check plans for installation and testing of the 1650 MHz LPF units alongwith the above; tests have been completed; a report needs to be produced characterising the performance. To check status of this action item.
==> work ongoing for compilation of report.

(iii) 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. Agreed that formal email sent by FE team to control room is sufficient and that Nilesh can take action based on it to update the webpage (Nayak to confirm the same with Nilesh) -- it has been formalised and we can follow for some time to see how it turns out. The specific case of C11 FE box (versus C13 box) came up as a case-study; reinforced the need that there should be a clear, well defined way of testing and informing control room about the release of any new item.
==> no clear action item / discussion here (can be closed?).

==> Regular follow-up after 2 weeks.

1.9 Finalisation of PCBs and chassis for various notch filters -- from 3 Sep (SSK/ANR): Different kinds of filters with different PCBs (some common) and different chassis (again, some are common) are needed. Further, various filters are in varying stages of acceptance and mass production. To keep track of matters globally, agreed that FE team to produce a spreadsheet giving details of all the notch filters presently being used, alongwith the type of PCB, total # required, total # available (and where used at present), and plans for procurement; and similar columns for chassis; first version of the spreadsheet has been done, and some feedback has been given; to check current status of the updated version.

==> updated version of spreadsheet discussed; agreed to move 2 columns to the front of the table; and add one column of comments at the end, and circulate the updated table; regular follow-up after 2 weeks.

1.10 Follow-up on 550-900 MHz band filters -- from 3 Sep, 23 Jul & before (ANR/SSK) : Comparison of product obtained from ICON with in-house effort and finalisation of plans : technical comparison of individual filter responses showed in-house design to be slightly better; tests with integrated unit using new PCB showed insertion loss increases to 3 dB now and some change in slope on higher side; complete chassis and full integration done and tests repeated to make detailed comparison with ICON results -- showed performance is very similar except for some out of band bumps (at 30 dB level) and slightly slower roll-off ; tried with AC coupling capacitors (no

improvement); new board fabricated which after retuning gave much better roll-off; meanwhile, some realistic cost estimates for in-house production vs getting things done by ICON were made, and it was concluded that ICON option will be much more expensive; sample PCBs from Argus and Shogini had been obtained -- first test results (without chassis) showed ~ 5 MHz shift in 2 sub-bands but better roll-off; final plots showed same IL but the higher sub-bands having slightly shifted centre and widths which cross the main BPF upper cut-off; hence, agreed to retune the filter in-house and get modified versions done with Shogini quickly and then take a final decision; current status and action items :

(i) new PCB from Shogini works all-right; complete system with chassis is available for one poln; to assemble second poln unit with existing older PCB + new chassis; agreed to defer further development and integration to the point when the new FE box is ready.

==> no action item.

(ii) to review the cost estimates for mass production in preparation for final decision : updated estimates : 32000 for 2 PCBs is the dominant cost; total is about Rs 41,000 per antenna (compared to Rs 90,000 by ICON); hence, agreed to go ahead with building our own design; meanwhile, reduced wt chassis (700 g less) has been ordered (2 nos) to workshop, on lower priority; agree to wait till chassis comes and final layout for the new FE box is decided before going for mass production; PCB material is in hand; switches needed are in hand; so may not be a major problem for mass production; still waiting for the chassis due to some issues in workshop; to check current status.

==> 2 nos of chassis received and integrated filter unit made and tested ok; now to wait till layout of FE box is taken up.

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

New item : Finalisation of 550-900 FE box -- from 17 Sep (ANR/SSK) : to produce a block diagram for the 610 FE box; then to start seeing which units are ready, which need to be done; which may need to be combined into single units etc.

==> to check status of this after 2 weeks.

1.11 New filters for Lband -- from 3 Sep, 23 Jul & 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. Detailed results for the main BPF shows that the BW is slightly less than existing BPF : 500 MHz (965 to 1465 MHz), instead of 590 MHz (890 to 1500 MHz) -- this gives better rejection to mobile band signals, but has implications for final usable BW of L-band system; furthermore, an improved notch filter has been designed for the 850-950 mobile band (-60 dB vs -45 dB at 900 MHz), alongwith a LPF for cutting off the 1800 mobile band has been designed -- 3 dB cut-off freq of 1650 MHz. The matter was presented to the users in Friday meeting on 9th May, and it was agreed to generate a note about this proposal, for clearance in the GSG. Current action items are as follows :

(i) to finalise the GSG note : ANR has sent the modified version after first round of feedback; YG to finalise and circulate to GSG.

==> pending with YG.

(ii) new BPF + mobile notch filter to replace existing filters in FE box; LPF to be put in common path (CB or antenna base?) -- confirmed that LPF will be at antenna base as a common facility for all bands.

