

A photograph of a server room aisle. The racks are blue metal frames with red safety stripes on the doors. The aisle is long and narrow, with a concrete floor and overhead lighting. The text "JCOP FRAMEWORK RACK CONTROL" is overlaid in the center in blue, bold, sans-serif font.

# JCOP FRAMEWORK RACK CONTROL



# A CHALLENGING PROJECT



- *Different electrical distributions for LHC experiments:*
  - *CANALIS power distribution devices:*
    - *Twido Box Simple (ATLAS and CMS)*
    - *EOD (ATLAS)* ←
    - *EXD (ATLAS)* ←
    - *EXD2 (ATLAS)* ←

Only available in ATLAS pit
  - *HAZEMEYER power distribution devices:*
    - *TDM drawer (LHCb and ALICE)*
- *A mixture of data sources:*
  - *ELMB (OPC) for rack environment monitoring*
  - *PLC (Modbus) for power control and monitoring*
  - *Equipment Management DB for rack zones layouts*



# A CHALLENGING PROJECT



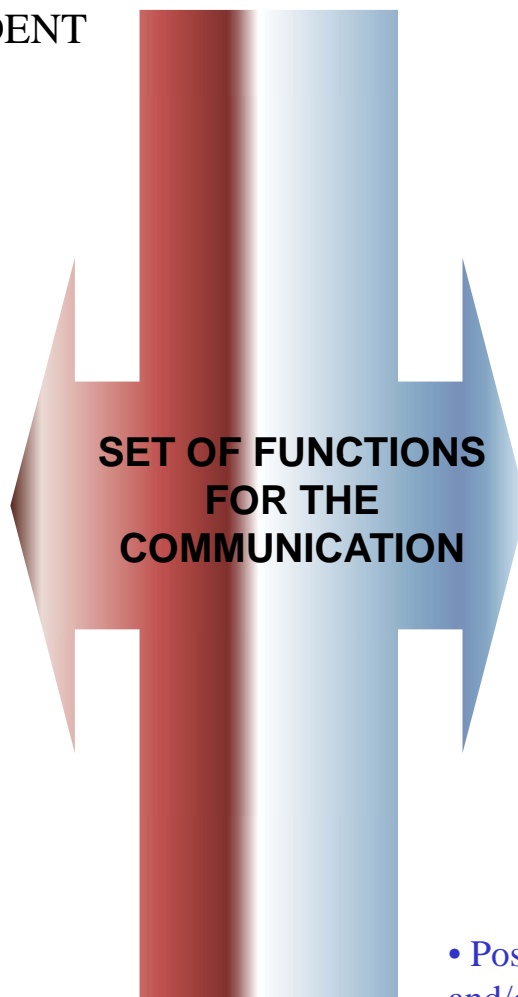
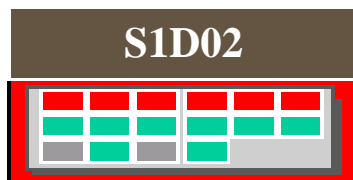
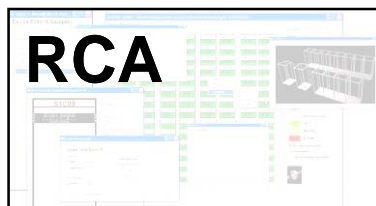
- *Building 4 demonstrator:*
  - *Missing many devices that can only be tested in production systems*
  - *PLC software versions were usually different from production ones*
- *PLC software design:*
  - *CMS proposed a discovery system design where DCS could built the whole electrical control structure by reading some description tables*
  - *CMS proposal was partly implemented and still requires changes when new devices are created in the PLC side (still ongoing!)*
- *Documentation:*
  - *A better PLC description documentation including different electrical layouts*



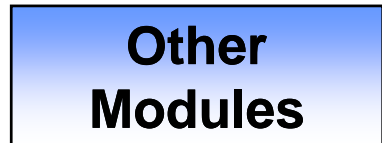
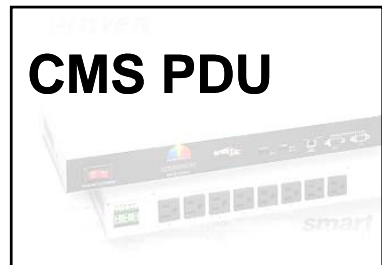
# A HIGH LEVEL DESCRIPTION



