The 32T

The Approach to 32T

- A necessary development phase in getting to the 512T
- An engineering test-bed
  - Check out the hardware & firmware (+ software) performance
  - Iron out the interfaces and system integration aspects
  - Get field experience
  - Learn more about the operating environment, sky, ionosphere, ...
  - An opportunity for things we did not think about to crop up
  - Hone our deployment skills and procedures
- We have a tight schedule for the MWA $\Rightarrow$ the 32T must follow a tight schedule as well
  - Forces one to focus on the key functionality (avoids feature creep)
- The implementation plan follows a phased approach
  - Expected hardware availability schedule
  - Expected infra-structure availability schedule
  - Maximise the learning/returns from the effort
  - Common sense

Some Guiding Principles

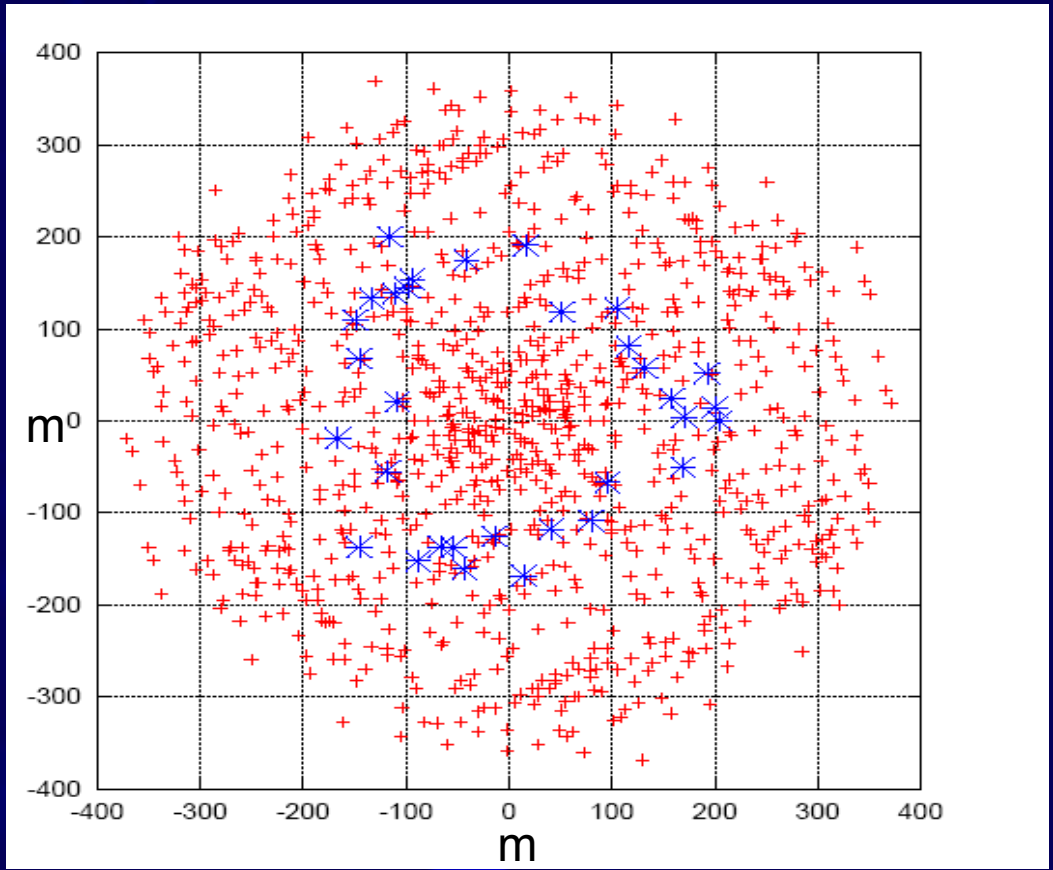
- Maximise environmental exposure to hardware
- Test, debug and verify all interfaces in lab prior to field installation
- Exercise the system enough to learn from it and for strains and cracks to show up
- Identify key questions and conduct focused observing campaigns
- Learn in time to feed into the MWA development process

32T Specs

- 32 tiles, 4 nodes
- Collecting area ~550 m^2 (~1 VLA dish, 6.25% of full array)
- Bandwidth – 32 MHz
- Δt = 62.5 ms
- $\Delta \nu$ = 80 kHz
- longest baseline ~350 m (~15’ @ 200 MHz)
- 496 physical baselines (0.4% of full array)
- Max data rate ~12.7 Mvis/s (UVFITS ~100 MBytes/s)
- Power consumption ~10 kW (includes HVAC in Control Facility)

