



Arcetri Radioastronomy Group Digital laboratory Arcetri IR Software Group

SKA CSP Control System

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SKA – Basic Facts



The Square Kilometre Array (SKA): Radio-telescopie placed Australia and Sud Africa.

SKA total are will be a Square Kilometre

SKA will be build in two phases (SKA1 and SKA2)

SKA will cover frequencies between 50 MHz and 14 GHz



SKA – Low





SKA Low, in Australia 256000 antennae Randomly placed Band 50-350Mhz

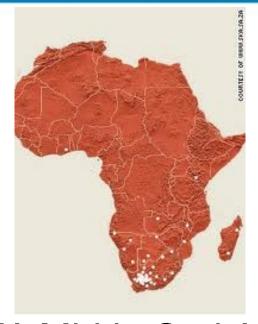


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2560000 In SKA 2

SKA - Mid





SKA Mid in Sud Africa 192 Dish antennae Band Up to 14 Ghz

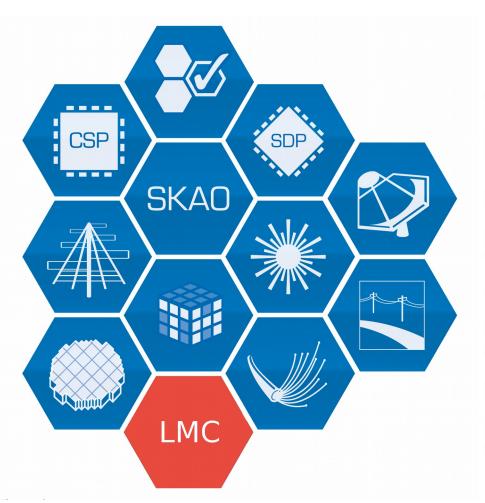
2000 in SKA 2





A Complex Structure























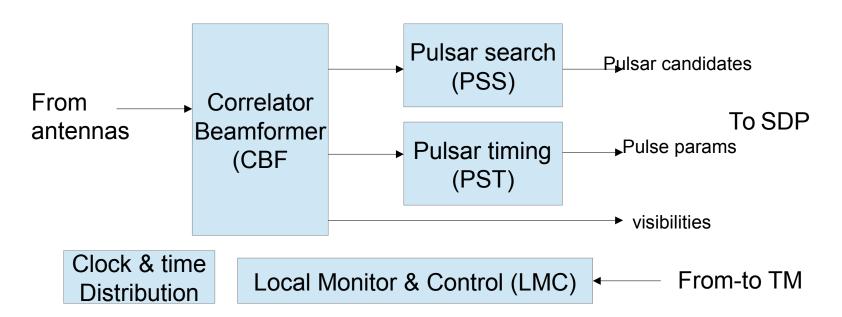




SKA CSP structure



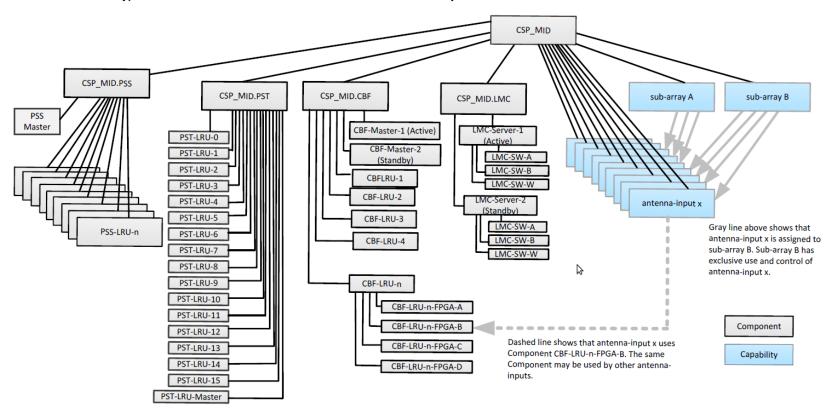
- CBF: high speed digital hardware (FPGAs)
- PSS-PST: Specialized digital hardware (GPUs)
- LMC: Off-the-shelf industrial computers + TANGO SW infrastructure
 - Each sub-element has its own LMC in addition to global LMC



