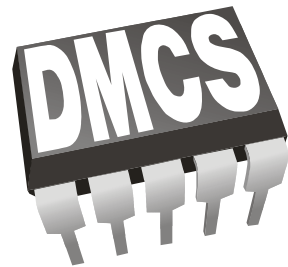




EuCard

WP10.6 - LLRF at FLASH μ TCA based system



Introduction

- Introduction to MTCA.4
- μ TCA based LLRF system concept
- μ TCA Crate development
- Power supplies
- Status



Introduction to MTCA.4

MicroTCA™

PICMG® Specification MTCA.4
R 1.0 Draft 0.9xf

**MicroTCA Enhancements for Rear I/O
and
Precision Timing**

20 April 2011

For Member Review Only - Do Not Claim Compliance To or
Distribute This Draft Specification



**Open Modular
Computing Specifications**



The xTCA for Physics Coordinating Committee Technical Subcommittee (CCTS) was successfully formed by petition to PICMG1 by four laboratories and two companies and held its first organizing meeting on March 10, 2009.

The Committee as of April 15, 2009 has a membership of 44 industry entities including 5 laboratories and 65 members.



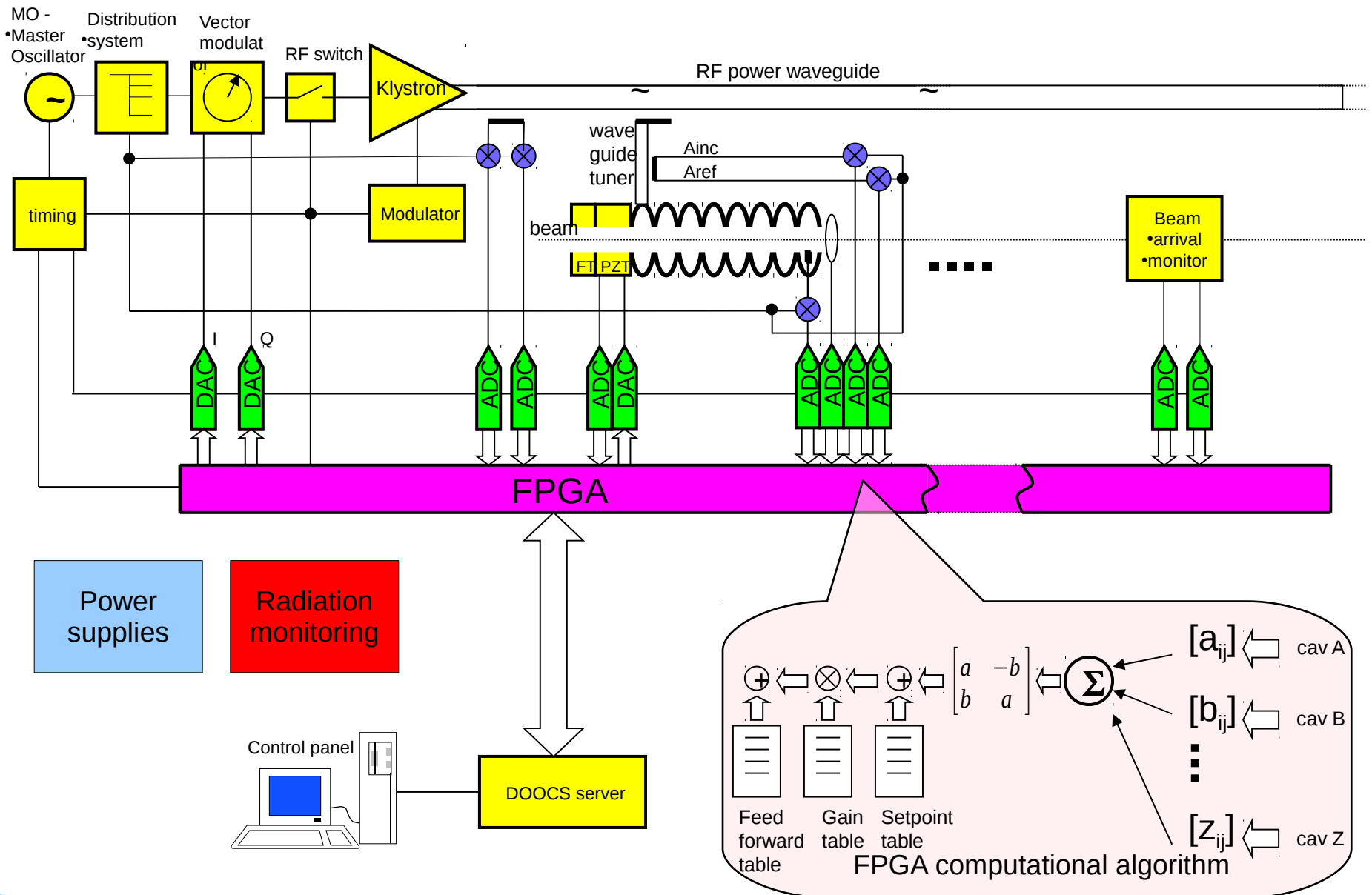
Introduction to MTCA.4

- major work areas

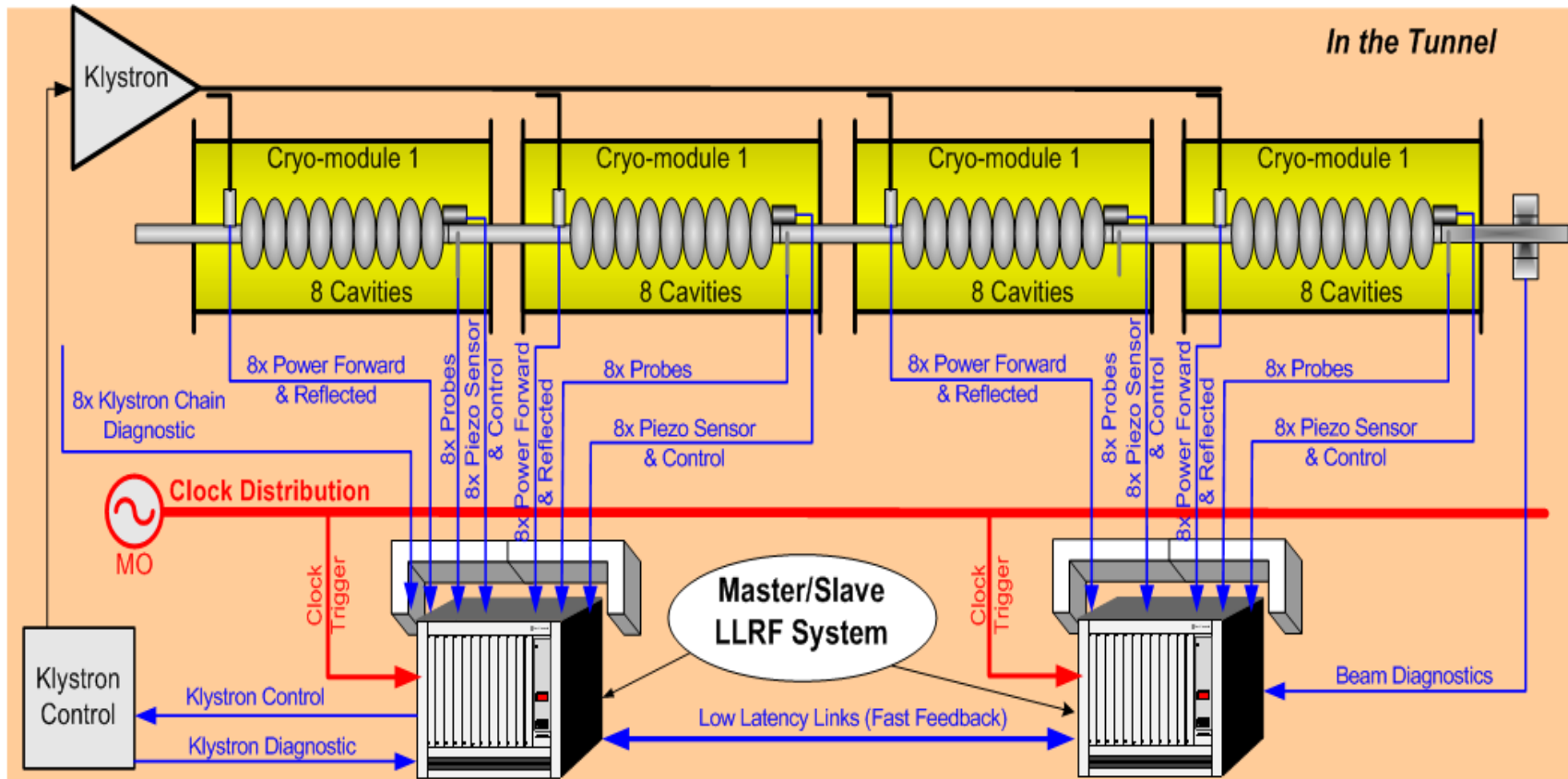
- * Specify Rear IO capability for physics form factor
- * Specify AMC modules with IO and compatible ATCA carrier cards
- * Specify a method for distributing timing synchronization and triggering signals to the shelf, carrier and AMC levels.
- * Specify protocols for inter-module and inter-carrier communication for range of usage including low latency fast feedback controls or data acquisition and preprocessing, inter-carrier communications, external long-distance communications
- * Develop specifications and guidelines
- * Develop guidelines for maximum interoperability with existing COTS AMC designs



