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Minutes of Plan meet of 2 Apr 2014 (follow-up of some pending topics from different areas) :

1. Documentation related :

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

(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.

(b) 250-500 main + sub-band filters (Sougata) -- first ver was to be ready by 26 Mar

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

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

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

==> (a) can take some more time as things are still changing ; (b) is still ongoing and will be completed by Sougata upon his return from leave; for (c) Imran has started the work.

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

==> still pending.

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

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

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

(ii) OF Tx to be started.

==> OF Rx report discussed : 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).

OF Tx yet to be started; can review status after 2 weeks.

Regular follow-up after 2 weeks.

1.3 Follow-up on level 3 (NTR) -- pending for long : from 5 Mar & long before (SSK): to check status of report on design of OF system -- SSK to try and couple this with work on paper for MW Sky. Needs urgent update -- was to be ready by 24 Mar!

==> first version has been sent by SSK this morning, but it is a 10 page report !

YG and SSK to discuss on how to reduce the length to fit MW Sky requirements and what should be planned for a bigger paper.

Regular follow-up after 2 weeks.

2. FE & OF related :

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

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

Need short note summarising the results : to check if last measurement with reduced

height has been completed and results ready for release. Agreed to try alternative of cutting the support legs of one 250-500 feed cone to the 10 cm reduction, instead of shortened stool (to avoid fouling with cable assembly); modified structure was ready and test was done on C6; to discuss the results from this.

==> no updates -- need inputs from HRB urgently !!

(ii) update on calculation (based on reference paper) of the expected deflection at 450 or 500 MHz and comparison with measurements to see if we are losing significant sensitivity -- GSS to come back with refined version more relevant for GMRT, and to see if further expts with 250-500 or 500-1000 feed are useful : cross check of results from code (0.3 dB for 0.5 lambda) wrt curves from Kildall paper was confirmed, and work was on for GMRT specific case of 250-500 to get efficiency factor as a function of freq over the band, after porting the data for the feed pattern -- first results for cone-dipole at 400 MHz showed 50% less aperture efficiency than expected : error was found in the code, which is now corrected and getting better results (9.9 dB vs 11.6 dB expected); follow-up action included trying to include realistic phase response (instead of 1.0) by reading data from a file etc. Some results were reported in meeting of 19th Mar:

Comparison of measurements (deflections) for 250-500 MHz system with expected values :

327 MHz	measured = 12.8 dB;	expected = 12.4 dB	[A_eff from legacy Kildal feed]
400	12.8	12.2	
450	12.4	11.4	
500	11.2	11.	

[some re-work needed for lower frequencies]

To discuss implications of these and decide further course of action.

==> computed results (based on change in efficiency due to shift of phase centre) shows likely drop in sensitivity by about 1.4 dB from 250 to 500 -- this can now be folded into the net sensitivity / deflection curves made by GP : GSS to supply a table at 5 MHz steps to GP. Then plan to extend this to 550-900 system.

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

(a) protection circuit for encoder and improved corrosion protection to be decided: after discussions with servo group : better grounding/isolation and proper alignment of shaft are possible options; after discussion with IntelTek (25 Mar?), Ajee will take up the jobs to be done. To check status of this

==> discussion held with Inteltek : they will get back on mechanical issues and lightning protection (could also check with our servo team); water proofing may be needed -- to discuss with HSK also. .

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

Action items : (b.i) compare simulation vs measurement at 610 -- HRB has circulated initial results and some comments had been given on the same; (b.ii) to repeat with more frequency steps and then noise source instead of CW signal;

(b.iii) to get back original ver 2b dipole from GMRT (after new dipoles are delivered).

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

==> no updates on resolving the mismatch between simulations and measurements; new tests to be done next week; with 2 new dipoles (tested ok) so issue of spares not a problem now (can be closed).

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

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

(i) new data and results for 130-260, 250-500, 550-900 (HRB/SSK/NK) : (a) follow-up on discussion of current results : understanding of bad antennas for 250-500 band : for C4, dipole checked in the lab and found to be fine -- hence, real cause of the problem is not understood!; to check if monthly overlay plots now available with off-source and on-off plots for comparison (ANR to remind Ankur).

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

(c) follow-up from analysis done by NK and plans for interferometric tests at 130-260 -- new tests being done this week, as previous ones suffered due to scintillations. Next round also suffered from scintillations; to check plans for further tests.

==> monthly overlay plots working ok; can be done in a standard manner now and detailed interpretation of results can start about which antennas are working well and which are not... tests with NK : last data set also corrupted by scintillations; will try again on 2nd night / 3rd morning.

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

New curves with effect of BPF included to be generated (discussed last week) :

the deflection peak is now matching fairly well across the band, but the curve rise and fall at the edges of the band is not quite matching : found to be due an offset in freq; corrected plots to be circulated and then follow-up action to be discussed (including possibility to try it for Lband); reason for the offset in frequency has now been understood (setting issue on test equipment) -- to check the new plots and decide how to proceed further.

==> latest plots (made for item (i) above) still show the mismatch at the top and bottom edges of the response -- this still needs to be resolved if it is due to shape of filter used or something else; also to add the efficiency factor in the code, as discussed in item 2.1 above.

==> Regular follow-up of relevant items after 2 weeks.

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

(i) comparison of product obtained from ICON with in-house effort and finalisation of plans : technical comparison of individual filter responses shows in-house design to be slightly better; but need to complete integrated unit for insertion loss etc before taking a final decision, including plans for mass production. Tests with integrated unit using new PCB show insertion loss increases to 3 dB now and some change in slope on higher side; to complete chassis and full integration and then repeat the tests and make detailed comparison with ICON results. Some results have been circulated : detailed comparison shows that 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; PCB fabrication for this being explored with 2 parties (Argus & Shogini); meanwhile, some realistic cost estimate for in-house production vs ICON desing have been done (it appears that getting things done with ICON will be much more expensive) -- to refine this process and reach a conclusion for mass production.

==> sample PCB from Argus has come -- first test results (without chassis) show ~ 5 MHz shift in 2 sub-bands but better roll-off : to put in the chassis and then confirm the results. meanwhile sample PCB from Shogini (cheaper than Argus) yet

to come; to check status after 2 weeks.

2.4 Total power detector for FE & common boxes -- from 19 Mar & 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) sample data from 2 units installed on E2 shows basic things are working ok: more sophisticated tests with on and off source tracking to be done (alongwith digital backend recording, if possible) -- first round of testing showed 11 dB deflection (for 12.4 dB expected), flat-top on-source waveform to be understood; new tests with noise on-off to be reported upon (also if weaker source like Crab has been tried); to try and get some fresh data and see if E2 can be used for night time tests. also to check what is the rms of noise vs least count of adc.

==> no update on this.

(ii) for FE version test on C4 : there was report of random fluctuations, not correlated between the 2 poln channels (noise or something else?); need update on status of this work.

==> problem persists; not clear if it is due to malfunctioning of detector or if it is due to wrong identification of monitoring channel.

(ii) plans for building 70 units for CB : all PCBs and chassis are now in hand; need to decide plan and schedule for mass production and installation on upgraded antennas; agreed to work out an algorithm such that new units are made ready to match the typical / expected consumption rate of going into boxes; assembly of new units gave some problems : old vs new flux (resolved) + unexpected change in detector voltage upon connecting input connector -- need to check the new PCBs carefully, against the older versions?

==> problem due to grounding identified; to be redone; also it seems that there is no RC filter at output of detector ! to be added and put in new PCB.

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

==> see above and merge as needed.

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

==> will be delayed a bit till the above issues are resolved.

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

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

(i) Spares : Agreed to have 5 LNAs ready and available as spares : device is available, PCBs ordered, chassis under request, gold plating of wire completed; 10 nos of LNAs that had been assembled and were being tuned -- check if completd

and can be closed.

==> this can be closed. new order for amplifier device will be needed to make sure enough spares available.

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

==> earlier version sent by Kulkarni not optimal version -- being followed by ANR.

(iii) RFCM-type card status (3 nos of old RFCM cards are ready) : status of new RFCM card -- all tests cleared and 10 nos of this PCB obtained for current LBand spares, and 1-2 were being assembled for quick testing and components were being procured for the others -- to update status of this.

==> 1 card out of 10 fully assembled and tested and working fine; to ensure components for remaining are procured and they are made ready (gradually).

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

==> getting wired in the spare feed.

(v) timescale for integration : all components (including LNAs) for assembly of 3 feeds now ready : check plans for integration of one unit, maybe using the presently dis-assembled feed (problem of Al strips had been sorted out) : can be get one spare feed ready? (RF cabling was in progress) -- need status update on this.

==> one spare feed is fully wired and ready; some gain difference between two channels needs to be investigated.

(vi) finalisation of plans for having total of X working spare feeds -- from mechanical to electronics : (a) what is the value of X?

(b) mechanical issues to be updated upon (see item 6.x)

(c) shortfall in electronics for these to be checked and addressed; mounting plates for the the electronics are being fabricated at NCRA w'shop -- work held up due to shortage of rivets (?).

==> 30 antennas have working Lband feeds; 31st is being assembled back after being dismantled for making drawing; 32nd is there in Pune wshop and can be shifted back; 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. Weight of 3 latest feeds is 18 kg more than earlier feeds -- to check which change in design aspect has caused this increase.

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

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

(i) scheme for filters at antenna base : 3 type of ckts being designed using the new device : 2, 4, 8 way switches with different possible applications : (a) notch filter bank switching in rx room (b) filter bank switching inside FE box (c) rcvr room monitoring (requires higher isolation and hence new design?); ckt for 2:1 and 4:1 versions assembled & tested -- 25 dB isolation achieved (changes from 25 to 17 dB with frequency for 8:1 switch); aim is to target

(a) integrated units for 550-900 with 4 sub-band filters with integration of RFCM

switch and compare against ICON units -- see item 2.X; (b) for 250-500, agreed to go ahead with the discrete design for now (which is now fully tested and ready for integration into new FE box); work on integrated PCB has also started -- looks like it may have switch separate from integrated filter PCB; for 550-900 detailed comparison work ongoing as detailed above; for 250-500 individual units already integrated in new FE box; integrated design now looking at 2 PCBs for 4 sub-bands in one chassis + switch PCB in separate chassis -- this design is done and prototype PCB was to be given for manufacture; to reconfirm desing for (c) above...

==> reconfirmed additional isolation needed for highest frequency of operation; prototype has not yet come (from Argus).

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

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

(b) then install in antenna path for field tests -- to be combined with testing of switched filter bank at rx room.

Ankur has sent the plot showing LF response showing 0.5 dB change in loss over frequency -- so notch filter permanently in the path may be acceptable option; to think about testing by installing in signal path of one antenna?

==> agreed to use 1650 LPF ONLY at antenna base as the final solution. matter can be closed.

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

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

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

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

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

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

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

==> no updates.

(ii) Summary of 250-500 band performance :

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

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

==> no updates.

(iii) to characterise the recommended attenuator settings for different bands : completed for Lband, 250-500, existing 610, only 130-260 / existing 150 -- to discuss once if values given to control room are optimal (e.g. 7,7 for Lband sub-bands) : from tests done by YG and DVL, this appears to be sub-optimal and need to be discussed; FE team to test the power levels at OF o/p and cross-check against SFA values; also, at 1390 the problem appears to be somewhat less and may be related to having extra 10 dB gain stage; FE team to confirm which antennas have this modification. VBB does not have a record of which antennas have the 1390 modification; YG has checked that APR's notebook has the record! -- information to be retrieved from that.

==> SSK to follow-up

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

2.8 Releasing existing 610 MHz system as part of the wideband upgrade -- from 19 Mar (SSK/ANR) : Preliminary tests of existing 610 feed through the wideband path show that ~ 100 MHz usable bandwidth may be possible as part of phase-I uGMRT. Agreed that only RF filter needs to be changed to new 550-900 BPF (alongwith mobile band and TV notch filters) -- two sample units had been made ready and were put in FE ch1 of C8 & C12; initial RF deflection tests look encouraging : extra 10 MHz on lower side and 20 MHz on upper side, leading to a total BW of ~ 120 MHz (~ 565 to ~ 690 MHz) + some lower level response (5 dB down) upto 780 MHz; action items : (i) to carry out 2nd round of interferometric tests to characterise the performance; YG & DVL to report on this.

==> no significant update on this.

