CSIRO DIVISION OF RADIOPHYSICS

THE AUSTRALIA TELESCOPE

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Overall Systems and
Performance
Tech. Notes & Reports

COMPUTATIONAL LOAD FOR BANDWIDTH SYSTHESIS

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Following Forster (AT/20.1/006) we see that acceptable bandwidth smearing requires $\frac{\Delta\nu}{\nu} = 1.73 \times 10^{-3}$ or $\sim$48 channels in a 128MHz bandwidth at L band. Alternatively this implies channel bandwidths of $\sim$ 2 MHz at 1.25GHz. Thus if all Stokes'parameters are required then at one time we can observe two bands each 64MHz wide and each containing 32 X 2MHz wide channels. Four separate sets of such observations at different frequencies will cover the whole L band for bandwidth synthesis observations.

In summary we can say that after an integration time of 20 seconds (5 seconds on each pair of 64MHz bands) we will have accumulated 4 X 2 X 4=32 correlation functions per baseline in the worst case. Thus each of 15 X 32 = 480 correlation functions need be transformed into 32 complex frequency components. If the transform times scale as N log N then 480 X 32 point complex transforms take only 5% of the time required for the worst case (15 X 8 192 point complex) transforms to be performed during line observations.

Thus the worst case bandwidth synthesis observations place quite small loads on the correlator array processor.