LLRF system architecture



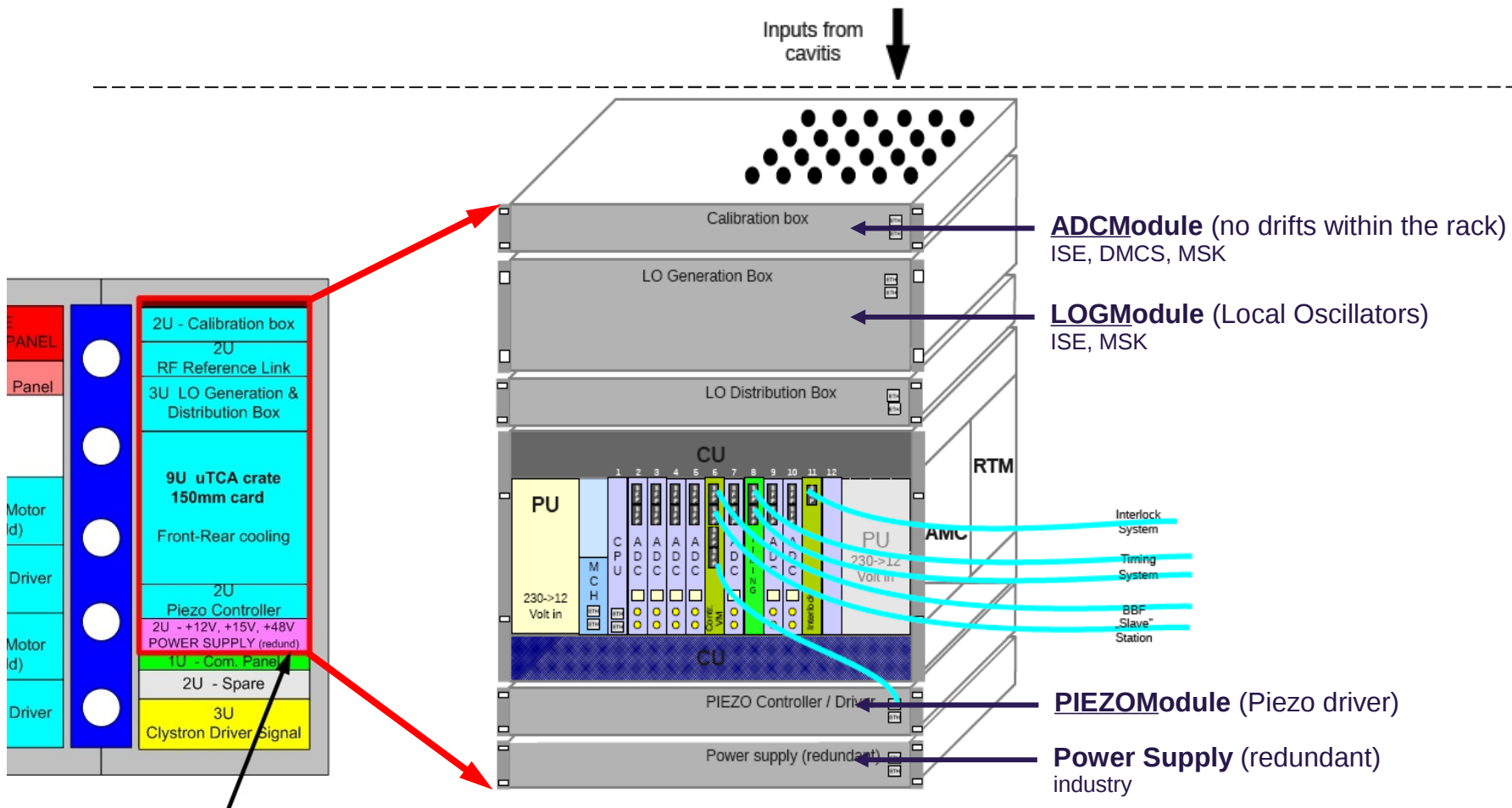
μ TCA based LLRF system concept



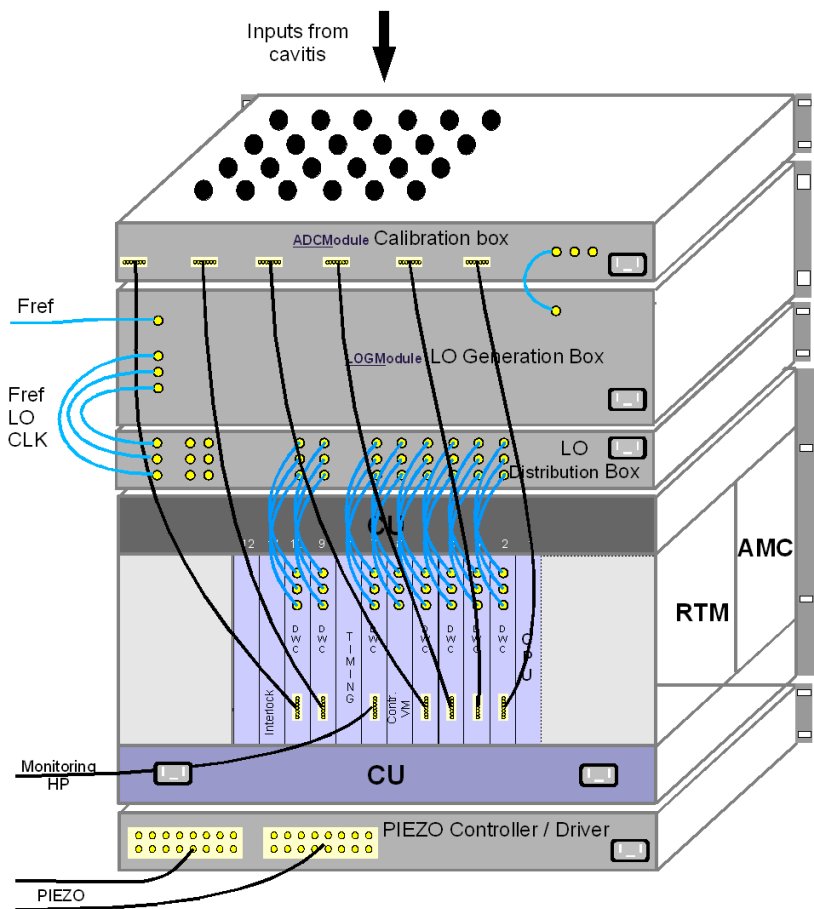
Driving Argument \rightarrow Short pickup cables for low drifts (10fs/m/K) and prevent crosstalk from high power cables