==> agreed; waiting for GSG clearance.

(iii) plans for implementation : to do is as a case-by-case replacement 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. 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; PCB + chassis for new BPF ready for 40 nos (30 antennas + 10 spares); for the new notch filter, 60 nos had been made (PCB + chassis) of which 30 have been used in existing system (waiting to order more); can start on Lband, once the formal go-ahead comes.

==> see Ankur's spreadsheet also; can start the assembling work.

(iv) sub-band filters can be taken up at even lower priority later on; still at simulation design level; can discuss next time if we have the resources to go into this.

==> given some of the problems with the existing Lband filters, agreed to start assembling these are the new filters, using the existing switch unit -- new layout has to be made, sample unit has to be ordered, and then decide about mass production.

==> Regular follow-up after 2 weeks.

1.12 FE power supplies at all antennas -- from 3 Sep & 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; by March 2014, all antennas had been upgraded to have independent FE supplies. Remaining action items are as follows :

(i) 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.

==> agreed to stop any further work on this, and use the available components as spares for existing supplies of this kind -- item can be closed.

(ii) 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, after space allocation plan at antenna base has been finalised.

==> 10 home made supplies + balance new Sayrush supplies : cover the full system. FE team may still want to order some Sayrush ones..

==> Regular follow-up after 2 weeks.

1.13 OF systems -- from 20 Aug & before (SSK/PAR) : Plans for further systems : 17 antennas installed : C4, C6,C8, C9, C10, C11, C13, E2, E6, W1, W4,W6, S2,S4,S6, C12 & C14. Next, C01 done as the 18th antenna by 3rd week of April. C3 was to be the 19th antenna, but got changed to C2, which is now complete (except for M&C for attenuation settings control?); next antenna to be taken up (20th) is C5; system was ready in the lab; needs to be tested and then installed at C5. To confirm that C2 M&C work is completed; check status of C5; check status of next antenna (C0 or C3 ?).

==> for C2, 2 bits from telemetry still not coming -- SN to check and revert back; C5 is complete, including telemetry; C3 is likely to be next. To check status after 2 weeks.

2. RFI related matters :

2.1 RFI tests of ethernet switches for antenna base & GAB -- from 3 Sep & earlier (SN/BAK/SSK): Testing the available switches for RFI & plans for design of RFI box for ethernet switches : sample units from Cisco, HP, Dlink and DELL had come and were tested for RFI -- conclusion from final report was that D-link is much better than others (but it is 2x more expensive than next best option of CISCO -- by Rs 20K); also, use of shielded CAT5 cable provides significant improvement; later, during March-April 2014, tests were done with RFI enclosures (with mounting of filtered and shielded adapters, eth cables, AC pwr line filter, shielding for fan etc); results looked very good : isolation is about 70 to 35 dB from 100 to 1400 MHz; also, good improvement is seen with switch + shielded CAT5 only (without box); both CISCO & D-link work equally well in shielded enclosure, but CISCO is slightly worse when only shielded CAT5 cable (without enclosure) is used as it has more number of discrete lines in that configuration. However, it is now clear that it is not possible to use this 24-port switch in GAB; hence, CISCO can be selected as the final version for antenna base, alongwith the shielded enclosure -- agreed to go ahead with this. Pending action items are as follows :

(i) to confirm that final report of the tests has been circulated : there is a draft report of 12 May 2014 circulated in early June; to confirm if any changes are needed or not and accordingly finalise the report -- PAR to check existing document and see if any parts need to be updated or not and circulate a final report (by end-Sep).
==> email update from PAR : final report not yet ready; still on track for end-Sep.
To check status after 2 weeks.

2.2 Follow-up on UPS RFI -- from 20 Aug & earlier (SSK/PAR/RVS) :
UPS units from Ador were found to be the most suitable : 2 nos of 3 kVA was purchased, tested for RFI & cleared; units are in use in C9 and C10. Updated RFI report has comparative statements quantifying the repeatability. Further, 2 nos of 4.5 kVA units were also ordered with Ador, with option of 2 single phase o/p with different isolation transformers (3 + 1.5 kVA); units were delivered but failed the RFI tests -- lots of discrete lines seen; Ador had taken the units back for modifications -- finally, modified version of Ador 4.5 kVA was tested and preliminary results are quite good; report for this has also been circulated. Current pending action items:

(i) to finalise plans for going with 3 kVA unit from Ador as the final choice :
can we order 10 nos of these as a starting option? RVS has received budgetary quote; need one more confirmation at C10 about the current drawn by servo to fix the split at o/p of the UPS (total cost per antenna may turn out to be around 2.x lakhs) --
to check current status of relevant items; servo current issue was resolved; to check status of order for 10 nos of 3 kVA units from Ador -- indent had been raised.
==> indent yet to be cleared ! YG to check and follow-up. Status update next week, if needed.

