COBALT

Project Update

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‘Specifications’

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- Correlator mode
  - 64 stations using 16 bit mode / 8 bit mode
  - 80 stations using 16 bit mode / 8 bit mode
- Beamformer mode
  - Coherent Stokes mode
    - Complex Voltage mode
  - Incoherent Stokes mode
  - 5 Use Cases provided by Jason Hessels
- Fly’s Eye mode
  - For 64 stations
  - For 80 stations
- Operational readiness for all 3 modes

Additional ‘features’

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- COBALT sw has better test coverage in LOFAR test system than BG/P
- COBALT will be delivered with documentation
- Latency decreased (allows improved responsiveness)
- New (improved) BF design
- 16bit / 8bit flux normalization
- Normalizing Fourier transforms in channel forming
- Phase off-set correction per station

- Superterp delay off-set found during commissioning

Timeline Q4 2013

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Date	Activity	Deliverable
September + October	If needed: Scaling up to larger system Network reconfiguration	
End September	Integration of correlator pipeline in RO	
End October	Integration of Beamforming pipeline in RO	Beamformer commissioning plan
~~Oct./~~ Nov. / Dec.	Full system tests (incl. Observatory) of Correlator pipeline	
~~End of November~~ Dec. 4	Operational Readiness Review	

Current status

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- Hardware in place
  - Maybe acquire 10th node
  - System certification under way
- Correlator pipeline ready for production testing
- Incoherent Stokes BF pipeline ready for initial commissioning
- Coherent Stokes BF pipeline implementation to be finished in December
- Fly's Eye mode not started

Correlator: GPU performance (8 bit full bw)

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Component	Cost/sb/s @ 64 st	Cost/sb/s @ 80 st
Reading input	9.0ms	11.4ms
FIR filter	4.0ms	5.8ms
FFT (64ch)	4.0ms	5.0ms
Delay compensation + Bandpass	7.6ms	9.6ms
Correlator (2x2 kernel)	19.7ms	29.2ms
Writing output	0.4ms	1.2ms
Total	**44.7ms**	**62.2ms**
GPU load @ real time	**71.5%**	**99.5%**

Down from 95% and 144% at Performance Review, respectively.