μTCA based LLRF – rack layout

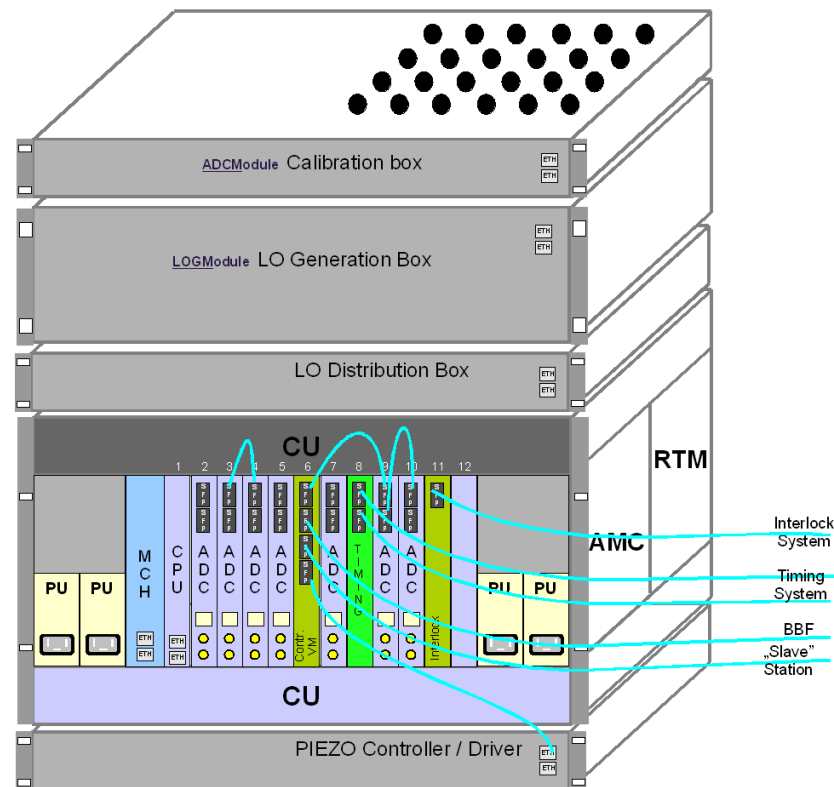
- How will a LLRF System look like inside . . . 19“ modules . . .



μTCA based LLRF – rack layout



1. CPU
2. ADC – Pfor
3. ADC – Pref.
4. ADC – Prob
5. ADC – Prob
6. Contrl.+VM
7. ADC – Monitoring
8. Timing
9. ADC – Pfor.
10. ADC – Pfor.
11. Interlock