2.3 Discussion relating to Industrial RFI survey -- from 3 Sep & before (PAR/SSK) :
revised docs (from 2009 and 2012 discussions) had been circulated by RFI group and were discussed in 5 June 2013 meeting (is the document too exhaustive?); new survey planned with main aim to generate updated database which will be useful to pinpoint likely hotbeds of RFI in the industrial areas in addition to finding those without NOC; after months of planning and discussion with DIC, was finally conducted during 23-27 June with 4 teams; covered Ambegaon and Junnar talukas ~ 40-50 villages in each; ~ 40-80 working industrial units (large number are closed down or never existed!); follow-up actions 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; about 70% of existing data had been entered into this form; agreed that this activity would be superseded with making a database of equipment and NOC record for the existing industries found in the survey; this data entry now completed for all 3 regions : Junnar, Ambegaon and V-K industrial estate; some highlights from the database : of the total list, a significant number of industries are closed down, and another significant factor are no longer traceable; about 1/3 of the original are still working (ignoring poultry which is about 1/4, but is considered RFI-friendly); to cross-check the list against the ones which have NOC (nothing much can be done for those operating without NOC, except to add to our database and inform them about informing us for changes) -- this is happening now. database for Junnar + Ambegaon was ready; need updates on the remaining; also follow-up action to be initiated.

==> email update from PAR : remaining data entry has been completed.

(ii) single phase welding machines in use, which are hard to account for -- to check with DIC for advice about it; based on the survey results, identify areas where one would like to go and quantify the level of RFI -- agreed that this will be taken up with DIC when sharing the database from the survey (around 20th Aug); to start looking at these, starting with the big units; discussion to be taken up with DIC when presenting the report.

==> email update from PAR : measurements will start next week; sample data will be collected from different areas and will be shared during meeting with DIC.

(iii) during the survey, some units which are likely to be important from RFI point of view, are to be studied in detail later on -- some work can start in parallel with completion of database, beginning with the bigger units; may need 1-2 ultra sound dishes, as the existing 2 are barely functional now (check status of order of these); can also look into IR thermal cameras. some RFI measurements of industrial units in Junnar area have started.

==> email update from PAR : measurements (using LPDA) from 2 big industrial units in Junnar and Ambegaon completed; others are in progress; indent for 2 nos of ultra sound dish placed and under processing.

(iv) To see if DIC can be requested to issue a letter to all those active industries who don't have NOC -- discussion to be taken up with DIC when presenting the report.

==> email update from PAR : date for meeting not yet finalised.

3. Operations :

3.1 Identification and procurement of appropriate ethernet switches for antenna base (and GAB) -- from 3 Sep & before (SN/PAR/BAK) : Ops group to work with Comp team and RFI group to work out scheme for getting appropriate 24 port switches for antenna base use (2-layers, manageable); CISCO make was finalised after the detailed RFI testing was over (see item in 2.x); current action items :

(i) to finalise plans for procurement of CISCO switch : 3 more such switches (in addition to the 1st sample unit) are in hand (total of 4); agreed to by 32 more in one bulk order (may be 10 k each) -- to check present status of this.

==> waiting for quotations. Can check status after 2 weeks.

3.2 New, improved Miltech PC -- from 3 Sep and earlier (CPK/SN/PAR) :

Two units of Miltech PC with two changes (more screws on panels + panel mount powerline filters instead of chassis mount) were under test : conclusion was that PC ok from all aspects. Pending action items :

(i) agreed to initiate the purchase of 10 nos of the final version above -- indent had been raised for 10 nos (including some spare accessories?); to check current status of the PO.

==> SN to check the status and report back.

3.3 Planning for proper UPS & space utilisation for new equipment at antenna base -- from 3 Sep & long before (SN/CPK/RVS) : long-term plans for installation of final UPS system and proper utilisation of the space at antenna base. Follow-up on 14 Aug 2013 discussion on first report : 2nd report was generated and detailed discussion took place on 5 Feb 2014; successive follow-up & final agreement on way forward (alongwith updated report) reached c. May 2014.

Some highlights are as follows :

(a) Regarding electrical loads : power drawn by different sub-systems estimated carefully, alongwith actual sample measurements on a few different antennas, for both existing systems as well as upgrade systems; effect of in-rush current at switch on also considered; total current requirement of 10 A for the ABR systems + servo control electronics found to be sufficient; hence 3 kVA UPS is adequate; agreed that, if needed, 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. Final load requirements have been carefully checked and tabulated in the updated report.