HARDWARE INDEPENDENT  
LAYER



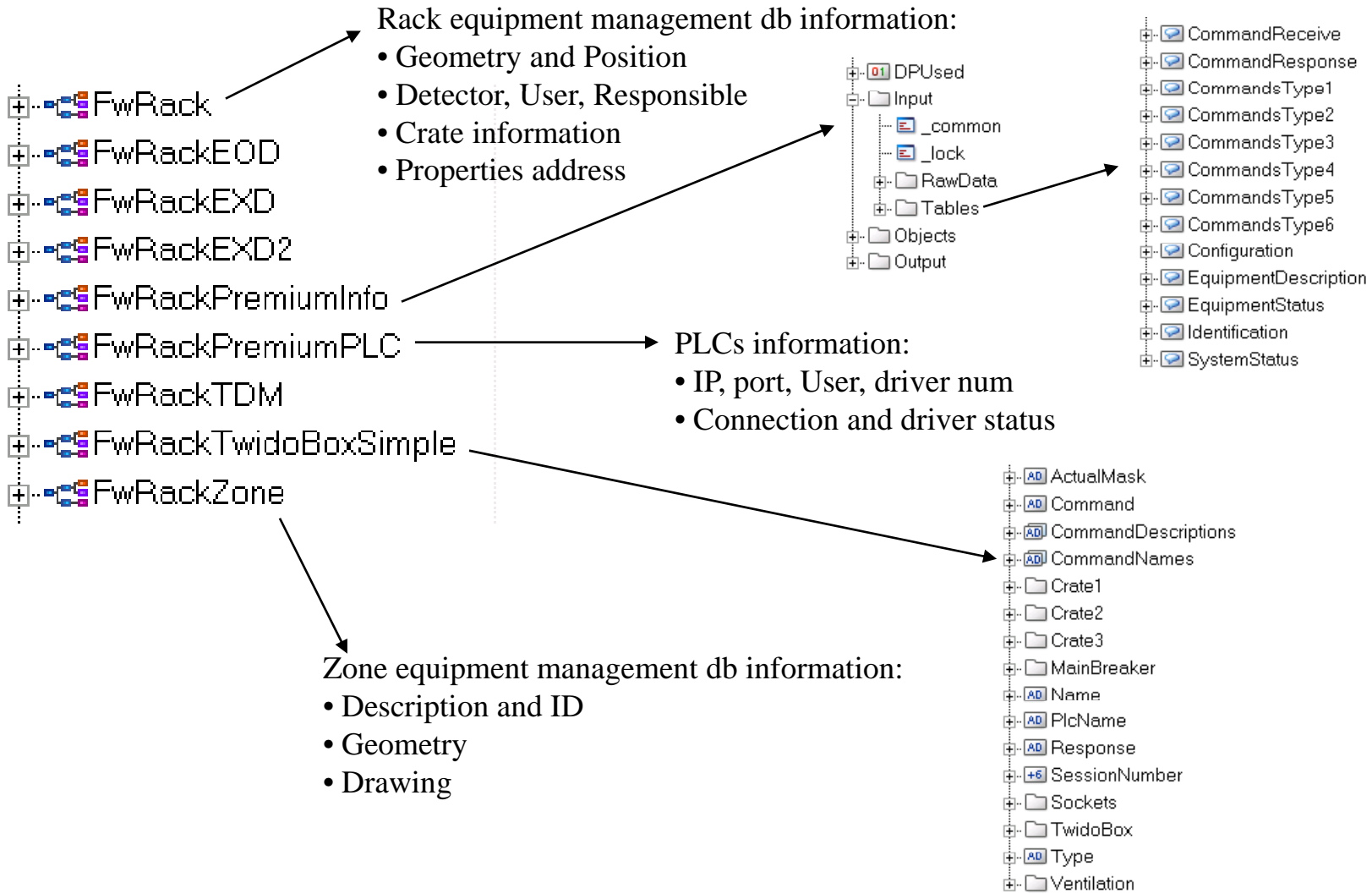
HARDWARE DEPENDENT  
LAYER



- Possible to create extensions to monitoring and/or control rack devices with the RCA.