(ii) to check progress on completing of 5 more antennas that can be done with present hardware, following the path of the 250-500 upgraded antennas : all items in hand, except for BPF chassis (which should have come by now) -- chassis (20 nos, outsourced) had not yet come -- to check urgently.

==> no significant update on this.

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

(a) we have 100 PCBs that can work for either 175, 540 or satellite filter; of these 12 nos are wired up for 540 filter; 2 nos used for satellite filter; will need a total of at least 120 nos of 540 filter for all GMRT (60 each for 2 bands); to order components for 120 nos of 540 filter; 80 nos of chassis are available; remaining 20-40 nos to be made (likely to be outsourced; to check about the 3 month old indent for inductors. 100 nos chassis ordered for 610 as well as 250-500 (with workshop); (b) for mobile filter, 60 nos + 10% spare are needed; to add quantity to chassis request. To see if PCBs for 10 antennas can be ordered for this, given available substrate material (which is also needed for other PCBs). remaining PCBs can be done later on; more epsilon10 substrate material needs to be ordered; 2 boards have been ordered (with 850 MHz lower cut-off); to check present status of this.

==> to confirm if items have been ordered.

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

2.9 Status of new CSIRO feeds : from 19 Mar & 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.

==> to check with HSK and update; regular follow-up after 2 weeks.

2.10 Calibration scheme with radiator at apex of antenna -- from 19 Mar & before (SSK/PAR/SRoy/DO/YG): to follow-up on detailed discussion meeting in August : to

schedule follow-up action appropriately, breaking the issue into smaller, more tractable items :

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

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

(b) to repeat on another antenna with new electronics (C6) and one with old : W1 has been identified, but tests were pending due to completion of RF cable and antenna mounting related arrangements.

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

(d) to get the plots done for the variation with antenna position (elevation etc) and then work on interpretation

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

==> PAR to produce a short summary of the current results; for (b) W1 has been identified as antenna with new FE and CB electronics, will be compared against C4 result with new electronics -- need to worry about notch filters etc?; need to check W1 for mechanical arrangements (help of HSK if needed); once results with existing transmitting antenna are tested at 325 band; for (d) to put these numbers in the short summary; (e) SRoy can start thinking about it.

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

==> tbd later on.

(iii) other longer ranging goals :

(a) procurement of new broadband antenna : suitable unit (from Aronia) has been identified and ordered -- delivery had cleared customs and should have reached GMRT.

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

==> new broadband antennas have come; looks like will work from 100 MHz to few GHz. noise src test can be done with set-up at W1.

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

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

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

==> can try to couple this with the test set-up at W1; regular follow-up after 2 weeks.

3. RFI related matters :

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

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

first round of tests have been done ; need first draft version of report on testing of integrated system to be circulated by RFI team. Meanwhile, partial consignment of the much-awaited connectors should have come by now ? to check status, including draft report.

==> set-up with shielded D-type connectors is under integration for 2 units; to check status after 2 weeks.

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

(i) procurement & testing of switches : sample units from Cisco, HP, Dlink and DELL had come and have been tested for RFI -- conclusion from final report is that D-link is much better than others (but it is 2x more expensive than next best option of CISCO by 20K); also, use of shielded CAT5 cable provides significant improvement; agreed to wait till RFI enclosure is ready and do full test with CAT5 for both D-link and CISCO and take a final decision; meanwhile BE group can borrow the units for testing in GAB system. first version of RFI enclosure has been received on 10th Mar, and is under integration in the lab; 2 nos RFI enclosures completed with mouting of filtered and shielded adapters, eth cables, AC pwr line filter, shielding for fan etc; all the 4 available switches tested one by one in these enclosures (on 20-21 March) and draft report to be discussed.

==> first draft results are available and results look very good; isolation is about 70 to 35 dB from 100 to 1400 MHz; further, improvement is seen with switch + shielded CAT5 only (without box) and this is best for CISCO -- this could be the final option for all use at GMRT. To be confirmed after the final report is out.

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

==> can wait for final report and also final integrated test of switch + PC + Rabbit card + media converted ++

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

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

Progress on identifying the operators at and around E06, and in Nagar, Junnar directions : letter had been sent to BSNL, some follow-up action was on -- they had agreed to change to 1800 at 3 locations (Ale, Gulanchwadi & Pargaon Mangarul) : one location (Pargaon Mangarul) tower has been swithced over to 1800 by BSNL; Alephata tower -- 2 sectors changed to 1800 (what about the rest?); for Gulanchwadi tower -- work is pending (as per latest update from BSNL officials); RFI team to verify these changes by visit to the sites & by checking the GMRT data (compare old vs new data), and summarise their finding -- follow-up action to be decided.

==> no change in status reported -- will need some follow-up : to check after two weeks.

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

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

(a) tests of 3 nos repaired 1 kVA units from Miltech showed significant RFI -- updated report comparing original Miltech 1 kVA test reports (with same load conditions) have been circulated; Miltech has offered to fix the problem with these units and electrical group had sent these back (transfer of order from servo to electrical?) -- need to check status of delivery of these units back to GMRT.
(b) Miltech has offered improved version for 3 kVA unit -- order has been placed for the same and unit is expected by early-mid Feb : Miltech will deliver along with improved 1 kVA units -- was expected by 25 Mar. Need status update on this.
==> email update from RVS (last week) : no clear update from Miltech about delivery of these units...

(ii) UPS units from Ador : 2 nos of 3 kVA was purchased, tested for RFI & cleared; units are in use in C9 and C10. RFI team has added comparative statements at the end of the 2nd report quantifying the repeatability; bigger units : agreed to order 2 nos of 4.5 kVA units with Ador, with option of 2 single phase o/p with different isolation transformers (3 + 1.5 kVA); units were delivered and RFI tests have been done -- appears that this is not as good as 3 kVA units (!) -- where is the report? follow-up ongoing with Ador including possible site visit by their engineer to look into rectification of the problem; meanwhile, is it useful to explore 3 kVA with split o/p isolation transformers?
==> confirmed that 4.5 kVA did fail the RFI test -- lots of discrete lines; visit by the vendor and efforts to improve did not help; can we go back to 3 kVA with split output ? this needs to be discussed and actions finalised.

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

(i) a form had been prepared for use in the survey and had been discussed in detail and agreed that it is suitable for use; need to finalise plans for entering existing data into this form : one possible candidate (trainee) had been identified and work was ongoing -- to check if complete or not?
==> 30% work done; rest ongoing.

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

==> Regular follow-up after 2 weeks.

4. Operations :

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

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

being tested with drivers on one m/c; now installing on Miltech PC, will need one more Miltech PC for the core m/c; will start installing TCS software version as soon as available from them. Check if these machines and installations are ready and the matter can be closed.

==> all of this appears under control and item can be closed.

(ii) plan for PoC testing : PC to PC104 on one eth port; PC to PC between ABR and CEB (for 2 level SACE); PC to Rabbit in GAB with PC to PC in CEB : Master SACE PC in CEB; connect to Slave PC in ABR via switch + PC104 connected to same switch; at CEB connect Master SACE to GAB Rabbit direct or via another slave or via the PC which currently talks to the GAB Rabbit? To check the final scheme and also availability of all the hardware required; status update about PoC testing done at TCS last week, and plans for testing at GMRT.

==> basic testing at TCS ok; now getting ready to test at GMRT in two weeks test; meanwhile, to make sure all preparations are done next week (some GAB software updates are needed).

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

==> to follow after item above.

(iv) plans for populating a few (5-6) antennas with Rabbit card (with or without PC) for testing. C3 and C6 have been completed, and moving to S3, W3 + C8, C11 (only PC104 required) for prototype testing : instead of S3 & W3, S2 & S4 have been populated, but S2 was giving some problems -- need status update. S2 o/f problem is still there as some signal is not reaching there -- PAR will resolve it shortly.

==> S2 has two fibres; one has heavy loss (the one used for eth) -- need to find the cause of the problem and fix the same -- this will take in some time; S2 is being replaced by another antenna (same for C3).

(v) follow-up on interface of FE with new M&C system -- Naresh + Charu and Sougata have started work on this; will have full set-up of FE + Common box, but will start with M&C of common box using Rabbit card : initial h'ware connectivity may not be too much work as 32 lines have to be mapped to 16 lines on interface card; low level software for bit pattern setting may be enough to demonstrate basic connectivity; after that, packaging will be the issue. Team had reached the point where able to set bits using the set-up of Rabbit talking to interface card; bit pattern from MCM to interface card coming out as expected; after that, the signal does the desired downstream cards (e.g. band selector card) -- looks like the correct bit pattern is not being set -- needs some further investigation.

==> no progress on this; needs to be taken up with some urgency; just after the MTAC.

(vi) updates from online-v2 :

==> interface with python has been done and it has been tested for 2 commands; PC104 connected to online-v2 and tested with tracking commands; interface to OF attenuator tested in the lab.

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

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

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

(i) need discussion on results from the tests to decide future action (see also 3.2)
(ii) plans for BE teams need for switches in GAB system (in receiver room) :
agreed to use 8-port switches for now though they are worse in RFI than the 24 port ones tested for antenna base use, and take a final decision later on -- agreed that all groups can use the same layer-2 switch finally; same for the SMPS power supply -- 2 nos ok for now; need some discussion on this matter, for long-term planning.
==> to work out the max data rate on this switch network (for looking into the communication failure problem); other possible reasons (including socket error checking) discussed, changing to star connectivity from daisy chaining -- matter under investigation; to try the new 24-port switch (maybe CISCO unit) after MTAC. Regular follow-up after 2 weeks.

4.3 New, improved Miltech PC -- from 5 Mar and much earlier (CPK/SN/PAR) :
2 units of Miltech PC with two changes (more screws on panels + panel mount pwrline filters instead of chassis mount) under order by Ops Group : to check status of delivery and plans for testing of the same.
==> 2 PCs have come and are being made ready; one unit to be given to RFI team for testing; 2nd unit may get used in the test set-up; one earlier i3 unit had failed -- needs to be checked by Sumit; regular follow-up after 2 weeks.

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

Summary and action items are as follows :

- (a) Doing a careful re-analysis of the total load (alongwith individual team members) and separating peak load (e.g. switch on load) from sustained load etc in table 2.
- (b) Agreed that peak load requirement (e.g. in-rush current) can be balanced out by synchronised delayed switching on of different units -- this is already implemented to some extent at present. Some discussion about current load of ABR system -- agreed that it could be capped at 4 A (though present supplies are drawing only 0.7 A -- may indicate leaky caps which should be checked); similarly, OFC + FE supply needs to be check (0.5 vs 3) and new MCM system (PC + Rabbit) ; did a quick run through the other numbers and came up with a tentative suggestion that 5.1 A can go up to 8 A (and hence 10 A is a safe limit) -- this is 2.3 kVA and hence it means 3 kVA is more than enough; to confirm with individual groups and come back.
- (c) New power consumption estimate to be made & final UPS capacity to be matched to it.
- (d) Diagrams showing rack utilisation to be rechecked for consistency (including some adjustments for antenna to antenna variations?)
- (e) Existing servo FPS units can be left where they are; if isolation transformer can be moved out from the rack, then space in that common rack is enough for all growth plans of FE and OF systems; this leaves some empty space in ABR rack bottom that can be utilised for further growth of telemetry system; all new servo growth to be accommodated in the servo racks (or in-situ replacement of existing units); with this, there should not be a crunch for space, but a careful relook in the updated report will help clarify the matter.
- (f) the new UPS can have the isolation transformer(s) integrated into it, without increasing its footprint (only height may go up); UPS can be located in the space between the ABR and servo racks -- this has been done in one antenna with the new UPS and can be checked for suitability; final configuration of the UPS can be decided once the load calculations have been refined. also, to check space occupancy of new BLDC servo system vis-a-vis old one.
- (g) extraneous items in the surrounding of the racks (electrical fittings etc) can be relocated, as far as possible, to make it convenient for people visiting for work.

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

==> no significant updates available; can be deferred to 2 weeks later.

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

==> no significant updates available; can be deferred to 2 weeks later.

5. Back-ends :

5.1 Documenations :

(i) Detailed design doc -- pending for long : from 26 Mar & before (BAK) : analog back-end was due sometime ago ! Hande had made the first version and was making the 2nd ver based on the feedback received, with target of end February (new end March) -- some inputs still remaining within the group to complete the version till PIU level; next version will go down to chassis level.

==> Hande has sent next version, which may still need some changes.