Beam Former: Pipeline design

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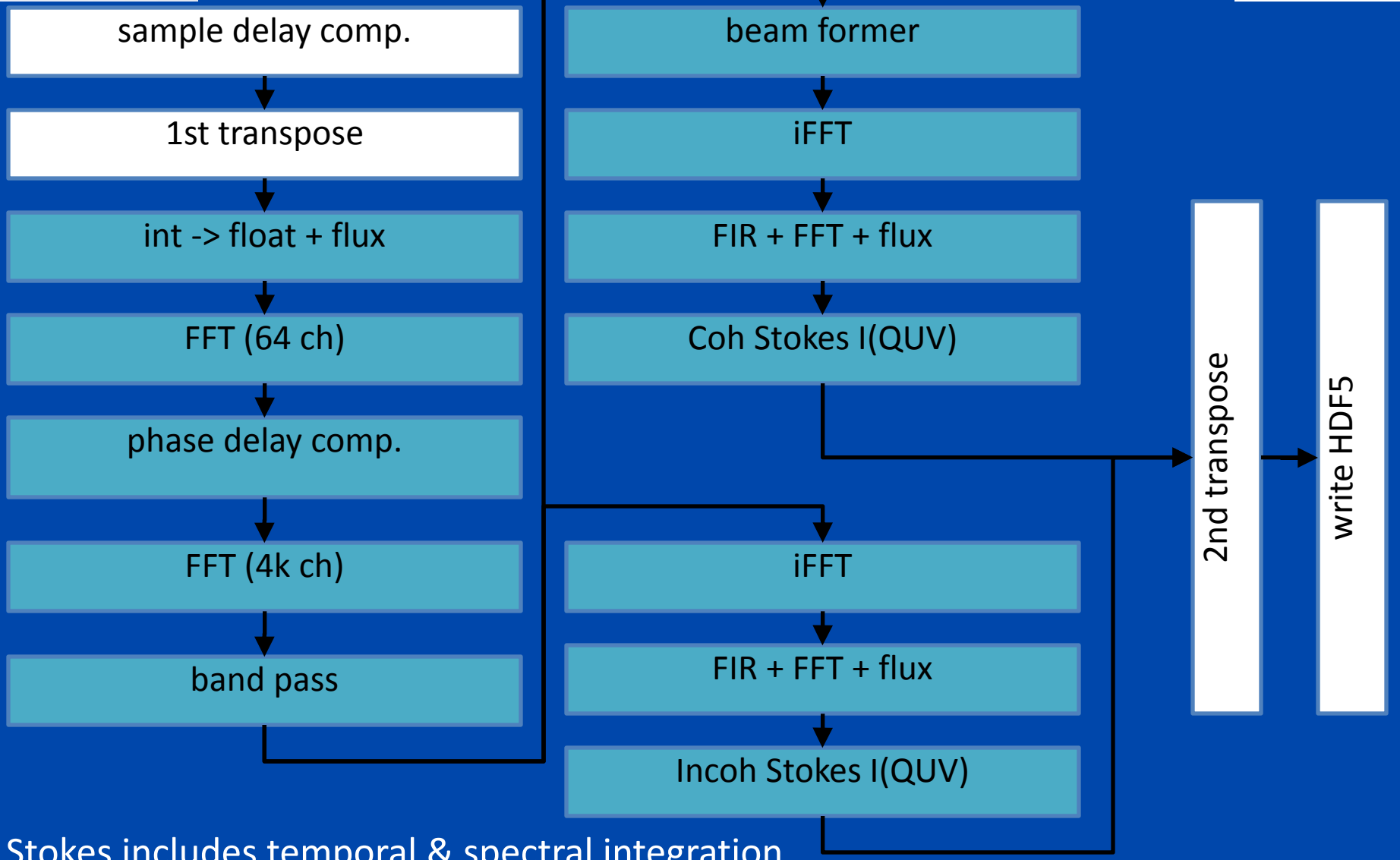

Stokes includes temporal & spectral integration

Beam Former: Observation Modes

Mode	Requirements	16-bit	8-bit
BF Spectrometer (max 48 stations)	Multiple TAB rings	6 rings (127 TABs)	4 rings (61 TABs)
Pulsar Survey (Max 12 stations, numbers for 48 stations)	73 CS + 1 IS	√	X (max 28 CS)
Pulsar Gridding (max 48 stations)	61 CS, 1ch	√	√
	61 CS, 16ch	√	X (max 43 CS)
Targetted Search (max 48 stations)	61 CS, 16ch	√	X (max 43 CS)
Precision Pulsar Timing (max 48 stations)	1 CS/CV	√	√

Fly's Eye mode

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- Support of dedicated Fly's Eye (like BG/P)
- Fly's eye is special case of CV/CS
- Requires ~1w dev time in 2014
- Accuracy: inherits BF commissioning
- Stability: inherits BF stability
- Performance: no issue

Timeline 2014

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Date	Activity	Deliverable
December 2013	Production testing of Correlator Pipeline	Operational Correlator Pipeline
	Commissioning of Incoherent Stokes BF pipeline	
	Development of Coherent Stokes BF pipeline	
January 2014	Production testing of Incoherent Stokes BF pipeline	Operational Incoherent Stokes BF Pipeline
	Commissioning of Coherent Stokes BF pipeline	
	Development & Commissioning Fly's Eye mode	
February 2014	Production testing of Coherent Stokes BF pipeline	Operational Coherent Stokes BF Pipeline
	Production testing of Fly's Eye mode	Operational Fly's Eye mode
	Implementation of • Coherent de-dispersion module • combined correlator & BF mode • Performance optimizations (if needed)	
March 2014	End of Project	Documentation
	Removing old hardware	

Network reconfiguration

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- Planning and timeline to be discussed with CIT
- Planning (TBC):
  - Jan 2014: Analysis and reproduction of problems
    - Using CEP3 (TBC)
  - Feb 2014: Proof of concept
    - Using CEP3 (TBC)
  - Mar 2014: Roll Out
    - After BG/P is phased out

Questions?

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