Order of boards for low distortions

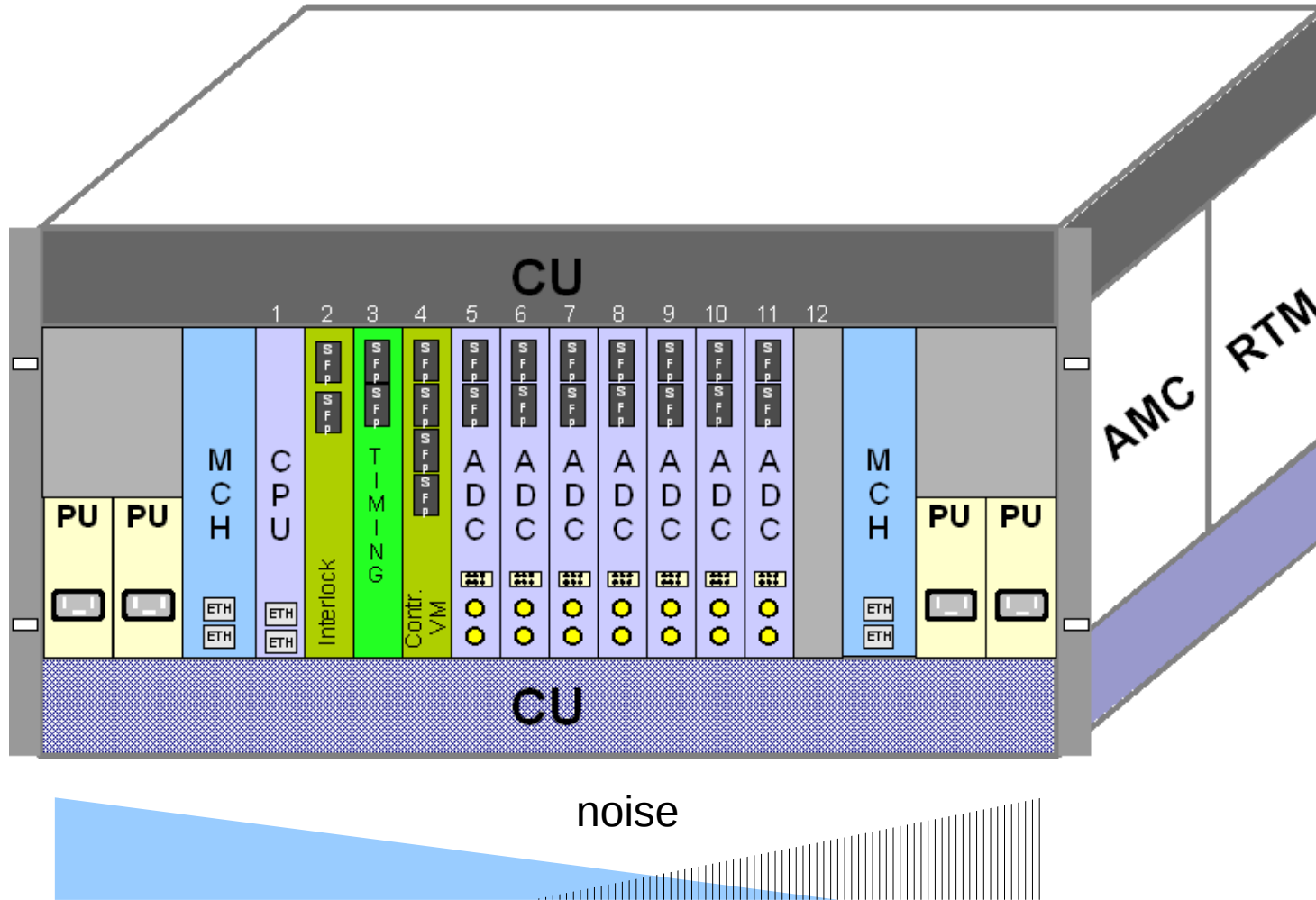