CSP LMC detailed structure

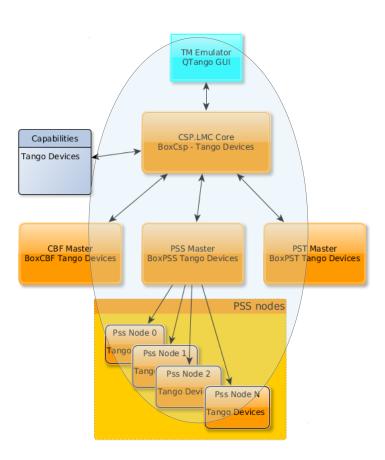


Figure 7-1 Monitor and control hierarchy for CSP Mid- this diagramhas been provided as an example of the monitor and control hierarchy, it does not show the accurate number of Components.

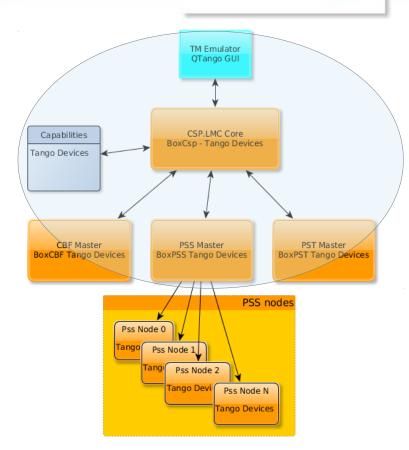


CSP LMC Prototype Horizontal and vertical prototypes





Vertical prototype: simulate the deep element control

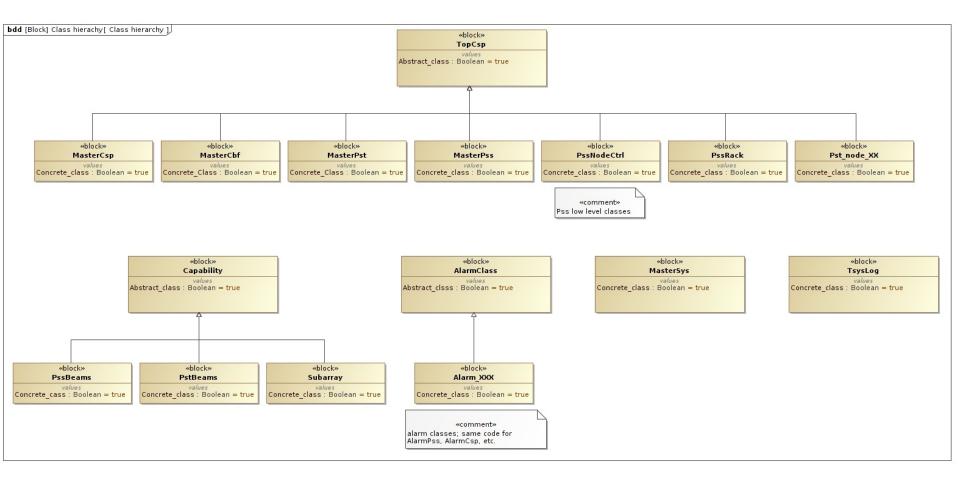


Horizontal prototype: simulate the general observation structure

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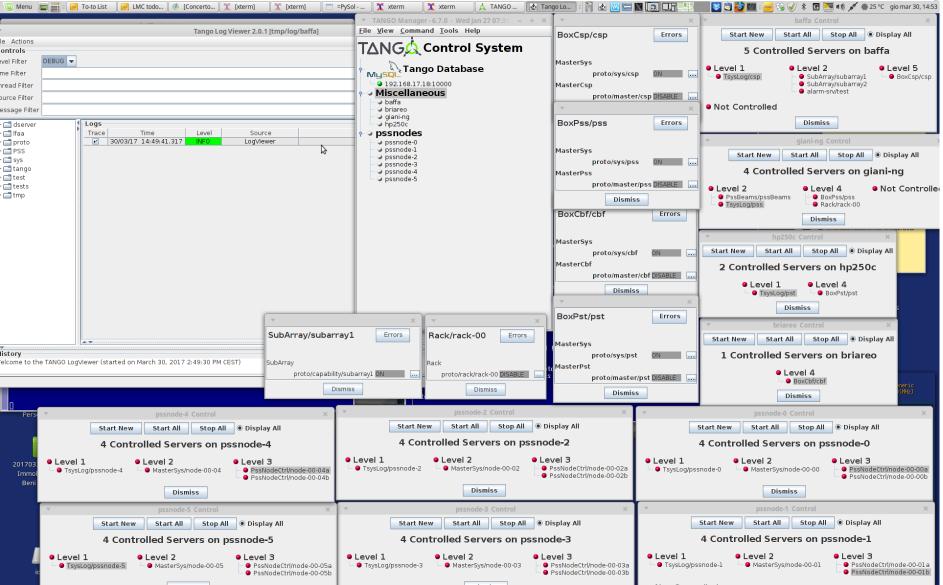
Uniform Controlling Classes





