(R)Evolution:
Taking LOFAR's M&C into the 2020s

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LOFAR's current Monitor and Control system (M&C) has had about 10 years time to mature.

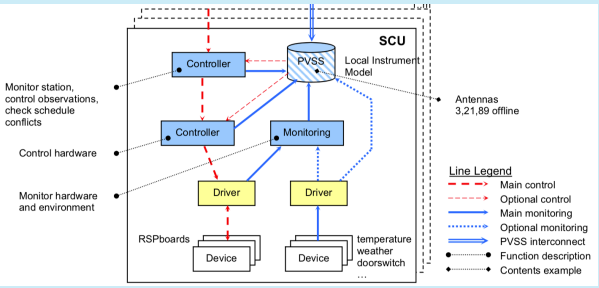
ASTRON's DUPLLO project upgrades major parts of the hardware in Dutch LOFAR stations.

It offers us now the chance to take a step back and review if the current LOFAR station M&C system is ready for the next 10 years.

We focus on these questions:

- How much effort does it take to make the current M&C system support the new hardware upgrades?
- Can a change in software design make station operations more efficient?
- Can we supply better data for preventive maintenance?
- Can we lower the number of man hours needed to add new features to the software system?
- Can we provide better real-time data for quality assurance?
- Can we provide easier access to archived Monitor data?

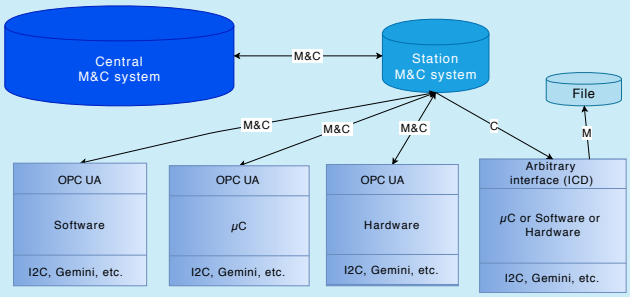
In the old days:



- No unified architecture for M&C
  -> Each device needs its own M&C solution
- No unified interfaces for M&C access
  -> API & protocol mess
- M&C had to be "enabled" through a driver
  -> Monitoring must be started manually
- No unified scripting API
  -> backdoors through ssh & direct driver manipulation bypassing M&C
- No automatic propagation of Monitor data from device level to higher level software
  -> Manual pushing from device to M&C necessary
- No automatic archival of Monitor data
  -> No central Monitor database

The new way:

(At station level)



Slim down and smarten up!
-> Flexibility through standardisation

- Unified architecture: Everything is a device

  + Software devices, e.g.
    * Beamweight calculation
    * Subband statistics calculation

  + Hardware devices, e.g.
    * HBA antenna tiles
    * LBA antennas
    * Receiver Unit (RCU)
    * FPGAs

- One M&C system (Tango, EPICS, WinCC UA under evaluation)

TANGO EPICS WinCC OA SIEMENS

- OPC-UA abstraction layer for hardware access

OPC FOUNDATION

- Built-in scriptability (no ssh backdoors into drivers)
- Lower overall complexity = improved reliability
- Lower software maintenance cost (man hours, money)
- Easier integration of a system wide Monitor database

LOFAR

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