(b) Regarding electrical wiring : agreed to have separate isolated supplies for (i) servo drive system (without UPS) (ii) servo control electronics (with UPS) and (iii) ABR electronics (with UPS); one common 3 KVA UPS with split o/p (2 KVA + 1 KVA for servo and ABR respectively) each with its own isolation transformer is the ideal solution; the new UPS can have the isolation transformer(s) integrated into it, without increasing its footprint (only height may go up); updated wiring diagram has been produced by RVS in consultation with SKB and others, and is available alongwith the updated report.

(c) Regarding space utilisation : new 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 appears to work ok; 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); 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. Most of these issues have been captured in the updated report.

Current action items :

New, updated report has been produced. This item can now be taken to the logical conclusion : net outcomes can be summarised and follow-up action to be finalised.

Main list of actionable items :

(i) there was an issue raised about extra current requirement for servo due to

(a) stow on UPS? (b) core losses in the xmer

Agreed in discussion with servo (S. Sabhapathy) that stow on UPS is not required at all as it does not make any sense; also core losses in existing servo isolation transformer (in control electronics) is not an issue. Agreed that 1kVA isolated UPS supply is sufficient for servo. This matter can be CLOSED NOW !

==> closed.

(ii) ordering of 10 nos of UPS; budgetary quote has been received; indent to be placed shortly (se earlier agenda item).

==> indent getting done, as mentioned above.

(iii) a closer to final wiring diagram for servo + ABR is needed

new wiring diagram circulated by RVS -- can check for any comments or suggestions and then incorporate as the updated wiring diagram; modified wiring diagram has been prepared by electrical and shared with servo (4th August) -- awaiting response. still waiting for response; Patil to check with Bagde about it.

==> discussion with BLDC supplier : now ok to gnd the neutral of the main 3ph transformer; extra emi filter may be required -- RVS is looking into this; only one set of line-filters will be required. RVS to modify the wiring diagram to reflect the above changes and send to servo for final agreement.

(iv) minor relocation of items on the wall of the shell : this is been tried in one antenna -- it has been done in C0 and electrical team is ready for doing on C10.

==> both are completed.

(v) making one antenna as a prototype or model where all the configurations are made as per the recommendations : C8 or C11 -- to be identified. agreed that C8 and C11 are not suitable, and selected C10 as the model antenna -- some work has been done on this : 3 kVA UPS is installed, but feeding power to ABR only; servo to make arrangement to shift PC104 load to UPS; switch boards / extension boards have been shifted to safe level. In addition, some work at C0 : 4.5 kVA UPS, with 2 isolation transformers, is installed with ABR rack connected on it; PC104 to be transferred shortly; relocation of elec boards is pending; Patil to check with Bagde about shifting of PC104 to UPS for C0 and C10.

==> in both C0 and C10, ABR and servo loads now connected to UPS -- in C10 the servo isolation transformer is still there. Agreed to FE power supply in the proper location in both antennas.

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

4. Back-ends :

4.1 Documenations :

(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; GWB first version (by Reddy + Irappa) has also been circulated; authors are working on a second version with additions -- this should have been circulated by now; need to discuss contents and decide follow-up action. Modified version has been circulated; to discuss and finalise next step; ITR issue can be closed now; some discussion to try to move to a point where a publication can be done -- this needs to be followed up appropriately within the team and s summary plan brought up for discussion; check status of this.

==> no concrete action has happened; YG to try for a discussion tomorrow.

4.2 Power equalisation schemes for new back-ends -- from 3 Sep 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 now checked and this needs to be done for each channel; basic power equalisation algorithm has been tested ok with 4 antennas; now working for larger number of antennas; SOP has been done; agreed to do a comparative study of this scheme with the GWB-based scheme to see if there are any differences or pros and cons.

first part of the test has been done : do GAB power equalise and look at GWB bandshapes -- looks like they are not equalised very well; to check the results and quantify; also complete the loop by doing GWB power equalise and checking GAB o/p. ==> both ways test has been done and both are self consistent, but not consistent with each other. Agreed to check this further and try to identify which element may be responsible for the spread (~ 4-5 dB).

(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:

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

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

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

Sanjay has completed the core coding; a wrapper is being done by SRoy; to be taken up for discussion.

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

(4) 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; detailed discussion has taken place between SRoy, BAK, SSK and YG on 14Aug2014 -- main conclusions and action items are as follows :

(a) attenuator values : aim is to check if measurements match with specs (within +/- 0.25 dB); initial test results for 3-4 units (at one epoch) had been reported by BE team (found acceptable); pending items (for BE team) are :

to check the constancy of the values across the band;

to repeat the tests for varying i/p power levels with constant o/p power;

to repeat the tests on different epochs to verify constancy with time;

to work out plan for calibration table for each attenuator (after above results).