(ii) ITRs for analog back-end systems and digital systems to be taken up : analog back-end : Sandeep and Navnath to look into; pkt corr first level has been done and circulated -- waiting for feedback; GPU corr first version (by Reddy + Irappa) was in internal circulation -- can it be released now? Need updates on these items as they have been pending for long -- version is circulating and 1st version could be finalised and circulated for ITR level.

==> more or less ready for sending -- BAK can take a look and decide.

==> Regular follow-up after 2 weeks.

5.2 : power supply for GAB (item introduced in 2 Apr 14 meeting) :

==> to produce comparison note for linear vs SMPS for all pros and cons.

Meanwhle, a few SMPS units can be bought, as the cost is very small. Follow-up after 2 weeks.

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

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

==> SSK to update on this.

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

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

test data is being looked at; to check and discuss these.

(b) plans for phasing algorithm and PA beam mode : phasing has been implemented and tested (SSK); PA kernel has been completed and first set of tests have been done; to check if GUI has support for all the features that GSB phasing GUI provided. also to confirm that phasing works for all the modes : single and dual pol.

==> second part is confirmed; first part needs some understanding and action.

(c) finalisation of GUI to support all aspects of beam mode operations: there may be some issues pending -- to be checked.

==> phasing and antenna masking (for PA) in GUI still pending.

(d) finalisation of process_psr pipeline for beam modes, including psr_mon etc.: done for total intensity; full stokes still has work to be done at kernel and process_psr pipeline level.

==> process_psr pipeline is now almost fully working for all modes, except band rotation in full polar mode.

(e) 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.

==> this needs to be discussed and resolved.

(f) SOP to be made ready : NSR to be asked to update SOP to include PA mode; also to check the directory structure etc being used by beam mode data acquisition systems.

==> work yet to be done here.

to check the float to int conversion in beam output !

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

==> not done yet.

==> Regular follow-up of relevant items, 1 or 2 weeks later.

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

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

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

==> discussed and agreed that this solution is ok for 200 MHz, 8 bit and 400 MHz, 4 bit modes. Can keep this for now.

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

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

(b) trying sample PA beamformer code to estimate load etc. -- will come when PA beam mode is released in GWB II

==> (a) need to follow-up with nvidia; (b) load is less than 7% for both beams (with some optimisations done)

(ii) to start testing 400 MHz BW mode -- how best to conduct these tests? all changes in the main code to handle 4 bits etc have been done (but not put in GWB-II) and now need to be incorporated in GWB-III and tested; need a discussion on this.

==> can be deferred for some more time.

(iii) Layout and racks (GSJ/BAK) : layout diagram to be updated and long-term plan for racks to be initiated; 3 different kinds of President racks discussed -- to try and finalise after one more round of discussions including RVS (also, new vendor Jyoti Tech); meanwhile, agreed to get 2 nos of cyber racks on urgent basis : 2 nos of cyber racks ordered with President -- to check delivery status; for the "cool" racks, not much response from President; some response from Jyoti Tech; need to follow-up and decide course of action; meanwhile, status of half-height rack to be updated.

==> to see if President order (10th April) can be speeded up (or not slip); meanwhile 2 half ht racks are getting ready -- one is almost ready and the other one will be the instrument rack; to decide how to distribute the GSB nodes and the GWBIII Roach boards and T620 nodes.

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

==> only party quoted -- to see if the order goes through.

(v) new purchase of Roach boards etc : follow-up on status of order -- expected date of delivery was given as June ! GJS had followed-up with Mo Ohady about this with a request for fast delivery -- status?

==> no update.

(vi) purchase of new machines & 8 K20s : T620 machines have come; K20s delivery should have happened? To start looking for rack space for mounting etc...

also, to discuss and initiate purchase of 4 new host machines for GWB III.

==> K20s have come; 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.

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

5.5 Walsh modulation : prototype set-up on Roach board -- from 19 Mar (SCC/BAK): plans of BE team for implementing prototype scheme -- basic unit for switching using sq wave signal from GPIO pin tested ok; was put in main PoCo correlator and was being tested; walsh waveform delay functionality has been added now and can set delay from 1 to 2^{32} clk samples (!); with this, variation of correlation with delay has been tested; to generate final plot showing this behaviour; confirm if issue of factor of 2 between expected and measured delay has also be understood; detailed follow-up action to be finalised : reminder to generate the plots (done?); to aim for one algorithm for hunting for the peak and detecting; can also think of a test case of showing cross-correlated signal goes away with modulation with square wave in one channel; Walsh pattern is being put inside ROACH boards [so that no dependence on external source]?

==> Walsh pattern in the Roach2 is 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 areas of work : (i) to complete the Walsh modulate and demodulate set-up in the lab; (ii) to optimise the hunting algorithm; (iii) to demonstrate cancellation of unwanted signals in ADC card and/or GAB; regular follow-up on all items after 2 weeks.

5.6 Testing leakage, coupling and correlated noise in new back-end chain -- from 19 Mar (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.

==> brief discussion; needs some follow-up; to check status again after 2 weeks.

5.7 SFP testing of final unit -- from 19 Mar and before (KDB/BAK) : SFP+ side working fine for both Cu and Opt; XAUI CX4 side is still flaky -- may still be marginal in timing. Update required from new tests after fresh inputs from vendor. Follow-up with MTE for PCB details and then with Vitesse -- not making progress; on SFP side everything is working; on CX4 side, 1 m is fine; 2 & 3 m work for some kinds of cables. To decide whether to pursue further or close the matter as it stands with a clear summary of what works and what does not? agreed that this can be closed and that we can live with 1 m length restriction from Roach board to converter box; to check with MTE about exchange of materials and information to close the matter formally.

==> YG to write formally to MTE for doing the transaction; to check status after 2 weeks.

5.8 RFI filtering -- from 19 Mar (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 -- to discuss the status and plans.

==> no major update; 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.

Detailed follow-up after 2 weeks.

5.9 Next-gen time & frequency standards -- from 5 Mar & 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.

(ii) plans for follow-up action :

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

Meanwhile some problem with Rb locking of one unit; remote help from Europe to try out diagnostics.; also to check about spare unit at RAC and unit at 15m for use in case of emergency when 2nd unit is to go for repair -- the Rb unit needs to be sent to UK (within 3 year warranty) -- status update on this.

==> 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.

==> Regular follow-up to be arranged (2 weeks later?).

6. Other items :

6.1 New python assembly design -- from 19 Mar (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 : could try to do in next few weeks, just after MTAC?

(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).

Status of procurement work to be updated.

==> 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. To check again afer 2 week.

6.2 Coexistence of 50-90 MHz RRI feed with 250-500 CDF on same face of turret -- from 19 Mar and before (HSK) : Mech group to check for possible solutions and report back, after looking at the drawings (awaited from RRI). Update from mech group about reverse engineering for making the drawings -- mech group has circulated a brief note : discussion showed that it is not compatible with 250-500 CDF (either cone has to be truncated or it height has to be raised by 30 cm to avoid conflict) -- may work with 550-900 CDF; mech group to try a solution for co-existence with Lband feed; dipoles removed from 2 antennas have been collected (slightly damaged, but can be repaired); will shift reflector to Pune workshop for testing with Lband feed there -- to update status of this.

==> job in pipeline at Pune workshop. to check after 2 weeks.

6.3 Problem of access to FE boxes with 500-1000 CDF feed -- from 19 Mar & 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 (?), and waiting for quotes from some parties -- follow-up to be discussed.

==> waiting for quotations? may want to go for additional unit that can allow worker to also go up (using same power pack); check status after 2 weeks.

6.4 Fabrication of 5 spare L-band feeds -- from 19 Mar & before (SSK/HSK) : drawing has been made in consultation with mech and FE but still waiting for signature of SSK (!) -- to be cleared today given for manufacture; order to Akvira for 3 nos (with enclosure) + 2 extra horns. Hence, total of 6 feeds will be ready + 1 dis-assembled unit -- so total of 7 spare feeds will become available. Matter is still stuck because of finalisation of drawing ! should be closed by now :

matching with drawing to be done by mech group and FE team together certify that it is ok, and no further changes needed; Need current status from mech group : drawing "finalised" (but not signed yet!); final list of changes and modifications agreed upon by both sides; request for one more feed cover from FE group -- to be outsourced to Akvira.

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; status ?

==> see comments in FE section; item to be taken up again after 2 weeks, with appropriate changes and substitutions put it.

6.5 Design of RFI enclosure -- from 19 Mar & before (HSK/PAR) : (see item 3.2) inputs for front panel design given to R. Lolap for completion of drawing; prototype was to be fabricated in w'shop, but is now outsourced (?) -- getting ready for placing order (somewhat excessive cost due to all-machining design -- ok for prototype unit, but different solution can be looked at for mass production) -- to expedite the delivery as much as possible : order has been placed; delivery of 2 nos delivered to NCRA Stores on 3rd Mar -- delivered at GMRT now; waiting for test results before deciding follow-up action...

==> see item in RFI section; detailed follow-up after 2 weeks.

6.6 Effect of increase in size and weight of FE boxes -- from 19 Mar & before (HSK/SSK) : Mech team to circulate existing drawing of turret to see how a longer FE box can be accommodated; and to do a first calculation about impact of weight increase which can be 50% for each FE box : capacity at turret; static & dynamic loading capacity of feed gearbox etc. First draft note was expected last week -- calculations have been done and conclusion is that extra moment etc are within design limit of gear box; report to be circulated shortly (laptop disk crash problem). Can first draft be circulated now !!?

==> work not completed yet; HSK to try and get in the next few days.

associated item (check its location) : analysis by HSK about wt reducing measures; feels 10-12% reduction is possible by going to rail chassis instead of milled chassis. FE team will produce the final list of the chassis. To follow-up after 2 weeks.

6.7 Jobs at TIFR + other work requests -- from 19 Mar and before (HSK/SKG) :

(i) update on status of our jobs at TIFR -- check status after collecting 120 nos: last set of 60 nos (bonus amount) still waiting in the pipeline -- no clear response coming from TIFR; agreed to forget this for now and go ahead with our own effort via outsourcing to industry.

==> bonus quantity likely to be done in May

(ii) other miscellaneous chassis items need to be taken care of by mech group, as long as they are in the official list of orders.

==> ongoing

(iii) to review the current process of taking job orders for better facilitation of the tasks with end users like electronics groups. YG discussed offline with HSK : to look to fill the lacunae in the process with maybe new development of in-house version? To bring-up for larger discussion.

==> agreed to try and get this done in-house with Joardar -- YG to arrange 3-way discussion...

==> Regular follow-up on pending / important items after 2 weeks.

=====

Minutes of Plan meet of 23 Apr 2014 (follow-up of some pending topics from different areas) :

1. Documentation related :

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

(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; now waiting for latest issues to be resolved and incorporated.

(b) 250-500 main + sub-band filters (Sougata) -- first ver was to be ready by 26 Mar; now waiting for Sougata to return from leave.

(c) 550-900 main + sub-band filters (Imran) -- started.

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

To check status of all items.

==> (a) is still pending as issues are still being resolved; for (b) first version will come by nex week; for (c) waiting for testing of new PCBs to be over.

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

==> still pending.

Regular follow-up after 2 weeks.

1.2 Detailed design doc -- pending for long : from 2 Apr & before (SSK/BAK) : follow-up on subsystems to be converted :

(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).

(ii) OF Tx to be started.

==> for OF Rx, will update and circulate by this week.

Regular follow-up after 1 or 2 weeks.

2. FE & OF related :

2.1 New LNA for 130-260 system -- from 9 Apr & before (VBB/SSK) :

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

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

==> results from testing of 130-260 LNA : shows about 35 to 40 deg K variation in T_{lna} over 0 to 60 deg and 0.6 to 0.8 dB (drop) in gain with increasing temp; for 550-900 LNA : about 35 to 40 deg K change in T_{lna} with 0-60 change in temp (except for 52 K at 300 MHz), and gain is 0.04 to 0.36 dB -- results obtained for

two epochs for both cases and found to be repeatable. Agreed that 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.

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

==> C13 also has temp monitor in both FE and CB, but connection to monitor pts are not wired to correct channels -- looks like there are unresolved issues in the wiring of the existing common box units that prevents reliable connectivity for the final monitoring in control room ! Hence, agreed to select a few antennas for proper monitoring (maybe W1, C13, E2) 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 CB is taken for maintenance or upgrade, the wiring can be corrected. (same argument applies for power monitor also).