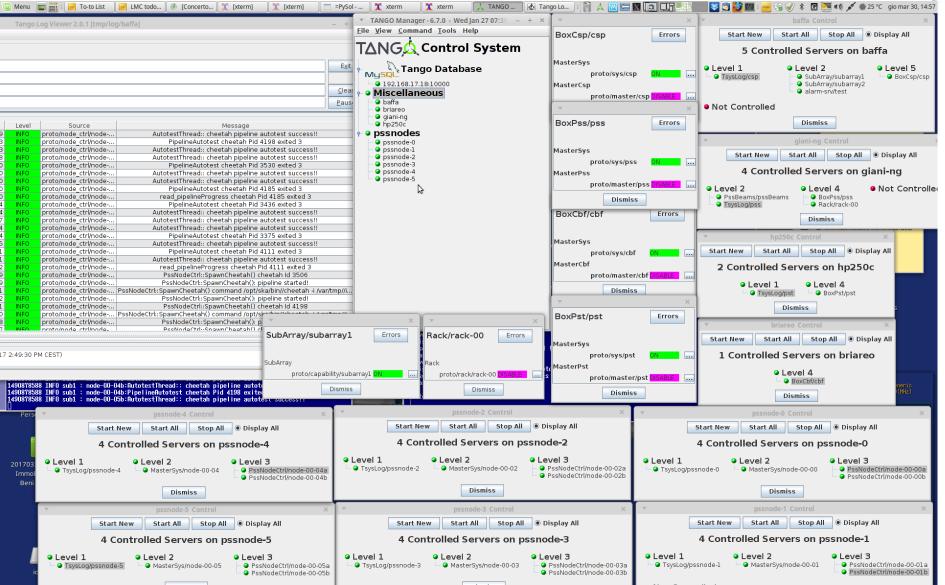
CSP INIT - 1





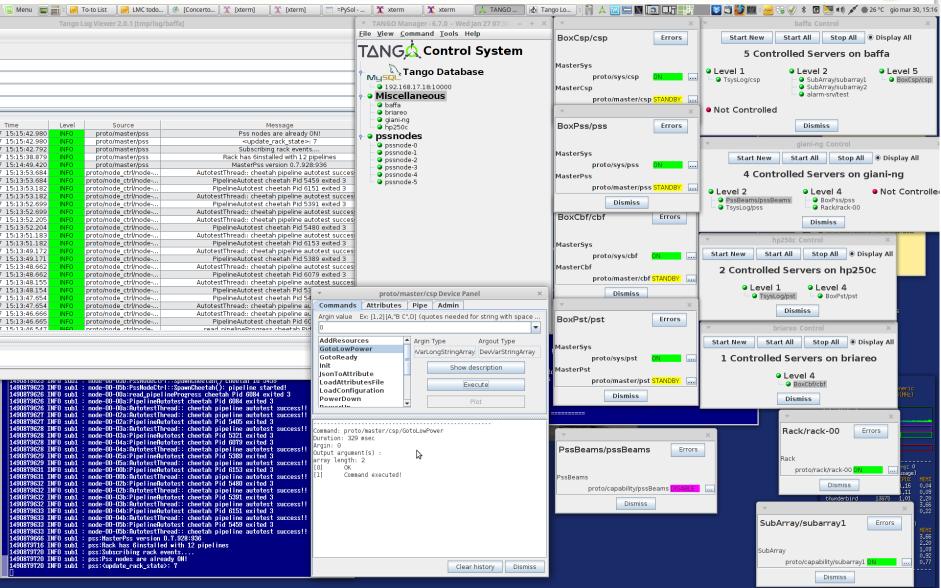
CSP INIT – 2





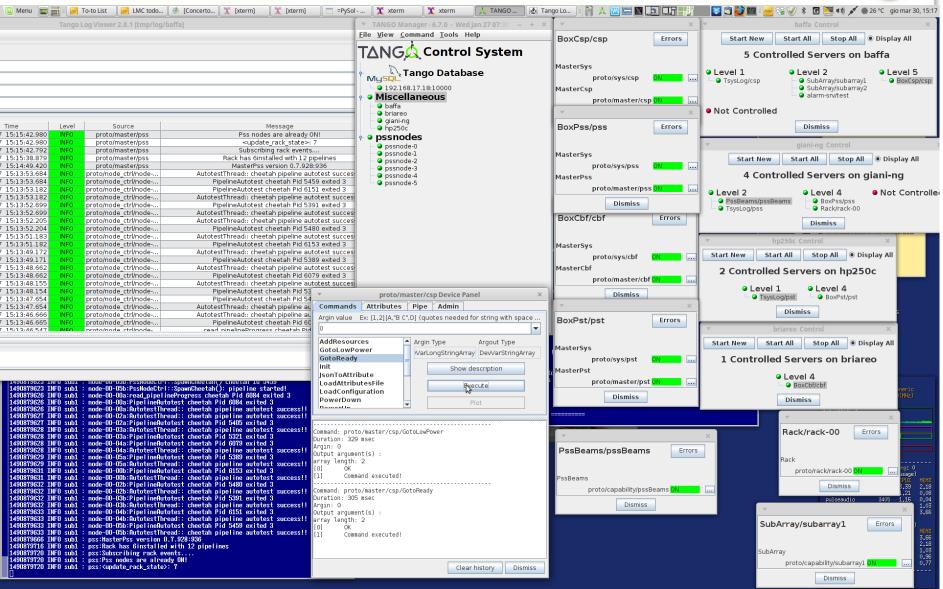
CSP INIT – 3





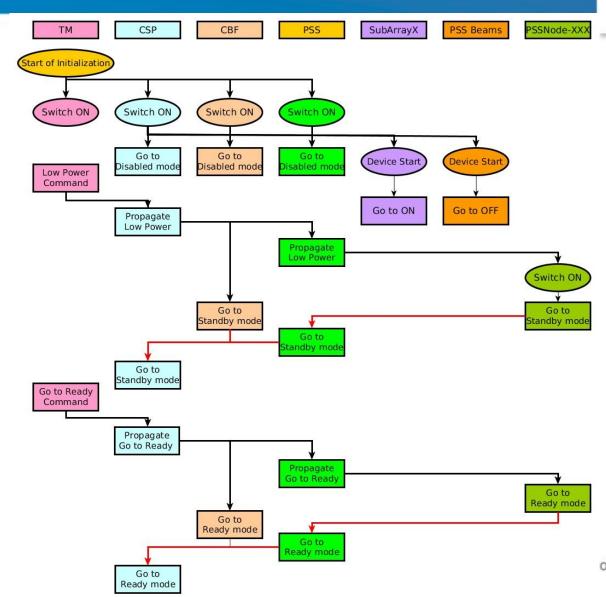
CSP INIT - 4





CSP INIT GLOBAL VIEW

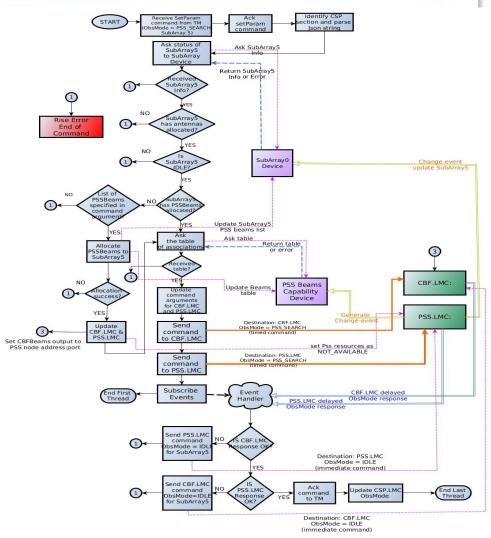




PSS LMC PROGRAMMING



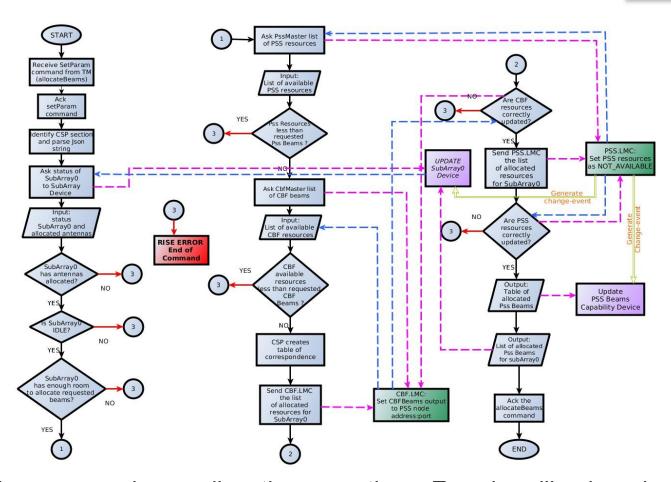