(b) requirements document to be updated to reflect the outcomes of the discussions e.g. better clarity about the 3 modes of operation etc. -- SRoy to produce updated version : to check if this has been done.

(c) SRoy to test the recently added feature of saving attenuation values to file.

(d) self data (from correlator data stream) to be saved in shared memory ring buffer of ~ 30 mins depth for further processing tasks to work on (should also work off a recorded lta file) -- SSK to work with NSR to get this implemented. This should lead to a sophisticated total power monitor tool.

(e) to further develop the relevant routines that read the data and process to achieve the desired results -- SRoy to build from the basic routines available at present, with participation from NSR.

(f) testing of bandpass shape (ampl and phase) for different values of attenuation :

6 out of 7 antennas showed less than 5% percent and 5 degrees change in ampl and phase

over 5 dB change in attenuation. band-pass variations with time reported by SRoy -- to be taken up for detailed discussion -- maybe under testing of GWB?

==> for (a) data for 3 epochs has been taken; data across the band may already be there; for different levels it is being done; for (b) SRoy has shared with YG -- needs to be checked and finalised; for (c) SRoy has checked with Nilesh (ok) and will check himself later on; for (d) SRoy has had some discussion with NSR : can initiate the activity for short length of data; for (e) work is in progress.

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

4.3 GPU corr (GWB-II) : release of 4 node, 8 input, 200/250/400 MHz version -- from 10 Sep & before (SHR/SSK/BAK/DVL/YG) : (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. Action items :

(i) testing of GWB-II interferometry mode with different OF attenuation values to check variation of correlation coefficient -- DVL + YG to provide an update. It looks like working ok now, with the sig gen LO. To confirm if working ok with the new, modified synthesiser mode; results from sig-gen versus synthesiser have been found to be consistent at 1280 MHz (marginally better than GSB); however, 1390 synthesiser scheme needs to be confirmed; it looks like that this may be resolved now (maybe due to setting problem, when it defaults to 10 MHz reference)? but some problems noticed with other sub-bands of L-band) -- needs some clear follow-up, including combined testing of attenuator levels -- DVL to organise these tests; some updates from DVL's email last week : 1170 appears to be OK; need to complete the checks for 1280 and 1390 subbands and clear the matter. DVL to test and report back the status.

==> waiting for DVL.

(ii) testing of GWB-II in dual pol interferometric modes : some tests initiated by DVL + YG to check total intensity and full stokes mode -- to update about the results, and also plans to update the SOP etc about these modes.

==> waiting for DVL.

(iii) 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; PA mode completed and tested; phasing implemented & tested; 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) there appears to be a problem in the PA mode : integrator & square law detector are in opposite order -- SHR has fixed this, tested the system, and released for use; to check if user level tests have been done to verify; also need quantification of compute load of new PA code.

==> YG + SG have carried out some tests; will analyse and check the results; SHR ...

(b) GUI changes for flexible phasing to be checked with SHR & NSR -- YG and others to test and report back -- can be closed after one more round of user tests.

==> no new updates on this.

(c) float to int conversion logic has been implemented for scaling but needs a cross-check -- user controlled scaling factor has been provided; updated SOP also

provided; need user feedback about the functioning and then check if it can be closed.

==> no new updates on this.

(d) beam mode still working with fixed channel and time factors -- need to be made general purpose; this should have been completed by now -- SSK has got the code changes done; needs to be verified and released.

(e) availability of psr_mon / pmon on nodes 53 and 54 for recorded data is there; for shm attach needs some work; this is still pending -- to be done along with (d) above.

(f) multi-subarray capability yet to be implemented (also to check about possibility of 4 beams)

(g) header for beam mode data : to be taken up in the present situation and incorporated along with the PA mode; to discuss further to see if it should be introduced at the time when sub-array is being tested -- pending.

==> for (d) to (g) : SSK has been working on it, but needs some more time to converge.

(iv) spikes in channels that are power of 2 : this problem needs to be discussed, understood and fixed. SHR has started looking at it, but no clear clues yet. may help with test using digital noise source; effect is seen in packetised corr also; now checking offline with raw voltage data acquired through Roach board, and with digital noise generated on Roach board; KDB has digital noise source + GWB spectra now running and some of the issues can be investigated; testing with noise generated in digital domain does not appear to show the problem. not clear what is the best thing to do now. SHR believes it is in ADC, but need a bit more thinking... a different ADC in the same slot or something else? some tests to be tried for one of four output of ADC? trying to see if selecting only 1 channel of ADC provides any clue? trying the one ADC approach to see if it shows clean spectrum.

==> some difference seen between the FFT of the single stream vs the 4 interleaved stream data -- to check for all the 4 single streams; also can check at slower FPGA clock rates and see what happens.