(iv) planning for long-term implementation : ~ 300 temp monitor units will be needed for full GMRT -- 25 units ready; 50 more can be done with available items; indent for balance number of components has been raised; same needs to be done for the PCBs. For components, quotation has come and order has been placed; PCBs are ready; to check if components have come and matter can be closed?

==> components have arrived and PCBs are available for 300 units and hence item can be closed.

==> Regular follow-up of relevant items after 2 weeks.

2.2 Mass production of 250-500 FE system -- from 9 Apr & 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) testing of 15 installed feeds : FE group has been doing weekly plots & results, and deflection plots have been added to these : regular on-off plots for March to be sent by Ankur; summary of antenna performance to be prepared from data of last 2-3 months.

==> plots are being done regularly, but need some follow-up to look at relative performance of antennas -- especially the ones not working properly; agreed to start looking at this aspect now.

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

one box with new features has been installed in C4 and appears to be working ok; to confirm status of this and 2nd spare unit and see if item can be closed.

==> 1 box is ready and in cycling mode for past few weeks; only filter tuning remains to be done for the 2nd spare box; some problems (maybe about 1 per 2 months?) are being reported in the existing systems; this item can be closed, but failure rate issue can be coupled to item (i) above?

(iii) plans for sub-band filters for 250-500 MHz system -- update on testing of sample units and results from these to be discussed; updated report with all 4 sub-bands over plotted showed roll-off is a bit slow on the higher freq side compared to existing L-band sub-band filters; insertion loss is better; agreed to put up one or two units in antennas and check the performance : all lab tests with manual settings using patch card + old MCM card were done successfully, and following were the pending action items :

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

(b) 2 units to be made ready and integrated in final FE box and tested : waiting for final test results -- there were some problems and debugging was going on.

(c) to check long-term plans for integrated unit : one chassis with 4 filters in it + separate chassis for the switch looks like the option -- design has been done and PCB has been ordered. Final design is 2 filters on one PCB and hence 2 PCBs in one chassis; prototype PCB for this may come in a week or ten days; switch PCB (20 nos) is available, but sample chassis came with a problem that is being rectified and will come in a week; status update is required !

==> (a) & (b) can be closed; for (c) : sample PCBs (for 2 pols) have come, now waiting for chassis -- drawing to be released by tomorrow. PCB + chassis for switch is ready (for 2 pols).

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

(a) status of installation in further 3 antennas to be updated -- C6 completed; next one : work under progress for 2 boxes (for 2 antennas) -- may take one week. status?

(b) plans for completing the job for all 250-500 antennas -- this is URGENT : to check availability of materials etc -- all items for 4 more antennas are available -- need to be assembled; need for one antenna in next 10 days or so. status?

(c) status and plans for mass production of 175 & 540 filters and chassis -- 100 nos of 175 filter PCBs had been procured and chassis work was ongoing at w'shop; for 175 filter, chassis needs to be confirmed from w'shop; for 540 filter, email update from Ankur : 2 nos are presently ready for use; components for 40 units in hand; 70 common PCBs (for TV and satellite notch filters) and 60 chassis (common for 540 & satellite notch filters) are available. status?

==> for (a) E6 is the next antenna (this week); for (b), ready for doing next antenna (W4) next week; for (c) chassis for 175 coming from w'shop in small batches; for 540 TV and satellite notch filters, same PCB (70 nos) and chassis (60 nos) are in hand; further 100 chassis is on hold as team is trying to reduce the size of the chassis (for both filters) -- this will be finalised after 2nd new box is integrated.

(v) status of other auxiliary items :

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

-- 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).

-- temp monitor : to check plans for final integrated testing in FE box -- some tests have been done on C4 (results?); C6 to be tested next (?)

-- walsh switching arrangement to be made ready and tested (with old RFCM card): completed?

==> with the box on C13, noise source has been tested, but data records need to be produced; for Walsh, a simple switching arrangement to see change in phase of radiated CW or loss of correlation / fringe with other antennas needs to be done; results from temp monitor to be recorded; once these plots are produced, these items can be closed (except for slow rise power supply).

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

2.3 status of lab integration of final version of 250-500 box -- from 9 Apr and before (ANR/SSK/HSK) :

modelling shows that existing size of box is not adequate (inspite of double decking of chassis); deeper FE boxes are needed -- 15 cm has been added (wt of new empty box is 15 kg); mech group has confirmed that this is ok (present depth is 468 mm, can be increased to 700 mm; also, rear member in the cage can be removed to further increase depth); also total weight of populated box will go up by a significant amount.

(i) one new box has been supplied by mech (2nd unit is also ready with them) and is being integrated by FE; first box completed all lab tests and finally installed on antenna (Cxx) -- appears to be working fine, to first order; pending action items :

(a) detailed testing of all aspects and features of the box to be carried out and reported.

(b) to discuss what to do about notch filters present only in the all-pass mode.

==> for (a) detailed plots to be produced illustrating the results; only temp and pwr monitor have problems of identifying correct channel and may need the box to be brought down; for (b) agreed to leave status quo and correct in next box that is getting ready.

(ii) estimate of total weight of populated new box is ~ 28 kg (vs 15 kg for present box !) -- agreed that it is too heavy (e.g. unwieldy to handle at the focus); plans for weight reduction :

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

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

(c) to discuss with mech about other things that can be done to reduce the weight of the box itself : it appears that only 0.6 kg reduction may be possible, as per HSK ?

==> for (a) items being integrated are sub-band filters + switch and band pass filter + 175 notch are being combined; 540 filter chassis width being reduced; for (b) not yet clear which chassis will go which way and for (c) looks like there may not be much option for weight reduction?

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

2.4 Next Gen Common Box -- from 9 Apr (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;

==> no update on this today.

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

==> the BSCTL card has been 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.

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

==> Imran to start looking into this.

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

==> agreed that Imran can also look into how to fit the Rabbit shielded box inside the existing common box.

==> Regular follow-up after 2 weeks.

2.5 Design of new RFCM card (v2) -- from 9 Apr & before (SSK/Ankur/Sougata) : RFCM card (v1) was built as part of generating spares for Lband system and fully tested for all control functionalities -- for Lband, as well as for 250-500 FE box (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. Action items :

(i) adding monitoring points (about 5) to existing card : Imran & Sougata have identified total of 8 points that are now available on the old (and new v1 card); now need to design basic tests to make sure that all these points are functional and then redo the PCB to utilise these points.

==> discussion shows that there are spare points on some of the connectors on the the existing RFCM card of Lband that can be used for the extra monitor points and hence there may not be any need to make a new PCB (only some points will need to be strapped from the IC to the required connector pins on PCB).

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

==> discussion showed that the v1 card (or modified v1 card that has been made) can be easily modified (already has the direct TTL lines available) for allowing it to work for other RF bands.

Agreed that both functionalities (i) and (ii) to be demonstrated in the lab and then decision about final PCB to be taken.

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

2.6 Status of improved 500-1000 MHz CDF -- from 9 Apr & 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 2b + 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' ? ==> can be done on C10 right now (after taking down 750 kildal feed) and then matter can be resolved.

aside : test range results for dipole v2a and v2b with cone v2 show that the degradation of pattern with frequency is worse for v2a than with v2b.

(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.

==> still having some problems with stability of the PC, and a solution is needed.

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

==> no updates.

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

Also 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.

Implementation of '1080 mm' stool height facing difficulty ?

==> agreed that feed brought down from C10 can be modified for this and this test can be done after item (i) has been completed.

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

(a) design Kildall ring feed at 750 MHz using v2b dipole -- work ongoing; status to be confirmed; also to produce plots for the RL and E-H plan patterns from the simulation, to check the available bandwidth. -14dB return loss achieved ?; waiting for FE box for further testing?

(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.

==> for (a) first deflection results appear to show improvement by 2.8 dB at 750 MHz (compared to v2b + v2 feed) ! to circulate results, including on-off plots after rechecking...

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

2.7 Signal flow analysis (SFA) related items -- from 9 Apr & before (GP/ANR/SSK)

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

==> SSK to check with the concerned parties.

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

==> most of the changes have been done; updated version will be circulated shortly.

==> Regular follow-up after 2 weeks.

2.8 Filters at different stages of receiver chain -- from 2 Apr & before (SSK) :

(i) scheme for filters at antenna base : 3 type of ckts being designed using the new device : 2, 4, 8 way switches with different possible applications : (a) notch filter bank switching in rx room (b) filter bank switching inside FE box (c) rcvr room monitoring (requires higher isolation for highest freq of operation and hence

new design?); ckt for 2:1 and 4:1 versions assembled & tested -- 25 dB isolation achieved (changes from 25 to 17 dB with frequency for 8:1 switch); aim is to target (a) integrated units for 550-900 with 4 sub-band filters with integration of RFCM switch and compare against ICON units -- see item 2.X; (b) for 250-500, agreed to go ahead with the discrete design for now (which is now fully tested and ready for integration into new FE box); work on integrated PCB has also started -- looks like it may have switch separate from integrated filter PCB; for 550-900 detailed comparison work ongoing as detailed above; for 250-500 individual units already integrated in new FE box; integrated design now looking at 2 PCBs for 4 sub-bands in one chassis + switch PCB in separate chassis -- this design is done and prototype PCB given for manufacture (to Argus).

==> sub-band filters for 550-900 have come from Argus and Shogini and are being compared.

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

(a) real-life testing of prototype unit of 1800 notch filter has been done (for the case of full band selection of LBand BPF) : results show that LPF gets rid of large part of the 1800 mobile, but not all of it; with notch filter, almost all of it is gone. Two options are possible : notch filter at rx room in the main signal path -- to test its low frequency response for flatness; LPF always in the path with notch filter switched in when needed. To evaluate the 2 options and decide. Ankur has sent the plot showing LF response showing 0.5 dB change in loss over frequency -- so notch filter permanently in the path may be acceptable option; agreed to use 1650 LPF ONLY at antenna base as the final solution. matter can be closed.

(b) then install in antenna path for field tests -- to be combined with testing of switched filter bank at rx room.

==> to be done.

(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. This is somewhat urgent. To confirm the status (and methodology used) and decide if this can be closed.

==> to be checked.

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

2.9 New filters for Lband -- from 9 Apr & 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.

(i) Agreed to go ahead with the main BPF as a low priority job -- PCBs (stripline) does not need much work for assembly -- can be given for manufacture; new chassis will be needed; population can be done as and when a FE box comes down. 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;

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

==> no major large scale activity happening here; existing units being used only

as spares. To take up once more after 4 weeks and then decide long-term plan.

3. RFI related matters :

3.1 RFI from TV signals (from cable to terrestrial systems + boosters) -- from 9 Apr and before (PAR/SSK) : Cable TV leakage could be a bigger problem than boosters etc ? : tests had been planned to see how much is the leakage as a function of frequency and then see if operators can be requested to change the frequency or improve their set-up; results on 2 tests to be reported : 1st one at control room of operator and 2nd at some distance away to see which channel and operator is the culprit. Further tests had been done at N'gaon. Present thinking of RFI team is that the lines seen are from terrestrial TV transmitters, rather than cable TV (!) -- likely to be in 175 to 229 MHz range. Follow-up action items :

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

==> 2 channels remain unidentified; can update existing table and circulate.

(ii) to work out a plan for monitoring the GTAC data (30:1 data) for RFI in 325 and 243 band OR use the new OF broadband monitoring system

==> to summarise which antennas show which TV lines with what strength etc.

==> Regular follow-up after 2 weeks.

3.2 Radiation from CAT5 cable -- from 9 Apr & earlier (SSK/PAR): Follow-up on action from 3 Apr 2013 (!): to install shielded CAT5/CAT6 cable in conference room as trial and finalise the scheme for all other public places in the building:

first report has been circulated that combines testing of switches and CAT5 cables; conclusion is that use of shielded cable makes significant difference to the discrete lines as well as to broadband RFI. Agreed to go ahead with controlled expt in GMRT Conf room to quantify the improvement; plan is as follows : put few laptops in conference room to ping some of the servers in main control room via the switch; do the test with and without the shielded CAT5 cable and report the result; will need some help from computer group for making the cable; RFI ambience test was completed and data collected for Conference Room; RJ45 RFI shielded cables to be made in the OF lab and test to be repeated after installing the cables; cable is ready and tests were planned : need update from preliminary tests and plans for completion of the task.