Complicated cable management



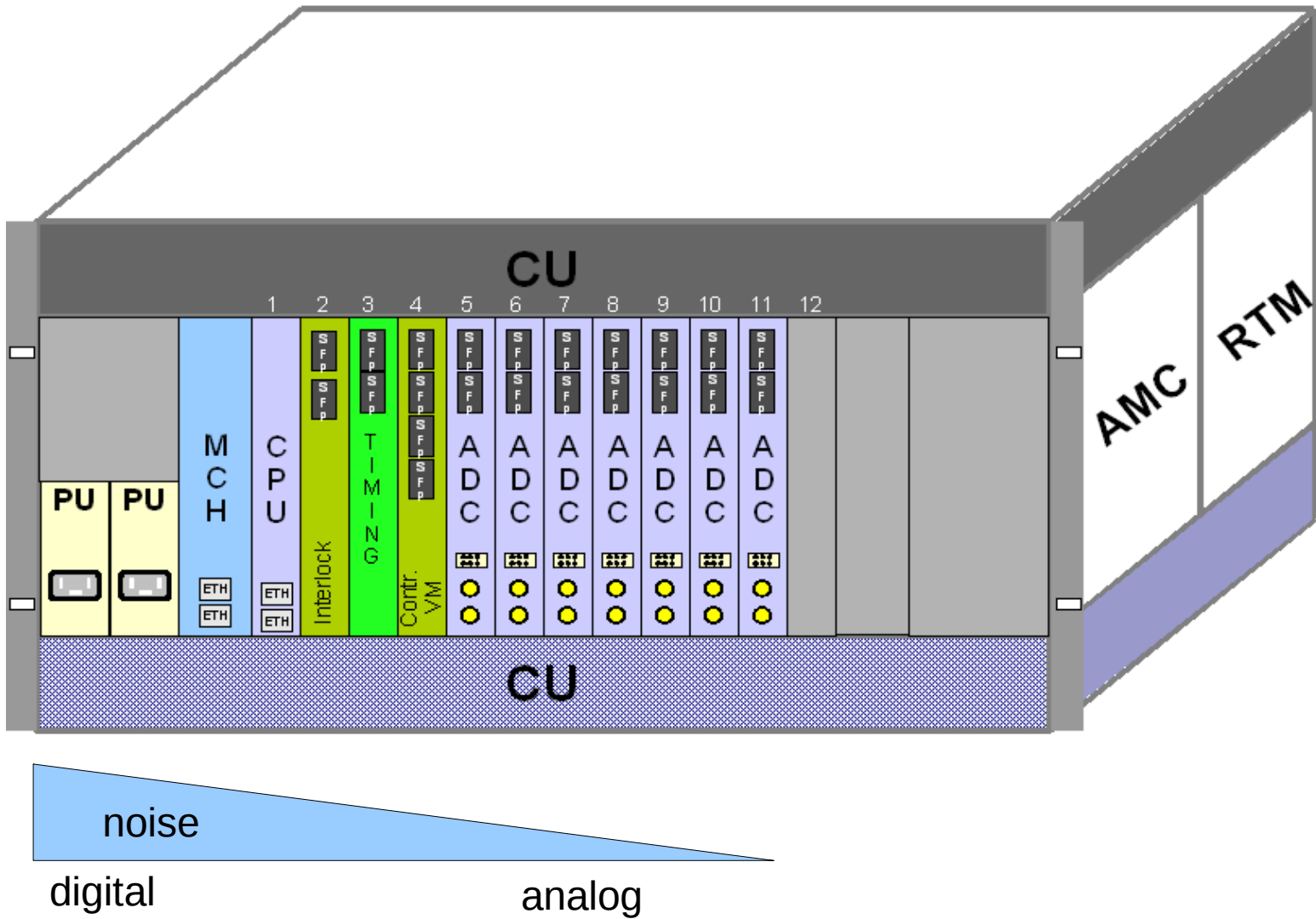
- LLRF AMC backplane concept

