

32T Test Plan – Track and Image Field over 6-8 hours (6)

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1 Introduction

This task demonstrates the capability of the instrument to perform aperture synthesis in the image plane. It requires the full execution of the 32T imaging pipeline and with the exception of wide field polarimetric calibration and ionospheric correction is a task common to that required by 512T. This plan is responsive to requirement #6 contained in the memo “MWA 32-T Objectives and Quality Assurance Evaluation Criteria”, dated 4 September 2009 (46-03001.99).

2 References

This task requires pointing and frequency flexibility, the RTS and Monitor and Control interface will have to operate to a level that permits the communication of pointing parameters. The M&C and RTS interface is currently under development.

The imaging task for 32T is similar to that of 512T. However we *do not* have to apply a wide field polarimetric calibration to the same degree as required by 512T. The 32T imaging pipeline will be outlined in a publication currently in preparation.

The catalog pixelisation scheme HEALPIX, in which the images will be integrated is described by Calabreta et al 2007 (*MNRAS 381*) and references therein.

3 Measurement Description

The task required is to image and track a field for 6 to 8 hours. This demonstrates image based aperture synthesis; integration of images in the catalog projection; and the wide-field correction.

This will require a continuous track of a single field at a single frequency for at least 6 hours.

3.1 Frequency Resolution

No frequency resolution is required, no integration across frequency is implied. An image from a single 40kHz channel would suffice for each pointing. However it is likely that considerable integration in frequency space will take place within each RTS node.

3.2 Time Resolution

This task is a demonstration of the performance of the integration pipeline. As a result the product will consist of at least 60 sub-integrations each of several minutes duration that are in a form that can be integrated into a final product representing a complete 6 to 8 hour track of a field.

3.3 Instrumental Polarization

The basic imaging task will not convert the image from instrumental polarisation. But the sub-integrations will have to be suitably weighed to permit integration.

3.4 Wide-field Correction

Wide-field correction in the image domain will be performed at the very least on each sub-integration, and maybe performed on each 8 second cadence. The 32T system has such short baselines, and such a poor PSF, compared to 512T that a less precise WF correction may be possible without a significant impact on image dynamic range.

4 Resources Required

4.1 Staffing

Imaging is an entirely automated task within the Real-time system. This system is intended to operate without intervention. In reality it is reasonable to assume that the RTS will have to be managed initially by one or more of the RTS development team

4.2 Hardware

To demonstrate the RTS imaging capabilities we depend upon the successful operation of the complete array

- Operational tiles and beamformers, receivers
- Operational correlator
- Operational Real-time computer with sufficient capability to perform the task.
- Monitor and Control system – must at least provide RTS with pointing parameters.

4.3 Software

Operational RTS
Operational Monitor and Control system with frequency and pointing control capability.

Basic status communication between M&C and RTS

4.4 *Execution Time and Constraints*

A contiguous observing session of 8 hours is required. The chosen field will need sufficient bright point sources to permit a direction independent calibration solution.

5 Success Criteria

An image free of artifacts and with noise properties consistent with array configuration, amount of aperture synthesis and integration time.

Revision History

Rev Ltr	Date	Author	Description
01	2009-09-27	SMO	First draft of 6.
02	2009-09-28	SMO	Corrections
03	2010-01-04	RFG	Formatting