# AN INSIDE LOOK





# THE ENGINE



System Overview tool

Updates PLC connections and Modbus drivers status

IP	Dvr Nr	Dvr Status	User	PLC Status
137.138.199.211	2	RUNNING	BOBBY	DISCONNECTED

Raw PLC data retrieval

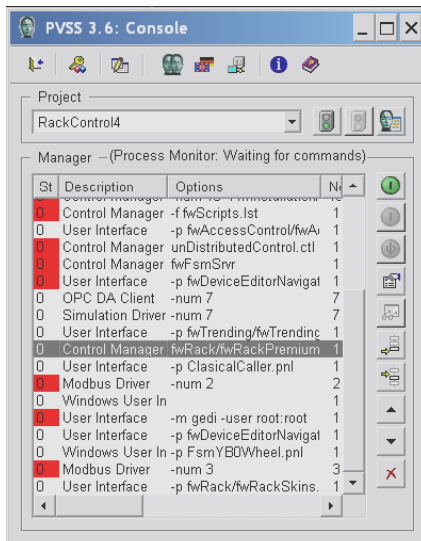
Modbus



Ctrl Script  
fwRackPremiumApplication

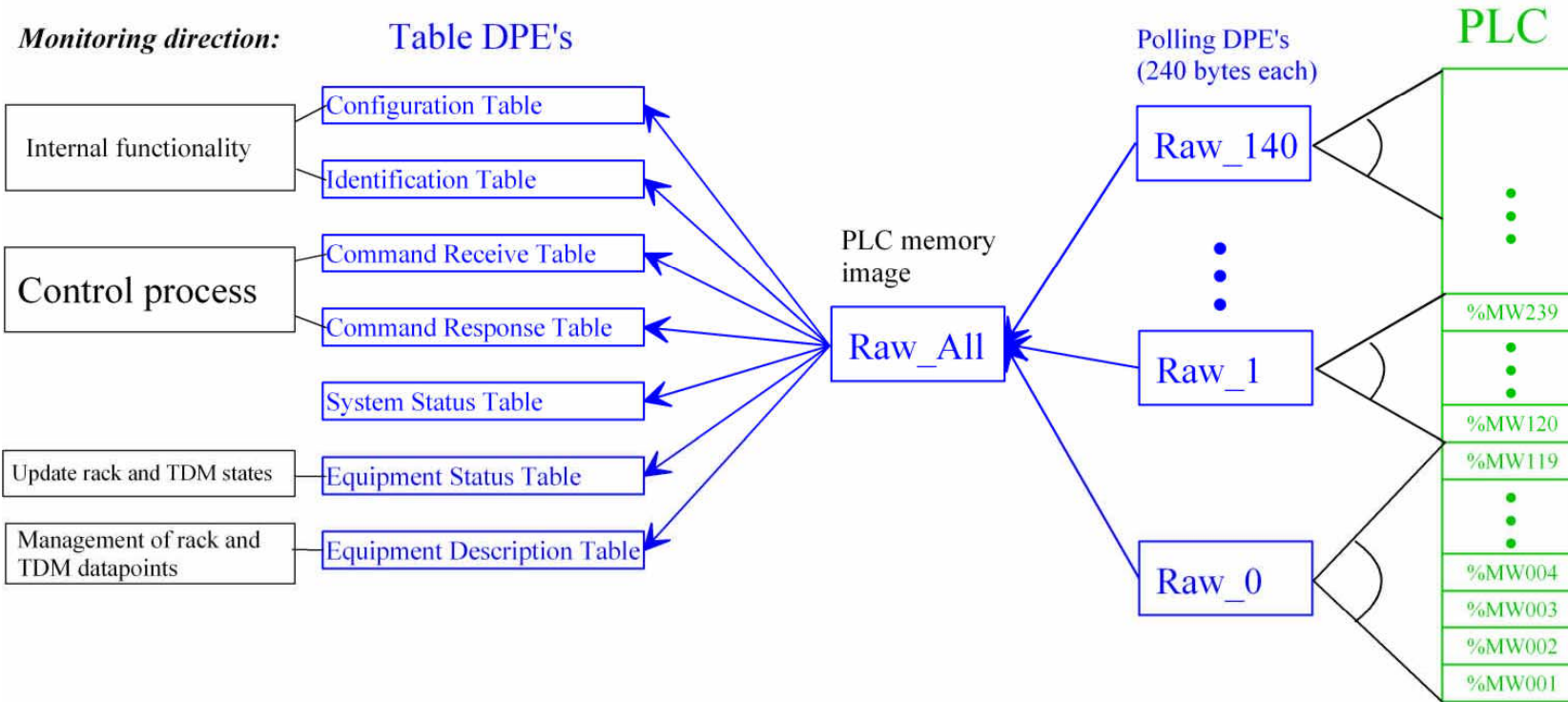
- [-] CommandReceive
- [-] CommandResponse
- [-] CommandsType1
- [-] CommandsType2
- [-] CommandsType3
- [-] CommandsType4
- [-] CommandsType5
- [-] CommandsType6
- [-] Configuration
- [-] EquipmentDescription
- [-] EquipmentStatus
- [-] Identification
- [-] SystemStatus