- LLRF RTM backplane concept

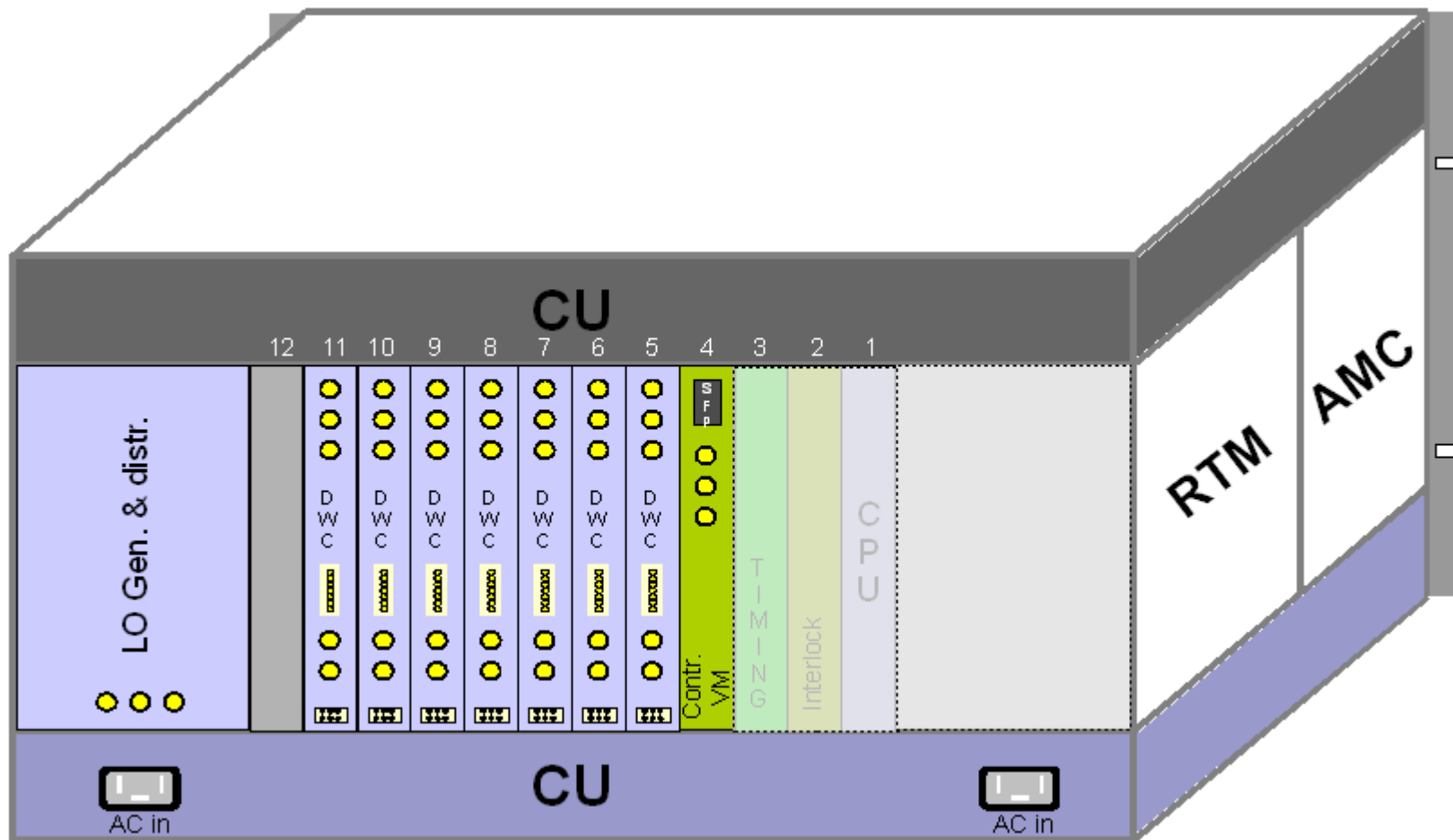