==> tests have been completed, and report is under preparation -- should come soon. Regular follow-up after 1 or 2 weeks.

3.3 Mobile phone RFI -- from 2 Apr & earlier (SSK/PAR) :

Progress on identifying the operators at and around E06, and in Nagar, Junnar directions : letter had been sent to BSNL, some follow-up action was on -- they had agreed to change to 1800 at 3 locations (Ale, Gulanchwadi & Pargaon Mangarul) : one location (Pargaon Mangarul) tower has been switched over to 1800 by BSNL; Alephata tower -- 2 sectors changed to 1800 (what about the rest?); for Gulanchwadi tower --

work is pending (as per latest update from BSNL officials); RFI team to verify these changes by visit to the sites & by checking the GMRT data (compare old vs new data), and summarise their finding -- follow-up action to be decided.

==> quick update from SSK : appears that there is not much change in the measured power, even after the changes described above -- report will be circulated soon.
Regular follow-up after 1 or 2 weeks.

3.4 Effect of military satellite RFI in 243 band -- from 26 Mar & before (PAR/SSK/SN) : follow-up action on testing for saturation effects, decision about appropriate location of switchable filter, possibility about control room (ops group) being able to come up with algorithm for prediction (for user's) :

(i) filter related action items :

(a) report on prototype filter has been circulated (?); old filter works only up to 1 GHz, and new version has been made that works upto Lband and was getting tested -- to confirm the status of this and see if it can be closed.

(b) meanwhile to try a test where this filter is inserted in the path (for 2 antennas) for a short time when 250-500 is selected -- put at ORX o/p in Ch1 of E2 & C6 (does it affect performance at other bands?) -- to check results and decide further action (awaiting user feedback).

==> confirmed that (a) can be closed ; for (b) filter is permanently in the broadband path in E2 and C6 -- need to check 610 and Lband signals for these; 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?

(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 -- RF power was monitored on broad band receiver output; SNK will make a new program changes for alarm settings and one more repeat test will be done; need results from the tests done so far !

==> no results circulated from either of these two exercises... need to resolve the matter soon.

==> Regular follow-up after 2 weeks.

3.5 Satellite RFI at GMRT : generalised task force (FE + BE + Ops team) -- form 26 Mar (new item from 15 Jan onwards) (PAR/KDB/SNK/JPK) : aim is to have a combined approach where Ops group can have prediction routine for all known satellites, FE group can help characterise their effects in different uGMRT bands, and BE group can come up with mitigation techniques. To follow-up on the initial discussion of 15 Jan. :

(i) look at new results from GPS satellite testing

(ii) to complete the work for the military satellites and then move on to all the other known satellites. also needs a slightly bigger discussion...

(iii) to organise a bigger discussion and see how matter can be taken forward.

==> no discussion on any of the above, as PAR not present ! To decide how to follow-up on this item...

4. Operations :

4.1 Mass production of shielded box for MCM cards -- from 9 Apr & before (CPK/PAR/SN/HSK): RFI test report of Akvira vs Physimech showed Akvira is better and this has been selected.

(i) testing of new MCM card in shielded box, with final configuration : integration of final system was in progress; 37-pin D-type shielded connector has not yet come -- to test with normal connectors in the interim; problem of fan power supply cards was to be resolved -- borrowed fans from older Akvira unit + power supply card from OF system has been used for present; initial tests have been done (with dummy LED loads?) : same level of shielding as seen before, except when digital I/O lines are exercised (?) -- to discuss the results from these; meanwhile, 37 pin and 15 pin D-type connectors have arrived and withdrawn from stores today and are under assembly (6 pin Dtype for power supply have not been delivered by the party) -- tests should have happened by now. To check "loose items" in the above and make firm; to see if a conclusion is available about the shielded box for Rabbit.
==> "loose items" discussed : power for the card to come from existing power supplies (rather than a separate converter); cooling fan & its power supply to be inside the box and to use the design borrowed from OF system; dummy LED load is ok; results after using shielded D-type connector need to be established and then matter can be concluded and handed over to Ops Group.

(ii) How to plan for the mass production? Ops group to report on discussions with Mech group and finalise + collect drawings for 2 types of box : with and without provision for SPI port on chassis + 1 serial port on each box; aim to place final order on Akvira. RFI group to complete 2 more prototype units, and then hand over the matter to Ops group. To check if this moving forward or not.
==> Ops group to start looking at the work required (parts list, jobs to be done, items to be ordered etc) and make a plan.

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

4.2 Development of M&C software -- from 9 Apr & before (JPK/RU/SN/NGK) :

(i) M&C software with TCS -- updates from PoC phase : configuration with master node at CEB connected (via ethernet) to slave node at ABR with PC to PC104 on one eth port, and master node connected to Rabbit in GAB -- tests and demo completed on 16th Apr : need summary of the conclusions + any further steps remaining in PoC work (including SDA related work)
==> still waiting for the evaluation report from TCS and also for the demo of the Spec Driven Approach (SDA); tests were done as per our requirements, including scripting mode.

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

(iii) plans for populating a few (5-6) antennas with Rabbit card (with or without PC) for testing. C3 and C6 have been completed, and moving to S3, W3 + C8, C11 (only PC104 required) for prototype testing : instead of S3 & W3, S2 & S4 have been populated, but S2 was giving some problems -- S2 has two fibres; one has heavy loss (the one used for eth) -- need to find the cause of the problem and fix the same -- this will take in some time; S2 is being replaced by another antenna (same

for C3).

==> C6 has 2 Rabbit cards for sentinel and OF, but tests have been done for 1 and 2 card configuration; E2 installation has some problem; S2, S4 and C3 will be shifted to C10, W1, W2 and W4; so final configuration will have 6 antennas with Rabbit card (to be kept on only during test time), with ethernet connections to a multi-port switch in Rx room, with one connection to the lab.

(iv) M&C software in-house : next round of tests were underway -- need status update and plans for development.

==> 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. will expand to other antennas and test....

(v) follow-up on interface of FE with new M&C system -- Naresh + Charu and Sougata have started work on this; will have full set-up of FE + Common box, but will start with M&C of common box using Rabbit card : initial h'ware connectivity may not be too much work as 32 lines have to be mapped to 16 lines on interface card; low level software for bit pattern setting may be enough to demonstrate basic connectivity; after that, packaging will be the issue. Team had reached the point where able to set bits using the set-up of Rabbit talking to interface card; bit pattern from MCM to interface card coming out as expected; after that, the signal does the desired downstream cards (e.g. band selector card) -- looks like the correct bit pattern is not being set -- needs some further investigation. detailed discussion took place in the lab and some clarity about the work to be done has emerged; need to follow-up on the action items.

==> it was agreed that Tel team would work with Rodrigues and Sougata to run the tests for one or two commands -- to be taken up now after MTAC.

==> Regular follow-up after 2 weeks.

4.3 Mass production of Rabbit MCM cards -- from 26 Mar & before (CPK/SN/NGK) :

(i) status check on how many cards are ready now (70 were done) and plans to speed up delivery, if needed. 71 cards are ready now.

(ii) to finalise plans for how many more MCM cards are needed -- earlier conclusion was that from the technical point of view, there is no real need for any extra cards, and 120 nos are enough to meet all the requirements, including reasonable number of spares; however, since Ops Group had projected more cards in their plan projections, it may be ok to go ahead and procure some more cards? to be discussed and closed.

==> final comment : It was reiterated that, as per present technical understanding, the number of cards available is adequate to meet the requirements (including a reasonable number of spares) and there is no technical bottleneck; however, if the Ops Group would like to order more cards as per the quantity projected originally, the choice is for the group to make. With this, the matter can be closed.

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

Summary and action items are as follows :

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

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

- agreed that it could be capped at 4 A (though present supplies are drawing only 0.7 A -- may indicate leaky caps which should be checked); similarly, OFC + FE supply needs to be checked (0.5 vs 3) and new MCM system (PC + Rabbit) ; did a quick run through the other numbers and came up with a tentative suggestion that 5.1 A can go up to 8 A (and hence 10 A is a safe limit) -- this is 2.3 kVA and hence it means 3 kVA is more than enough; to confirm with individual groups and come back.
- (c) New power consumption estimate to be made & final UPS capacity to be matched to it.
 - (d) Diagrams showing rack utilisation to be rechecked for consistency (including some adjustments for antenna to antenna variations?)
 - (e) Existing servo FPS units can be left where they are; if isolation transformer can be moved out from the rack, then space in that common rack is enough for all growth plans of FE and OF systems; this leaves some empty space in ABR rack bottom that can be utilised for further growth of telemetry system; all new servo growth to be accommodated in the servo racks (or in-situ replacement of existing units); with this, there should not be a crunch for space, but a careful relook in the updated report will help clarify the matter.
 - (f) the new UPS can have the isolation transformer(s) integrated into it, without increasing its footprint (only height may go up); UPS can be located in the space between the ABR and servo racks -- this has been done in one antenna with the new UPS and can be checked for suitability; final configuration of the UPS can be decided once the load calculations have been refined. also, to check space occupancy of new BLDC servo system vis-a-vis old one.
 - (g) extraneous items in the surrounding of the racks (electrical fittings etc) can be relocated, as far as possible, to make it convenient for people visiting for work.
 - (h) report to be updated for relevant items from (a) to (g) above.

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

==> fresh inputs from measurement of in-rush currents : going typically upto 3 to 5 Amps total for ABR; hence, 1 kVA is more than enough for ABR racks; servo side is 2 Amps; taking a max of 10 Amps for switch-on is ok, including servo; hence, 3 kVA should be fine. RVS suggests that instead of 2 isolation transformers, it may be better to have one (for ABR electronics) and one direct connection to servo. RVS to produce a suggested wiring diagram for these connections. Space utilisation : refined diagram is being prepared and it appears that the space constraints are manageable; to have an updated report on this to be circulated. To follow-up and check again after 2 weeks.

5. Back-ends :

5.1 Analog back-end related issues -- from 9 Apr & before (BAK) :

(i) appropriate attenuator settings for Lband & 250-500 done; 610 band was being finalised -- updated table had been circulated; few iterations need to be done and then updated table + report can be circulated by Ganla; now needs to be done to 16 antennas -- measurements had been done and results were to be circulated (cause of change in values being understood) : last release was done on 27 Feb and after that lat 8 antennas are being tested; to see what can be learnt from the 27 feb data and decide follow-up action plan -- to take up for discussion and see if the item can be closed.

==> new attenuation values have been computed (for the new, final GAB units) and given to control room for use now. However, DVL reported that using these settings

does not give equal powers at corr o/p -- this needs to be resolved.

(ii) to check the issues regarding setting of LO in GAB and other related M&C problems (from email exchanges of last 2-3 weeks)

==> latest unresolved issue is one of settings below and above 600 MHz -- online program modified to not send commands to FSW unit for freqs below 600 MHz; plus some extra monitor points added in FSW monitoring; also program in LO-conf has been modified to resolve occasional hanging. To monitor situation for few days to weeks to see if all is resolved or not.

(iii) status of work for having i/p side RF filters : plans with FE group for sharing mass production units; to check status of 8:1 switch : agreed that it is ok with FE group to share the designs, provided BE team is ok with the performance specs; ok to include BE requirements in order of PCBs and components (cost sharing to be worked out accordingly); however, BE group to take care of mass assembly separately, as it will be done with in-house manpower by FE group for their filters. BE group has completed design of 8:1 switch to be used for this. Pending issues & action items:

(a) 4 BPF filter chassis (from FE group) + 2 nos of 8:1 sw chassis + one straight through path -- having difficulty in fitting it one PIU; trying to make one integrated chassis with internal partitions for this; to check status of this.

(b) plans for actual implementation of BPFs (PCBs etc) by FE team for use by BE team to be finalised.

==> full set of 4 BPFs will become available this week and then space constraint can be looked at more closely.

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

5.2 Analog back-end : completion of 30 antenna system -- from 9 Apr & before (BAK):

To check status, plans and timescales for 30 antenna system : 16 antenna system fully completed (from cabling from OF to cabling to corr wall panel); 24 antenna system also released (mid-April 2014); issues and action items :

(i) small gain variations seen in some units -- to check status of these tests.

==> this may not be a major issue... can be closed for now.

(ii) plans for extension from 24 to 30 antenna system to be discussed.

==> all units except for baseband filters are available; may be done by one month.