Update PLC devices:  
TDM, EOD, TwidoBox, EXD

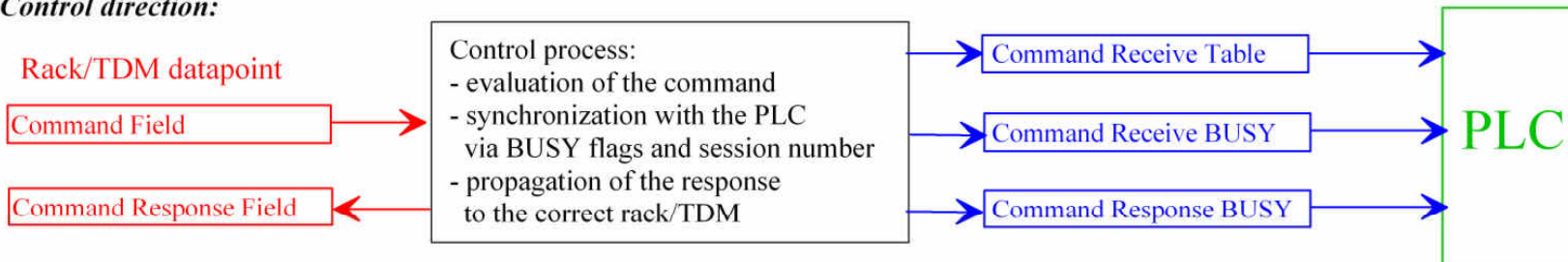




# PLC CONNECTION DETAIL



**Control direction:**





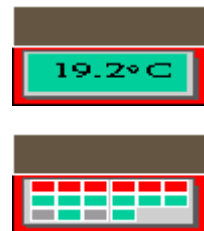
# NEW fwRack VERSION



- *Will include:*
  - *All existing Premium PLC devices (Twido, EOD, EXD[2] and TDM)*
  - *Connection to monitoring ELMB*
  - *Interface to equipment DB*
  - *FSM device templates*
  - *Trend template pages for rack properties*



- *Will allow for:*
  - *Easy device extension*
  - *Crate customization and link to other framework devices*



CHANNEL	VOLT(V)	CURR.(A)
Channel0	5.000	2.280
Channel1	15.500	0.000
Channel2	0.000	0.000
Channel3	3.250	54.850
Channel4	0.000	0.000
Channel5	12.010	0.140
Channel6	0.000	0.000
Channel7	3.500	67.900

WILNH CHA1E

ON/OFF

AVG FAN SPEED

3180

ERRORS

AC POWER





# DEMO