32T Configuration

- Randomised Reuleaux triangle
  - Well sampled, reasonably uniform uv coverage
- Tile spacings along the arm vary in a log manner
- Longest baseline ~350m
- Distance between vertices 200m
- Optimisation in progress



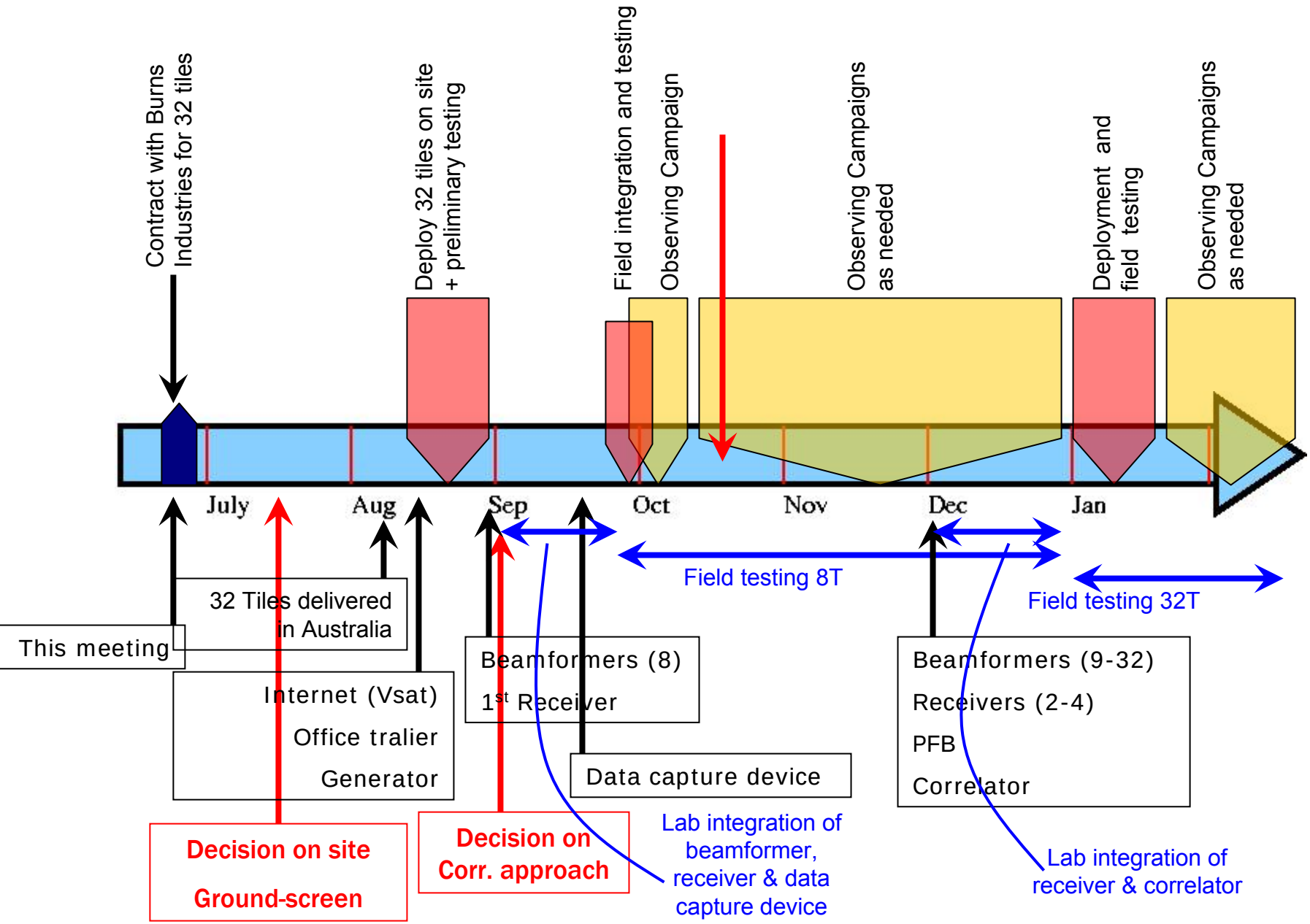
32T expectations

- All 32 tiles to be deployed in one go
- Estimate of effort involved ~25 days for one 2 person crew (survey + ground preparation + deployment + preliminary testing + 20% contingency)
  - Assumptions – No trenching, minimal ground preparation
- 8T
  - 1st receiver on bench, reduced functionality
  - A data capture device and offline correlation, limited bandwidth
- 32T
  - 4 receivers, subsequent receivers closer approximations to the final design in functionality and packaging
  - On site hardware correlator
- Connect beam-formers to receiver by coax running on the ground
- Receivers and Correlator sit next to each other in a trailer
- Upgrades to firmware functionality over time
- 32T expected to functional well into the 512T regime, as an engineering test bed and eventually as a high time resolution instrument