(iii) 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 -- this needs to be looked into, including RFI testing of 8 port switch.

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

5.3 Power equalisation schemes for new back-ends -- from 9 Apr 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. Need status update.

==> saturation problem is corrected and scheme will be tested now.

(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?

(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; main action items :

(a) to check unit to unit variations of attenuations for a couple of units and if settings are stable -- do the measurements match with spec (within +- 0.25 dB)?

BAK and team have reported some results from lab measurements -- can be discussed, including follow-up of repeatability and variation between 2 units.

(b) to check if 1st draft of document is now ready and available for discussion : first draft document has been circulated by S Roy -- to be taken up for discussion.

(c) follow-up action and time line to be then worked out.

==> for (a) : still to complete the 2 units for 2 to 3 times testing and discuss the result of that for repeatability and stability and also for deviations at high freq; for (b), draft document has been shared and some comments have been given by YG.

==> Regular follow-up after 2 weeks.

5.4 GPU corr (GWB-II) : release of 4 node, 8 input, 200/250/400 MHz version -- from 16 Apr & before (SHR/SSK/BAK) : (NOTE : GWB-I is existing released system !) : agreed to make 4 T7500 nodes with C2050/C2075 Fermi GPUs + remaining 4 T7500 nodes as host machines (to take care that these are the ones that transient pipeline uses presently so that sharing is possible); this should have ALL basic modes : total intensity and full polar IFR modes; IA + PA BFR modes with process_psr pipeline attached; full GUI support; to come up in trial code section without affecting the presently released mode.

(i) running of GWB II from standby online (for in-house testing) -- needs a special interface to get the project code -- SNK is looking into it : SSK to update about status of this -- BAK to check and see if it can be resolved.

==> to be confirmed...

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

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

(b) plans for phasing algorithm and PA beam mode : phasing has been implemented and basic functionality fully tested for all modes -- only GUI related aspects need to be checked and ported over from GSB implementation; PA kernel has been completed and first set of tests have been done; to decide follow-up action on these.

(c) finalisation of GUI to support all aspects of beam mode operations: there may be some issues pending -- phasing and antenna masking (for PA) in GUI still pending, including some small modifications in GPU header.

(d) finalisation of process_psr pipeline for beam modes, including psr_mon etc.: done for total intensity; full stokes still has work to be done (band rotation).
(e) 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.
(f) SOP to be made ready : NSR to be asked to update SOP to include PA mode; also to check the directory structure etc being used by beam mode data acquisition systems. to check the float to int conversion in beam output !
==> PA beam mode with phasing also tested (including in polar mode); process_psr pipeline though working for all modes, is with fixed time and channel values -- more generalised version is yet to come !; some GUI issues remain for beam mode, which have been informed to Nilesh; need to follow-up; header issue discussed with SSK and couple of issues came up related to sub-array and GAC mask that need some thinking to resolve.

(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.

5.5 Final online control for GPU corr -- from 9 Apr & much before (SSK/JPK/NR/DVL) :

(i) status of full GUI compatibility : update on sideband flag support and issue of net_sign[] to be resolved : needed some change in GPU & DAS code. net sign has fixed in one template version; net_sign flipping (i.e. LSB/USB mode of correlator) now working, tested with data; needs to be implemented in all the versions of the code; agreed to not fix this problem in GWB code, but to provide a patch for all LTA files; to fix the code ab initio in GWB-III. To confirm if the patch has been released by SSK; found to be OK; DVL has also checked & confirmed -- matter can be closed?
==> short-term solution confirmed ok; long-term to be taken up.

(ii) follow-up on long-term items like provision for control of FPGA and other peripherals (like sig generator) for different modes -- details of existing provisions to be discussed and plans for final configuration to be finalised; this should NOT be an issue in the new release? may need some testing on antenna signals : agreed to identify one PC for control of all the peripherals related to GWB; this m/c can / is interfaced to online via a socket and GUI can send commands via this -- already done for loading of FPGA files, needs to be extended for other applications.
==> item not discussed due to shortage of time.

5.6 SFP testing of final unit -- from 9 Apr and before (KDB/BAK) : SFP+ side working fine for both Cu and Opt; XAUI CX4 side is still flaky -- may still be marginal in timing. Update required from new tests after fresh inputs from vendor. Follow-up with MTE for PCB details and then with Vitesse -- not making progress; on SFP side everything is working; on CX4 side, 1 m is fine; 2 & 3 m work for some kinds of cables. To decide whether to pursue further or close the matter as it stands with a clear summary of what works and what does not? agreed that this can be closed and that we can live with 1 m length restriction from Roach board to converter box; to check with MTE about exchange of materials and information to close the matter formally; YG has written to Rakesh Mehta and he has agreed for a formal call and discussion to close the matter.
==> item not discussed due to shortage of time, but action is pending on MTE for a final visit to swap hardware items and close the matter.

5.7 Testing leakage, coupling and correlated noise in new back-end chain -- from 2 Apr (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.
==> no new updates.

5.8 Power and cooling requirements for projected back-end systems -- from 9 Apr and earlier (GSJ/BAK/RVS/YG) : some modifications have been made and some tests have been done and preliminary results circled -- 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 installed on 9 machines but not on nodes17-32; this is because the kernel used is slightly different; to check if other kernel is also available on these nodes and if so, then boot one node with this and test regular GSB code;

(ii) plans for further testing : to add temp monitoring package on all GWB nodes. kernel was installed on some nodes -- to be discussed and follow-up action to be decided.

==> quick discussion : two different matters were there -- 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); to follow-up later on with controlled tests to check the problem and identify the root cause.

5.9 Next-gen time & frequency standards -- from 2 Apr & 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.

==> item not discussed due to shortage of time.

(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.

==> item not discussed due to shortage of time.

=====

???

MoM for weekly Plan meet of 30 Apr 2014 (follow-up of some pending topics from different areas) :

1. Documentation related :

1.1 Follow-up on level 3 (NTR) -- pending for long : from 16 Apr & long before (SSK): to check status of report on design of OF system -- SSK to try and couple this with work on paper for MWSky. Needs urgent update -- was to be ready by 24 Mar! first version has been sent by SSK, but it is a 10 page report ! YG and SSK to discuss on how to reduce the length to fit MWSky requirements and what should be planned for a bigger paper.

==> YG and SSK to discuss and also talk about query from ASTRON re RF over fibre. To follow-up next week.

1.2 Detailed design doc -- pending for long : from 2 Apr & before (SSK/BAK) : follow-up on subsystems to be converted :

(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 is long overdue -- was agreed to be circulated last week.

(ii) OF Tx to be started.

==> Lokhande on leave this week but will be back next week and can try to send the draft out by mid or end of next week. Regular follow-up after 2 weeks.

2. FE & OF related :

2.1 Update on results from test range -- pending from 16 Apr & before (HRB/GSS/SSK) :

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

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.

==> no updates on this.

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

a file etc. Some results were reported in meeting of 19th Mar:

Comparison of measurements (deflections) for 250-500 MHz system with expected values :

327 MHz measured = 12.8 dB; expected = 12.4 dB [A_eff from legacy Kildal feed]

400 12.8 12.2

450 12.4 11.4

500 11.2 11.

[some re-work needed for lower frequencies]

Computed results (based on change in efficiency due to shift of phase centre)

shows likely drop in sensitivity by about 1.4 dB from 250 to 500 -- this can now be folded into the net sensitivity / deflection curves made by GP : GSS has sent a table at 5 MHz steps to GP, who is working on it. GSS is working on plans to extend this to 550-900 system.

==> GP is working on it; needs to use the correct efficiency factor in the calculations; GSS is working on extension to 550-900.

Meanwhile, comparison of computed results with measurements for good antennas (other than C6) with default height of 1280 and for C6 (with reduced height of 1080) show that computed values are actually better at high freq end for 1080 ht, which is different from the observations which are showing droop at high frq for 1080 (in conflict with first results reported in 2.1 above !) Agreed that GSS should continue with computed curves for different heights (with maybe 10 pts across the band) and compare to see where the max response is and how it falls off with ht and freq.

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

(a) protection circuit for encoder and improved corrosion protection to be decided: Inteltek will get back on mechanical issues (such as proper alignment of shaft etc) and lightning protection (could also check with our servo team); grounding issues may also need to be checked; water proofing may be needed -- to discuss with HSK also. better grounding/isolation and proper alignment : to outline final plan of action.

Waiting for Inteltek to respond about mechanical alignment and lightning protection; to follow-up about grounding and water proofing.

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

Action items : (b.i) compare simulation vs measurement at 610 -- HRB has circulated initial results and some comments had been given on the same; (b.ii) to repeat with more frequency steps and then noise source instead of CW signal

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

Some results were reported last week -- to discuss and decide further plan of action.

==> for (a) no response from Inteltek as yet; meanwhile Bagde and Ajee will take some steps for adding transobs etc; for (b) some CW tests with 50 MHz step have been tried.

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

2.2 RF dump tests for new feeds -- from 16 Apr & before (HRB/GSS/SSK/PAR/NK)

(i) new data and results for 130-260, 250-500, 550-900 (HRB/SSK/NK) : (a) follow-up on discussion of current results : understanding of bad antennas for 250-500 band : for C4, dipole checked in the lab and found to be fine -- hence, real cause of the problem is not understood!; to check if monthly overlay plots now available with off-source and on-off plots for comparison (ANR to remind Ankur). March data to be sent; new data from April onwards will have integration to reduce fluctuations.

(b) follow-up from analysis done by NK and plans for interferometric tests at 130-260 -- new tests being done this week, as previous ones suffered due to scintillations. Next round also suffered from scintillations; to check plans for further tests.

==> for (a) new monthly plots (April onwards) will include on-off in addition to on and off and appropriate quick summary of the performance (b) YG to follow-up with NK about extracting some results from the data.

(ii) scheme for (re)calculation of expected values across the broad bands to be finalised (and added to measured curves) -- (SSK/GP/HRB) : curves now being done with constant QH value and with variation of T_{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 is not quite matching : due an offset in freq or setting issue in the test equipment? this is not yet resolved; follow-up action to be discussed (including possibility to try it for Lband); also to add the efficiency factor in the code, as discussed in item 2.1 above.

==> FE team claims that cause of problem has been understood; but SP and HRB need to sit together to resolve and produce the final plots which show that the matter is resolved. work on adding the efficiency factor is ongoing.

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

2.3 Follow-up on 550-900 MHz band filters -- from 16 Apr & before (ANR/SSK) :

(i) comparison of product obtained from ICON with in-house effort and finalisation of plans : technical comparison of individual filter responses shows in-house design to be slightly better; but need to complete integrated unit for insertion loss etc before taking a final decision, including plans for mass production. Tests with integrated unit using new PCB show insertaion loss increases to 3 dB now and some change in slope on higher side; to complete chassis and full integration and then repeat the tests and make detailed comparison with ICON results. Some results have been circulated : detailed comparison shows that 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; PCB fabrication for this being explored with 2 parties (Argus & Shogini); meanwhile, some realistic cost estimate for in-house production vs ICON design have been done (it appears that getting things done with ICON will be much more expensive) -- to refine this process and reach a conclusion for mass production. Sample PCBs from Argus and Shogini have come -- first test results (without chassis) show ~ 5 MHz shift in 2 sub-bands but better roll-off : to put in the chassis and then confirm the results; to discuss detailed comparison of final in-house product (from Argus and Shogini) and ICON product and decide the course of action.

==> final plots show same IL but the higher sub-bands have 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. Regular follow-up after 2 weeks.

2.4 Total power detector for FE & common boxes -- from 16 Apr & 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) sample data from 2 units installed on E2 shows basic things are working ok: more sophisticated tests with on and off source tracking to be done (alongwith digital backend recording, if possible) -- first round of testing showed 11 dB deflection (for 12.4 dB expected), flat-top on-source waveform to be understood; new tests with noise on-off to be reported upon (also if weaker source like Crab has been tried); to try and get some fresh data and see if E2 can be used for night time tests. also to check what is the rms of noise vs least count of adc.

(ii) for FE version test on C4 : there was report of random fluctuations, not correlated between the 2 poln channels (noise or something else?); need update on status of this work. problem persists; not clear if it is due to malfunctioning of detector or if it is due to wrong identification of monitoring channel. To get latest status update on this.

==> C4 FE output not ok yet; meanwhile looking at C13 FE output -- one channel appears to be working fine and data is available but only from one test run showing some problems in the form of dips to repeat and check if the problem is real or not and then decide the course of action; to check if C13 Common box monitors are working or not; and if both can be recorded simultaneously.