- 1)Each CSP element has its own LMC element, as a PSS Tango device server under the CSP device server
- 2)PSS LMC handles PSS structure and operations
- 3)Definition of PSS beams, resources, observation parameters
- 4)Use cases for the control operations
- 5)Example use case: set up of a PSS observation



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PSS LMC SUB ARRAY SET





Example use case: beam allocation operations. Error handling in red, Capabilities in purple and SubDevices in green green the Universe with the world's largest radio telescope

GUI Interface





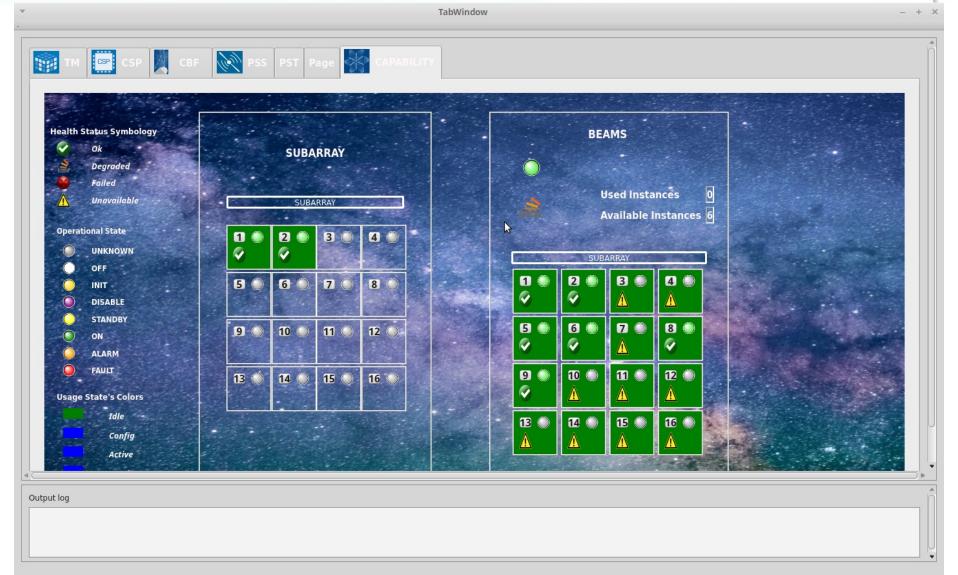
GUI Interface





GUI Interface





Future Developments



- Development of missing components
- Large network testing (now 6 nodes, aims to 100-200)
- Update to the evolving SKA model
- GUI test mode