Infrastructure requirements

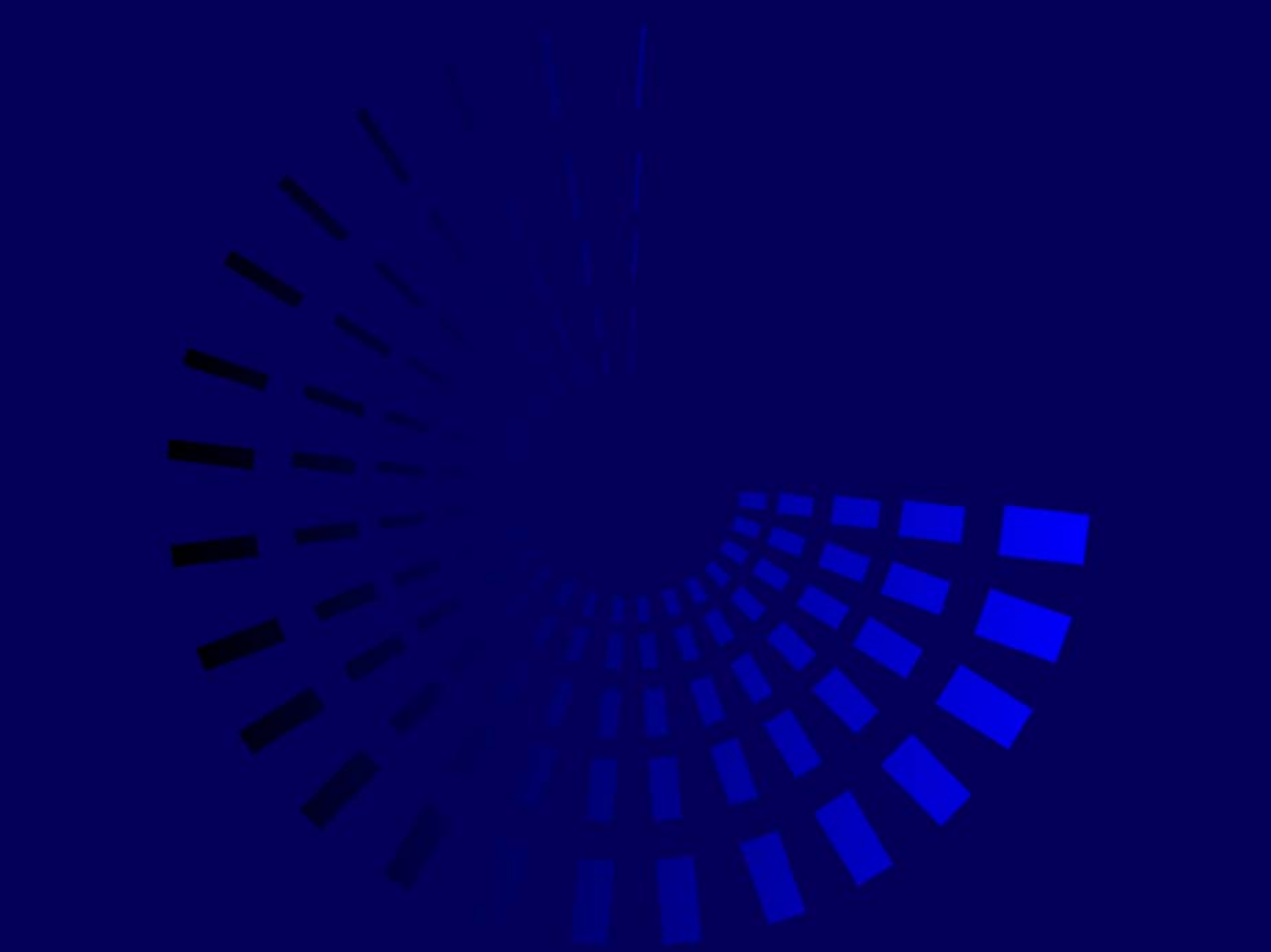
- Lab and office space (trailer?)
- Living space (mobile home, donga?)
- Power generation and fuel supply
- Internet connection to the outside world

32T target timeline



Ongoing efforts

- Logistics of system integration, testing and debugging
- EMC enclosure for Node hardware and correlation
- Computing hardware requirement
- M&C software (minimal functionality)
- Refine list of issues to be addressed by the 32T
- Observing plan
- Post processing software
- Data archiving and access
- …



The 32T planning and execution

- We are all convinced that
  - We need 32T
  - The time scale seems doable
- 32 << 512… but
  - Will eventually involve every sub-system of