==> Regular follow-up on relevant aspects next week.

4.4 GPU corr (GWB-III) : next gen system -- from 3 Sep & 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) 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); some changes in the overall stream organisation of the code to get better overlap between data transfer and computation and also less number of times that global memory is accessed inside the MAC -- shows ~25% improvement for 32k chan and 64 input mode. 16k channels is 20% and much less for 8k channels. pending action items :

(a) looking at XGPU code (with Pradeep & Vinay of nvidia) -- there is some progress in these efforts -- XPGU work is showing ~20% improvement; one more round of testing with variable gulp size did not show noticeable benefit; new aspects are being looked at by the joint team as part of further work on optimisation -- to provide updates.

==> summary of the results from discussion with Vinay taken up; may help to upgrade to 6.0; also R2C vs C2C may need to be looked into a bit closer.

(b) trying sample PA beamformer code to estimate load etc. -- will come when PA beam

mode is released in GWB-III -- to confirm that load is less than 7% for both beams?
old estimates are for C2050, ratio may change on K20 -- fraction of time for
beamforming is 6% for K20 -- to check after the latest corrections in PA code.

==> waiting for timing tests to be done on GWB-II.

To discuss further plans, including taking up with nvidia for optimisation.

(c) from all the tests done so far with nvidia, it looks like the full correlation
job will not fit in 16 GPUs (though a couple of optimisations that can be tried are
still pending); hence, we need to start planning for 32 GPUs : 2 K20s per host, or
double-GPU card, or 32 host machines; agreed to try a test where 2 GPUs on one host
machine is used to test the correlator code is portable; set-up with 2 GPUs is there
on 4 of the 6 nos 620 machines -- so tests can be done on this when the code
development reaches that stage.

==> agreed to wait till main GWB III is ready.

(ii) other improvements in code :

(a) issue of net_sign[] flipping (LSB/USB modes of correlator) to be resolved : needs
some change in GPU & DAS code; for GWB-II, it was agreed to not fix this problem in
GWB code, and a patch was provided for LTA files -- this has been done and tested ok;
to fix the code ab initio in GWB-III; pending for now.

(b) 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: 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; existing proposed
option is fine and for other things like turning RFI rejection or Walsh modulation
on/off, writing to registers in powerPC would work all right; agreed to start working
towards implementing scheme in GUI for taking additional parameters that allow
different bof files to be loaded; agreed that these flags need not go into ltahdr
but can go in the user log as setting parameters (can also be there in gpu.hdr).

==> no follow-up on this as yet -- needs to be taken up.

(iii) to start testing 400 MHz BW mode -- how best to conduct these tests? the
hardware (nodes + FPGA boards, i/o wiring, power cabling etc are all ready; changes
in the main code to handle 4 bits etc have been done (?), but some pending tasks
were there : 2 x 10 Gbe has to be integrated with the correlator code; proper delay
correction for 4-bit mode needs some changes; also choice of which 4 bits to use
needs to be decided -- right now it is set for 4 MSbits; handling of 4 bits in main
code is now completed; 2x10 Gbe integration with correlator code also done; delay
correction 4-bit mode under test; all the above are tested with noise generator i/p;
16 input 400 MHz 4bit just fits (no room beamformer!); tested with pseudo DAS
interface, using 3 host machines; need some software updates in DAS chain to handle
more than 2048 channels; to start planning for interfacing with real online system
and see where the bottle-necks may be;

agreed to start porting improvements from the optimisation work with nvidia
into the GWB III code from next week onwards; meanwhile, one test run with real
online can be tried to see if there are any stumbling blocks.

agreed to test with the real online; also agreed to hold work on beam modes for
GWB III till final optimisation of FX on K20 is established.

==> still some issues to be resolved for running with real online e.g. information
transfer at init das level.

(iv) 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 ("cyber",

"cool" + one more?) -- to try and finalise after one more round of discussions including RVS (also, check new vendor Jyoti Tech); as an interim, 2 nos of cyber racks ordered with President. Current action items :

(a) 3 nos of half-height racks are made ready for immediate use for GWB-III -- two nos are populated with the 4 new nodes each, the other has 8 Roach boards; clk and input cabling to be finalised (need current status); host nodes to be kept separately; the final configuration should be ready for test soon. check status of these items.

(b) For the 2 President racks : one is being modified for GSB related nodes (spares) -- this is ready now, waiting for riser cards for the spare nodes (to be moved in during MTAC); 2nd rack being modified for trying an arrangement for special cooling (with help from mech group) -- being tested outside and will go inside corr room for detailed tests shortly;

2nd rack for cooling is now ready for first set of tests with 1 kW load and increasing slowly... still waiting for the riser cards for the other rack.