(ii) plans for building 70 units for CB : all PCBs and chassis are now in hand; need to decide plan and schedule for mass production and installation on upgraded antennas; agreed to work out an algorithm such that new units are made ready to match the typical / expected consumption rate of going into boxes; assembly of new units gave some problems : old vs new flux (resolved) + unexpected change in detector voltage upon connecting input connector -- need to check the new PCBs carefully, against the older versions; problem due to grounding identified; PCB to be redone; also it seems that there is no RC filter at output of detector ! to be checked and added and put in new PCB.

==> this matter not resolved; to check with vendor explicitly if there is an intrinsic time constant; to set-up in the lab to check basic functioning.

(iii) plans for prototype of the FE monitoring unit : 2 units had been assembled and found to give identical performance as per specs; problem of feed-thru vs connector was resolved in favour of feed-thru (as per original chassis design); all testing completed in the lab; was put up on C4 in original 250-500 FE box, is showing some funny problem where power levels are not stable with time -- random fluctuations, not correlated between the two poln channels. Also, new units being assembled (for batch of 20) are showing unexpected change in detector voltage upon connecting input cable etc. -- to check against one unit from the older set of 4 units that were made.

==> not discussed.

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

==> deferred for now.

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

2.5 Spares for L-band feeds -- from 16 Apr & before (SSK/ANR) : we have 32 feeds, 2 not working (1 dismantled for making drawings of new feed); all were device failures; now some LNAs have been successfully assembled by Gopi and C3,W1,E2 & E5 have been fitted with these and found working ok.

(i) Spares : Agreed to have 5 LNAs ready and available as spares : 10 nos of LNAs had been assembled, tuned and made ready (done); new order for amplifier device needed to make sure enough spares available. not confirmed if device has been ordered -- ANR to check and confirm.

==> not ordered yet; Gopi to do that shortly.

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

==> no update as of now (can be put at low priority).

(iii) RFCM-type card status (3 nos of old RFCM cards are ready) : status of new RFCM card -- all tests cleared and 10 nos of this PCB obtained for current LBand spares, and 1-2 were being assembled for quick testing and components were being procured for the others : 1 card out of 10 fully assembled and tested and working fine; to ensure components for remaining are procured and they are made ready (gradually). All components are available and remaining 9 cards will be assembled; to check the status after 4 weeks (i.e. mid-May).

==> no specific updates.

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

==> integrated with W1 feed and item can be closed.

(v) timescale for integration : all components (including LNAs) for assembly of 3 feeds now ready : check plans for integration of one unit, maybe using the presently dis-assembled feed (problem of Al strips had been sorted out) : one spare feed is fully wired and ready; some gain difference between two channels were being investigated.

==> problem sorted out and feed is now installed on W1 and working fine...

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

30 antennas have working Lband feeds; 31st is being assembled back after being dismantled for making drawing; 32nd is there in Pune wshop and can be shifted back; 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. Following issues need to be resolved:

(a) Weight of 3 latest feeds is 18 kg more than earlier feeds -- to check which change in design aspect has caused this increase and whether it can be rolled back.

(b) shortfall in electronics for these to be checked and addressed.

==> for (a) to check what is the exact increase in the weight, and due to what causes and what should be done about it for (b) SSK confirms that all the electronics needed for 4 antennas is right now available and no further purchase is required.

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

2.6 Characterisation of new FE+OF systems -- from 16 Apr (PAR/SSK/SN) :

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

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

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

updates to the above 2 items are long awaited !

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

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

Sanjit Rai has sent some recent results, need to be discussed.

==> FE team has started to modify program for on-off plots and has one data set; will collect for some more dates and circulate.

(ii) Summary of 250-500 band performance :

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

==> plans as discussed earlier.

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

completed for Lband, 250-500, existing 610, only 130-260 / existing 150 -- to discuss once if values given to control room are optimal (e.g. 7,7 for Lband sub-bands) : from tests done by YG and DVL, this appears to be sub-optimal and need to be discussed; FE team to test the power levels at OF o/p and cross-check against SFA values; also, at 1390 the problem appears to be somewhat less and may be related to having extra 10 dB gain stage; FE team to confirm which antennas have this modification. VBB does not have a record of which antennas have the 1390 modification! Resolved the matter into 2 action items : (i) for FE/OF team to give measured values of power level in comparison with SFA and (ii) YG to follow-up with SSK about the notebook !

==> no updates on these matters...

2.7 Releasing existing 610 MHz system as part of the wideband upgrade -- from 16 Apr (SSK/ANR) : Preliminary tests of existing 610 feed through the wideband path show that ~ 100 MHz usable bandwidth may be possible as part of phase-I uGMRT. Agreed that only RF filter needs to be changed to new 550-900 BPF (alongwith mobile band and TV notch filters) -- two sample units had been made ready and were put in FE ch1 of C8 & C12; initial RF deflection tests look encouraging : extra 10 MHz on lower side and 20 MHz on upper side, leading to a total BW of ~ 120 MHz (~ 565 to ~ 690 MHz) + some lower level response (5 dB down) upto 780 MHz; action items : (i) to carry out 2nd round of interferometric tests to characterise the performance; YG & DVL to report on this. 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.

==> will draw conclusions from existing data set and take one more this week.

(ii) to check progress on completing of 5 more antennas that can be done with present hardware, following the path of the 250-500 upgraded antennas : all items in hand, except for BPF chassis (which should have come by now) -- chassis (20 nos, outsourced) had not yet come -- to check urgently.

==> confirmed that 10 nos of PCBs and 20 nos of chassis are in hand.

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

(a) we have 100 PCBs that can work for either 175, 540 or satellite filter; of these 12 nos are wired up for 540 filter; 2 nos used for satellite filter; will need a total of at least 120 nos of 540 filter for all GMRT (60 each for 2 bands); to order components for 120 nos of 540 filter; 80 nos of chassis are available; remaining 20-40 nos to be made (likely to be outsourced; to check about the 3 month old indent for inductors. 100 nos chassis ordered for 610 as well as 250-500 (with workshop);

(b) for mobile filter, 60 nos + 10% spare are needed; to add quantity to chassis

request. To see if PCBs for 10 antennas can be ordered for this, given available substrate material (which is also needed for other PCBs). remaining PCBs can be done later on; more epsilon10 substrate material needs to be ordered; 2 boards have been ordered (with 850 MHz lower cut-off); to check present status of this.

Confirmed that 4 nos of 540 notch filter is ready; 8 nos of mobile notch filter is ready; 10 nos of BPF are ready (if chassis is there); spare FE box is also there; to try to target one antenna in next 3 weeks; meanwhile to continue with 540 notch filter assembly. Status update needed on this.

==> to target this activity after 250-500 notch filter installations are completed in pending 4 antennas.

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

2.8 Status of new CSIRO feeds : from 16 Apr & 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.

==> no updates -- need inputs from HSK.

2.9 Calibration scheme with radiator at apex of antenna -- from 16 Apr & before (SSK/PAR/SRoy/DO/YG): to follow-up on detailed discussion meeting in August : to schedule follow-up action appropriately, breaking the issue into smaller, more tractable items :

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

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

(b) to repeat on another antenna with new electronics (C6) and one with old : W1 has been identified, but tests were pending due to completion of RF cable and antenna mounting related arrangements.

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

(d) to get the plots done for the variation with antenna position (elevation etc) and then work on interpretation.

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

From 2 Apr meeting : PAR to produce a short summary of the current results; for

(b) W1 has been identified as antenna with new FE and CB electronics, will be compared against C4 result with new electronics -- need to worry about notch filters etc?; need to check W1 for mechanical arrangements (help of HSK if needed); once results with existing transmitting antenna are tested at 325 band; for (d) to put these numbers in the short summary; (e) SRoy can start thinking about it.

short summary was to be ready by now ! to check if W1 mechanical work is done; 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.

To discuss latest status and plans for follow-up.

==> interim short report not ready yet, may happen by the end of week; mechanical work at W1 has not yet been done; to check if we can pick up another antenna like C6 -- PAR to check and report back. SRoy to check about the best way to do the expt where the change in power of the beam can be quantified and how to plan the experiment.

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

==> no update on this.

(iii) other longer ranging goals :

(a) procurement of new broadband antenna : suitable unit (from Aronia) has been identified and ordered : 2 nos have been received (with slightly different freq coverage) -- looks like will work from 100 MHz to few GHz (hence OK for our use).

(b) testing with broadband noise source : feasibility of connecting noise source and radiating has been checked by PAR -- test can be done with set-up at W1, which should have been ready by now; to check the status.

==> waiting for set-up at W1 to be ready.

==> Regular follow-up after 2 weeks.

2.10 Walsh switching arrangement in FE -- from 16 Apr & before (SSK/SCC/PAR) : Some tests have been done on the bench by FE group; first draft of report has been circulated.

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

==> tried 4 antenna test including C13 but could not get a definitive answer; will try again, including checking the Walsh bits at antenna base. Regular follow-up after 2 weeks.

2.11 FE power supplies at all antennas -- from 26 Mar & 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.

==> no progress, item kept at low priority.

(ii) 3 nos of the new supplies that were ordered were diverted to OF system at Rx room -- repeat order was placed for 10 more supplies; total will become 12 nos which will be used as common spares for various needs, including lab use -- status update required on delivery.

==> units have arrived, item can be closed.

(iii) 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.

==> same status, waiting for the space allocation plan to be finalised.

==> Follow-up on pending items after 4 weeks.

3. RFI related matters :

3.1 RFI testing of Miltech PC + peripherals for antenna base -- from 16 Apr and earlier (PAR/SSK/SN):

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

first round of tests have been done ; need first draft version of report on testing of integrated system to be circulated by RFI team. Meanwhile, partial consignment of the much-awaited connectors has come and 2 units being integrated? to status, including draft report.

entire set-up (for one Miltec PC + one shielded Rabbit card + one shielded eth switch) with shielded connectors and shielded CAT5 cable is ready -- waiting for new Miltech PC to be made available.

==> tests have been done with the new Miltech PC in place; two sets of preliminary results are seen : Miltech PC alone shows better performance than earlier version (although all the extra screws not put by vendor!); also, the combined unit with Rabbit + switch + PC + media converter (with shielding fabric) + shielded CAT5 cable + shielded + filtered connectors on Rabbit box shows very good performance. RFI team to make final report and summary of items and information for Ops Group to take over from here. Regular follow-up after 2 weeks.

3.2 RFI tests of ethernet switches for antenna base -- from 16 Apr & earlier (SN/BAK/SSK): Testing the available switches for RFI (as per 29 May discussion); plans for design of RFI box for ethernet switches :

(i) procurement & testing of switches : sample units from Cisco, HP, Dlink and DELL had come and have been tested for RFI -- conclusion from final report is that D-link is much better than others (but it is 2x more expensive than next best option of CISCO by 20K); also, use of shielded CAT5 cable provides significant improvement; agreed to wait till RFI enclosure is ready and do full test with CAT5 for both D-link and CISCO and take a final decision; meanwhile BE group can borrow the units for testing in GAB system. first version of RFI enclosure has been received on 10th Mar, and is under integration in the lab; 2 nos RFI enclosures completed with mouting of filtered and shielded adapters, eth cables, AC pwr line filter, shielding for fan etc; all the 4 available switches tested one by one in these enclosures (on 20-21 March) and draft report was discussed : first results look very good; isolation is about 70 to 35 dB from 100 to 1400 MHz; further, improvement is seen with switch + shielded CAT5 only (without box) and this is best for CISCO -- this could be the final option for all use at GMRT? To be confirmed after the final report is out.

As per PAR, same switch that works well for both situations is the D-link and that CISCO will not work well for just CTA5 shielding -- this point needs to be resolved with PAR.

==> item to be discussed separately with PAR to resolve.

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

can wait for final report and also final integrated test of switch + PC + Rabbit card + media converter ++

==> pending for final report from tests (see above) before moving forward.

==> Regular follow-up after 2 weeks on revised set of agenda items for 3.1 and 3.2

3.3 Follow-up on UPS RFI -- from 16 Apr & earlier (SSK/PAR/RVS) :

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

(a) tests of 3 nos repaired 1 kVA units from Miltech showed significant RFI -- updated report comparing original Miltech 1 kVA test reports (with same load conditions) have been circulated; Miltech has offered to fix the problem with these units and electrical group had sent these back (transfer of order from servo to electrical?) -- need to check status of delivery of these units back to GMRT. Miltech is not delivering these and we are on the verge of cancelling this order; to confirm the final status.