Our prime asset

- A talented and energetic team
- Demonstrably impressive pace of work
- The will to push forth and take on the problems

My role

- Coordinator
- Provide a skeleton implementation plan, seek inputs from appropriate people to flesh out
- Keep a system wide perspective on the state of things
- Look out for problems, schedule impacts, inconsistencies and gaps in planning
- Organisational glue, communcations, …

The outcome

- Get to a more complete task list
- Identify a person(s) for each of the tasks
  - Contribute to formulating a detailed plan for the task, coordinate with others if needed
  - Do what is necessary to execute the plan
  - Identify potential problems
  - Raise flags before they become real problems
  - Be the contact person for information regarding the task

Site

- Identifying the land on which MWA will appear
  - Permissions
  - Initial survey of potential sites – Merv, 07/16/07
    - First survey of the circular regions in Tony's polygon + perhaps another region
  - Coordination with ATNF about locations of ASKAP, MWA and central building – Boolardy Site Coordination Group
    - Infrastructure sharing (common building, power generation, optical fiber pipe out of Boolardy,…)

Infrastructure

- Compile a list of requirements (accommodation, lab/office space, power requirements) and time scale – Bob Sault
- Communicate/coordinate with ATNF
- Identify concerns, looks for solutions/work arounds – Bob Sault

Tile

- Dipoles – Brian Corey
- Ground-screens – Brian/Merv/Steve Burns
  - Identify suppliers, lead times, …
- Beam-formers – Brian Corey
- Cables (co-ax+power) – Brian/Mark Waterson
- Power generation – ED
- Protection against fauna - Brian

Deployment

- Expedition 1 Goals
  - Deploy as many of the 32 tiles as possible (ground planes + dipoles + lay (few) co-ax cables)
  - Test as many of the tiles as possible
    - 2 beam-formers, 1 spectrometer available, set up overnight drift scans 1 tile at a time
- Timeframe – 3rd-4th wk. Aug
- Estimate volume of work $\Rightarrow$ size of team, duration of stay (4 people, ~2 wks)
- Identify the team
  - Team leader (someone with prior site experience) – Brian/Divya
  - One technical expert
  - Skill set – task list
  - Special skills (first aid certification, survey, drivers)
  - Team leader to assign responsibilities of local logistics to team members and others
  - Students from (MKI)
  - Mark Derome (Haystack)

Deployment…

- Equipment list - David Barnes?/Team Leader
  - Procurement
- Installation procedure
  - Tile assembly
  - How do we make sure that we learn from this
- Test procedure(s)
- OHS issues -
- Cultural Sensitivity training (9-15 July) – Bob Sault
- Configuration -Divya Oberoi

Deployment…

- Trenching?

Receiver

- Mark Waterson
- Development Milestones ?
- Raise flags when you have concerns, before they become problems

Data Capture (8T)/Correlator

- Discussions underway - Roger
  - Decisions made?
- Decision point – availability of the PFB?
  - Early Sep
  - Leave enough time to pursue alternative approaches

RTS

- UVFITS writer - Randall
- UVFITS format, understood by RTS
  - What can we learn about the tiles
    - How identical are they
    - Beam patterns, stability…
  - Algorithms
    - Convergence, SNR
  - Ionosphere

- EMC Enclosure for – Roger/Ant
  - Receiver
  - Correlator
  - Field installable Faraday rooms -
- Computing hardware requirement
- System integration (Lab/Field) - Roger
  - Tiles – Beamformer
  - Beamformer – Receiver
  - Receiver – Data capture device
  - Receiver – Correlation

M&C

- Control – Lister/Miguel
- Hardware status and system health
- Simple data checks - Randall
  - Near real time display – matrix of mean,rms of amp, ph on different baselines

- Objectives
- What sort of observations do we need
- Observing Plan
- Analysis Software

- Data formats - Mitch
- Archive – Frank/Barnes
- US copy – Ed Morgan

1st Expedition

- 7th Sept, 2 wk
- 7 people
- Deploy 32 tiles
- 2 ‘old’ beamformers + Acquaris spectrometer

- Brian, Divya, Mark Derome, Steve Burns, Merv, Dave Herne, Chris

2nd Expedition

- 7th Oct, 2 (?) wks
- 4 people
- 8 ‘new’ beamformers
- 1st receiver
- Data capture device

- Frank*, Mark Waterson, Roger, Colin

3rd Expedition

- 15th Nov, 2(?) wks
- 4 people
- More observations

- Univ. of Melb.

4th Expedition

- 1st wk Jan
- # of people
- Remaining beamformers
- 3 Receivers
- The correlator

- Roger, Bart, Divya*, Miguel*, Jackie*, Alan Whitney, Mike

32T target timeline