==> for the new rack for cooling test : loading up to 4 kW tested by comparing the temp difference between input and output air. need to compare with unmodified rack; for 2nd rack, it will move into its slot and relevant machines will be put in it.

(v) purchase of 4 new host machines for GWB III : to decide configuration of host machines (disk i/o to be kept in mind) within next few days; also to check if SSD is a viable option now for recording of data. Investigation shows that SSD vs SATA has pros and cons; it may be possible that one class of server may be there that supports both; to check if we can shorten this process by choosing basic server that meets the requirements using SATA disks -- to confirm final choice of units being ordered and status of the procurement : 4 nos of T620s (2 nos have 16 TB and 2 nos have 4 TB disks); order has gone; due by end of Aug; can check to speed it up a bit. To start thinking about the next phase and how many compute machines we should buy now; GSJ to check if delivery is on track; discussion on new compute machines can be had a bit later... 4 new machines have come -- to check if they are now ready for use.

==> all the 4 machines have come; 2 are with 16 TB with and 2 with 4 TB -- compute vs host; PERC card issue needs to be resolved; one K20 on each machine can be there for some time.

==> Regular follow-up after 2 weeks; can split into a few different agenda items.

4.5 Procurement of accessories and other hardware required for GWB systems -- from 3 Sep and before (BAK/GSJ) :

(i) 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 only party quoted -- in last stages of clearance for placing the order; 20 nos of CX4 cards have come and being tested; to confirm that this order is enough to meet our long-term requirements; Agreed to produce a formal note about the situation for long-term -- first draft circulated by GSJ. Agreed to relook at the spares requirement without counting the units already being used in the existing systems and buy more if needed; issue is coupled with what we want to do with existing packetised corr unit -- agreed to leave the PoCo and pkt corr in place and get enough peripherals to meet the requirements.

==> spares list needs to be updated and fresh orders to be done.

(ii) new purchase of Roach boards etc : 12 nos of Roach1 + 16 ADCs and 4 nos of Roach2 have come; test bench for Roach1 board is getting ready; need discussion

about plans for testing of Roach2. Roach1 test set-up ok; 10 boards cleared, 2 are not booting over network -- work ongoing to test; for Roach2 : need to check if we need to buy add-on mezzanine card; also software environment needs to be upgraded -- this is ongoing; had agreed to check the standard procedure for Roach-2 testing on casper and check what peripheral items are needed; also Matlab-Simulink upgrade is ongoing (to get status of that) and for Xilinx software it needs to be initiated. all 12 Roach1 boards are now working and 16 ADCs also tested; for Roach2 : mezzanine card needs to be initiated; Matlab-Simulink is on order; Xilinx upgrade needs to be looked at.

==> for Roach2 can be seen on USB port using Ubuntu -- basic tests can be done; need to fix the compile tools for Roach2 (ver of Matlab-Simulink and Xilinx); mezzanine card to be ordered; to take one of the existing PCs and adapt it for Roach2.

==> Regular follow-up after 2 weeks.

4.6 Testing leakage, coupling and correlated noise in new back-end chain -- from 3 Sep & before (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 taken up for discussion; new tests show significantly different results for cross-coupling for GAB+GWB; this needs to be understood better -- confirmed that these tests used sig gen LO, whereas earlier tests used synth LO; maybe separate tests for the analog system can be done -- these have been carried out now, and results can be discussed; new report has been circulated that also shows significantly reduced coupling; agreed to repeat the original, user level tests done by YG & VJ to see if things are different now ; agreed to try the ADC noise input and north pole sky tests and see what results come out; sky test with north pole and noise at input to GAB have been done; need to be interpreted carefully, in comparison with the earlier results; also to complete the test with noise at ADC input; check status of this.

==> email update from SCC : 2nd round of tests done about 2 weeks ago, show leakage of 2-4% (consistent with first round of measurements of 1-3%) -- YG to discuss with SCC about the range of tests and whether all user level tests (done earlier by YG + Jaiswal) have been covered. Regular follow-up after 2 weeks.

4.7 Walsh modulation : prototype set-up on Roach board -- from 3 Sep & before (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 (done?); to aim for a robust 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; Walsh pattern being put in the Roach2 : ok, as very few slices are needed; issue of accuracy of the oscillator being used in the Walsh generator; what about synchronisation of starting?; Identified 3 possible action areas for work:

- (i) to complete the Walsh modulate and demodulate set-up in the lab -- almost ready.
- (ii) to optimise the hunting algorithm;
- (iii) to demonstrate cancellation of unwanted signals in ADC card and/or GAB

Some mismatch between the CPLD waveform and FPGA waveform for the Walsh signal; now resolved and all FPGA generated waveforms (which use the CPLD logic; different from the original EPROM scheme) are matching. Now need to run a test where pattern from external source can be synchronised to the pattern generated in the FPGA -- this requires being able to hunt and correct for the unknown delay ! A few different aspects of this discussed; SCC to try out and report the progress.