(b) Miltech has offered improved version for 3 kVA unit -- order has been placed for the same and unit is expected by early-mid Feb : Miltech will deliver along with improved 1 kVA units -- was expected by 25 Mar, but did not happen and there is no clear update from Miltech about delivery. Need status update on this from RVS. Miltech is not giving a firm and reliable answer about date of delivery; to discuss and see if this order should also be cancelled.

==> need updates from RVS.

(ii) UPS units from Ador : 2 nos of 3 kVA was purchased, tested for RFI & cleared; units are in use in C9 and C10. RFI team has added comparative statements at the end of the 2nd report quantifying the repeatability; bigger units : agreed to order 2 nos of 4.5 kVA units with Ador, with option of 2 single phase o/p with different isolation transformers (3 + 1.5 kVA); units were delivered and RFI tests have been done -- appears that this is not as good as 3 kVA units (!) -- where is the report? follow-up ongoing with Ador including possible site visit by their engineer to look into rectification of the problem; meanwhile, is it useful to explore 3 kVA with split o/p isolation transformers?

confirmed that 4.5 kVA did fail the RFI test -- lots of discrete lines; visit by the vendor and efforts to improve did not help; Ador has taken the unit back for modifications -- should have come back by now?

can we go back to 3 kVA with split output ? this needs to be discussed and actions finalised.

==> need updates from RVS.

3.4 Discussion relating to Industrial RFI survey -- from 16 Apr & before (PAR/SSK) :

revised docs (from 2009 and 2012 discussions) had been circulated by RFI group and were discussed in 5 June meeting (is the document too exhaustive?) : follow-up action identified :

(i) a form had been prepared for use in the survey and had been discussed in detail and agreed that it is suitable for use; need to finalise plans for entering existing data into this form : one possible candidate (trainee) had been identified and work was ongoing -- 30% was completed; to check latest status.

==> work has resumed.

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

date is deferred to 1st week of May due to elections; to check status of this and of hiring of manpower.

==> start date further pushed till end of elections; to aim to complete in 2 weeks,

but may stretch longer. one person has been identified and paperwork is getting done.

==> Regular follow-up after 2 weeks.

4. Operations :

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

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

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

==> for enclosure : tests appear to be concluding satisfactorily; RFI team will start handing over the information and material to Ops Group; for the switch itself one round of discussion between PAR and YG and then a final call on the matter.

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

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

to work out the max data rate on this switch network (for looking into the communication failure problem); other possible reasons (including socket error checking) discussed, changing to star connectivity from daisy chaining -- matter under investigation; to try the new 24-port switch (maybe CISCO unit) after MTAC. Switch testing by BE group can start after MTAC as per earlier agreement; other items may need a more detailed discussion -- to be done this week.

==> RFI team to be asked to refresh about relative RFI performance of 8 port and 24 port switch; BE team to take CISCO unit and give it a try as replacement of one 8 port switch and think about replacement of 3 switches. To check status after 2 weeks.

4.2 New, improved Miltech PC -- from 16 Apr and much earlier (CPK/SN/PAR) :

2 units of Miltech PC with two changes (more screws on panels + panel mount pwrline filters instead of chassis mount) under order by Ops Group : 2 PCs have come and are being made ready; one unit to be given to RFI team for testing; 2nd unit may get used in the test set-up; one earlier i3 unit had failed -- needs to be checked by Sumit; new PCs are still being made ready and i3 also not yet looked at by Sumit -- need status update on these.

==> basic software installation and testing of different aspects is ongoing with one unit and second unit has been given to RFI team for testing (as reported above). Follow-up after 2 weeks.

5. Back-ends :

5.1 Documentations :

(i) Detailed design doc -- pending for long : from 16 Apr & before (BAK) : analog back-end was being done by Hande; 2nd version had been circulated and it needed some additions -- introduction to LO PIU section by NDS -- to complete thd document to PIU level; next level of document will go down to chassis level and will take till mid-May; to check current status.

==> updated document to be produced soon; later version to PIUs to be done later.

(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 -- need to discuss contents and see what refinement is needed for second version.

==> no significant comments received yet; authors have a couple of things to add -- can be done while waiting for inputs.

==> Regular follow-up after 2 weeks.

5.2 : Power supply for GAB : from 16 Apr 14 meeting (NDS/BAK) : Two options are possible : linear vs SMPS. Agreed to produce comparison note with all pros & cons. Meanwhle, a few SMPS units can be bought, as the cost is very small.

==> not yet ready; can check again after 2 weeks.

5.3 GPU corr (GWB-II) : release of 4 node, 8 input, 200/250/400 MHz version -- from 16 Apr & before (SHR/SSK/BAK) : (NOTE : GWB-I is existing released system !) : agreed to make 4 T7500 nodes with C2050/C2075 Fermi GPUs + remaining 4 T7500 nodes as host machines (to take care that these are the ones that transient pipeline uses presently so that sharing is possible); this should have ALL basic modes : total intensity and full polar IFR modes; IA + PA BFR modes with process_psr pipeline attached; full GUI support; to come up in trial code section without affecting the presently released mode.

(i) running of GWB II from standby online (for in-house testing) -- needs a special interface to get the project code -- SNK is looking into it : SSK to update about status of this -- BAK to check and see if it can be resolved. Can this be closed??

==> this is solved and can be removed.

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

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

(b) plans for phasing algorithm and PA beam mode : phasing has been implemented and basic functionality fully tested for all modes -- only GUI related aspects need to be checked and ported over from GSB implementation; PA kernel has been completed and first set of tests have been done; to decide follow-up action on these.

(c) finalisation of GUI to support all aspects of beam mode operations: there may be some issues pending -- phasing and antenna masking (for PA) in GUI still pending, including some small modifications in GPU header; need status update on this.

(d) finalisation of process_psr pipeline for beam modes, including psr_mon etc.: done for total intensity; for full stokes a limited edition version has been released for fixed # of channels and integration time -- general purpose version is pending; to check status of integration of psr_mon.

(e) to check the float to int conversion in beam output ? SSK/SHR to comment on this.

(f) 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.

(g) SOP to be made ready : NSR to be asked to update SOP to include PA mode; also to check the directory structure etc being used by beam mode data acquisition systems.

==> GUI changes for beam mode support have been made by Nilesh but need to be tested and cleared by SHR; GUI changes for flexible phasing to be checked with NSR; availability of psr_mon on nodes 53 and 54 for recorded data is there; for shm attach

needs some work; float to int conversion logic has been implemented for scaling but needs a cross-check.

(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....

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

5.4 GPU corr (GWB-III) : next gen system -- from 16 Apr & 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); pending action items :

(a) looking at XGPU code (with Pradeep & Vinay of nvidia) -- GMRT corr code is now running on their machine (using K40) -- to update on latest status of discussions and interactions with Vinay.

==> follow-up with nvidia due this Friday.

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

==> no updates; old estimates are for C2050, ratio may change on K20.

(iii) to start testing 400 MHz BW mode -- how best to conduct these tests? all changes in the main code to handle 4 bits etc have been done (but not put in GWB-II) and now need to be incorporated in GWB-III and tested; need a discussion on this -- agreed to defer for some time. Are we ready for this now?

==> almost ready to go...

(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 -- to try and finalise after one more round of discussions including RVS (also, new vendor Jyoti Tech); meanwhile, agreed to get 2 nos of cyber racks on urgent basis : 2 nos of cyber racks ordered with President -- to check delivery status; for the "cool" racks, not much response from President; some response from Jyoti Tech; need to follow-up and decide course of action; meanwhile, 3 nos of half-height racks were getting ready -- two nos are populated with the 4 new nodes each, the other will have 8 Roach boards; clk and input cabling to be finalised; to check current status of various items.

==> dialogue ongoing with President but no firm date of delivery -- to check with purchase dept about follow-up; meanwhile, to initiate dialogue with Jyoti Tech for 2 similar racks. 3 half-height racks are almost ready, except for some wiring; host nodes to be kept separately.

(v) 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. Status?
==> order has gone; nominal delivery time ?

(vi) new purchase of Roach boards etc : follow-up on status of order -- expected date of delivery was given as June ! GJS had followed-up with Mo Ohady about this with a request for fast delivery -- status?

==> appears that our boards are going to be tested soon by Mo, so shipment should happen soon; to follow-up and see if a firm date can be got.

(vii) 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. Needs update urgently !

==> still in discussion stage, need to speed up.

==> Regular follow-up after 2 weeks.

5.5 Walsh modulation : prototype set-up on Roach board -- from 16 Apr (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;

(ii) to optimise the hunting algorithm;

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

==> set-up almost ready; 10 MHz clk from ref is connected; no progress on the other items. Regular follow-up after 2 weeks.

5.6 RFI filtering -- from 16 Apr (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 outpus; 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.

==> no updates at present. Regular follow-up after 2 weeks.

6. Other items :

6.1 New python assembly design -- from 16 Apr (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 : could try to do in next few weeks, just after MTAC? still pending to identify an antenna with FE group ?

==> no updates on this !

(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. Need status update.

==> email update from HSK : waiting for order to be placed.

Regular follow-up after 2 weeks.

6.2 Coexistence of 50-90 MHz RRI feed with 250-500 CDF on same face of turret -- from 16 Apr and before (HSK) : Mech group to check for possible solutions and report back, after looking at the drawings (awaited from RRI). Update from mech group about reverse engineering for making the drawings -- mech group has circulated a brief note : discussion showed that it is not compatible with 250-500 CDF (either cone has to be truncated or its height has to be raised by 30 cm to avoid conflict) -- may work with 550-900 CDF; mech group to try a solution for co-existence with Lband feed; dipoles removed from 2 antennas have been collected (slightly damaged, but can be repaired); will shift reflector to Pune workshop for testing with Lband feed there -- to update status of this.

==> email update from HSK : possible solution has been worked; sample arrangement to be shifted to GMRT next week; needs a more detailed discussion alongwith FE team about possibilities for installation and follow-up tests, and also possible simulation to check the effects ? Regular follow-up after 2 weeks.

6.3 Problem of access to FE boxes with 500-1000 CDF feed -- from 16 Apr & 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 -- follow-up to be discussed.

==> email update from HSK : status quo, waiting for a decision to be taken; agreed to bring up the matter in SMEC for a wider discussion. Regular follow-up after 2 weeks.

6.4 Fabrication of 6 spare L-band feeds -- from 16 Apr & 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; new set of 3 units from Akvira have arrived?

==> email update from HSK : 3 sets have been delivered at GMRT; fabrication of 3 enclosures is under process. Regular follow-up after 2 weeks.

6.5 Design of RFI enclosure -- from 16 Apr & before (HSK/PAR) : (see item 3.2) inputs for front panel design given to R. Lolap for completion of drawing; prototype was to be fabricated in w'shop, but is now outsourced (?) -- getting ready for placing order (somewhat excessive cost due to all-machining design -- ok for prototype unit, but different solution can be looked at for mass production) -- to expedite the delivery as much as possible : order has been placed; delivery of 2 nos delivered to NCRA Stores on 3rd Mar -- delivered at GMRT now; waiting for test results before deciding follow-up action...

==> email update from HSK : no new developments; holding status quo. To check status again after 2 weeks.

6.6 Effect of increase in size and weight of FE boxes -- from 16 Apr & before (HSK/SSK) : Mech team to circulate existing drawing of turret to see how a longer FE box can be accommodated; and to do a first calculation about impact of weight increase which can be 50% for each FE box : capacity at turret; static & dynamic loading capacity of feed gearbox etc. Calculations have been done and conclusion is that extra moment etc are within design limit of gear box; first draft report has now been circulated -- to be taken up for discussion.

associated item : analysis by HSK about wt reducing measures; feels 10-12% reduction is possible by going to rail chassis instead of milled chassis. FE team will produce the final list of the chassis.

report has been circulated; conclusion is that expected increase in weight of FE boxes will have negligible effect on quadripod and drive system; to check once and see if matter can be closed.

==> email update from HSK : feels that the matter can be closed.

6.7 Improved software for work requests -- from 16 Apr 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.

==> email update from HSK : work not started yet; needs a discussion with Joardar. Regular follow-up after 2 weeks.

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