SCC is finalising the block that will allow max delay of 500 msec (for 128x4 msec Walsh length) with a resolution of 5 nsec (FPGA clock); to check if this is working now and tested ?

==> email update from SCC : delay block ready and under test to resolve some issues related to start-up offsets. Regular follow-up after 2 weeks.

5. Other items :

5.1 New python assembly design -- from 3 Sep (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 dicussed 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 :

(i) modified E6 design with hinge-like support was installed on C4; to watch the set-up on C4 and do periodic inspection for checks of (a) damage to hose (b) hose clamps (c) water entry etc -- first inspection to be done after 2 months (mid-Sep) by mech and fe teams; to check status of this.

==> agreed that it is now time for a joint inspection at C4.

(ii) IGUS cable wrap -- new technology prototype to be developed and tested on quadripod; also option of hose without wire impregnation -- long-term solutions.

1] hose without wire impregnation

2] Entire hose assembly under procurement (long-term solutions).

Quotes for both items received : item 1 is Rs 10k for 10m (4 antennas);

item 2 is 60k each -- will try on the quadripod test range;

items have been received; will be doing test on quadrupod behind lab building -- to check about plans for this.

==> planning to test on quadripod during MTAC period.

==> Status check after 2 weeks.

5.2 Problem of access to FE boxes with 500-1000 CDF feed -- from 20 Aug & 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 option; 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 (?), quotes received from some parties, processed and order placed; delivery by end of November; may need inspection (in Bangalore) in early/mid November. To check if item is on track.

==> party is visiting this week for other jobs; can follow-up on status after 2 weeks.

5.3 Fabrication of 6 spare L-band feeds -- from 3 Sep & before (SSK/HSK) :
Order to Akvira for 3 nos (with enclosure) + 2 extra horns. Hence, total of 6 feeds
will be ready + 1 dis-assembled unit + 1 old feed at Pune -- so total of 8 spare
feeds will become available.

Feeds inspected at Akvira site - many corrections / suggestions for improvements
have been made [e.g. improved probe mount : press-fit vs. screws; M4 -> M5; etc];
delivery expected (after these modifications) by end-March'14; one assembly made
ready at NCRA w'shop and sent to GMRT last week; 3 sets have been delivered at GMRT;
fabrication of 3 enclosures is under process; and procurment of 3 enclosures is in
progress; 3 new feeds after powder coating had come to GMRT; there was some issue about
the thickness of the plate used for mounting connectors and some in-situ modifications
have been done on one of them and it is found working ok; pending clearance for the
other two; and decision needs to be taken for the 3 new ones not yet delivered --
these are complete and ready with the vendor, except for the finalisation of the
above plate. The enclosures have been received -- will be shifted after inspection
is done; work on conversion to press fit type from screw type is being looked into;
probe with press type and screw type deliver to FE group for further tests; check
updates on all aspects of the matter.

==> for feed #32 -- see above; for feed #33 : combination of mechanical units
with threaded probe has been made ready; for numbers 34 & 35, will try for threaded
units, with push-pull probe (3 sets will be made available by w'shop) as a fall-back
option; box has to be made ready for #33 (and then for #34 & #35) with matching
plates -- there are some unit to unit variations that require specialised attention;
for #34 and #35 horn and OMT are being corrected to exact specs and will be fitted
with the probes and will be sent to GMRT by next week. Check status after 2 weeks.

5.4 Improved software for work requests -- from 3 Sep and before (HSK/SJ) :

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? Aagreed to try and get this done in-house with Joardar -- can be taken up
after completion of ongoing tasks related to electrical -- to confirm plans and
status : work not started yet; needs a discussion with Joardar -- it should be
possible to take up the job now, as electrical task is over; to check if this is
underway now -- work ongoing, basic structure ready, first version could be available
shortly. To check the status and progress.

==> work in progress, but there may be some issues -- YG to check; formal update
after 2 weeks.

5.5 Status of new CSIRO feeds : from 3 Sep & before (ANR/JNC/HSK) : 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.

recently it has been discovered that a major change in the design /drawing required
to maintain alignment between different sections [using guide-pins etc]; how to
proceed further needs serious discussion about alternate options.

HSK to try some new ideas to see if a solution can be found e.g. liquid Al
layer to cover ? additional coating of Al paste being looked at as a possible option;
follow-up after 2 weeks.

==> no updates. To take up again after 2 weeks.

=====