xTCA Crate



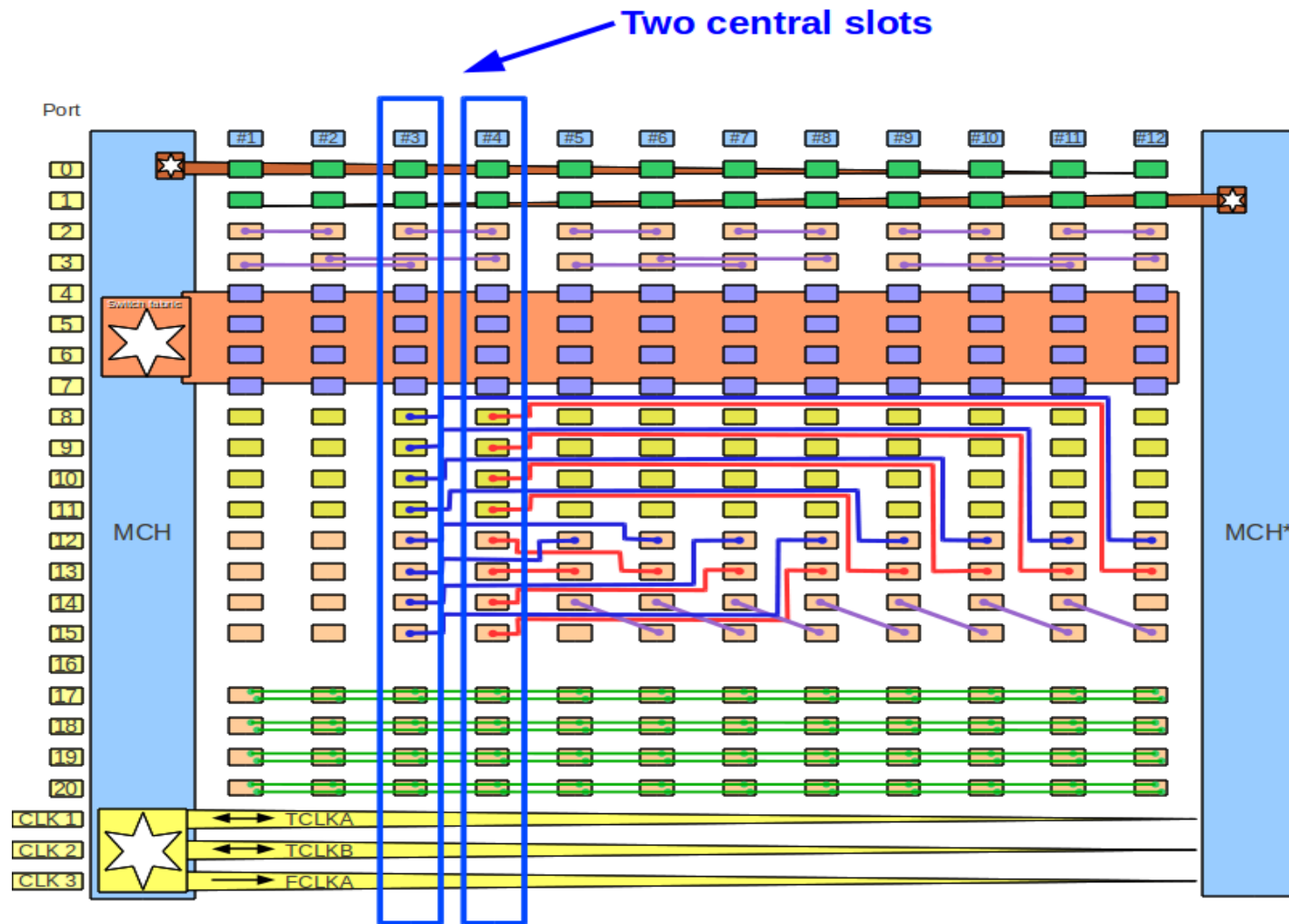
xTCA Crate for LLRF – front view



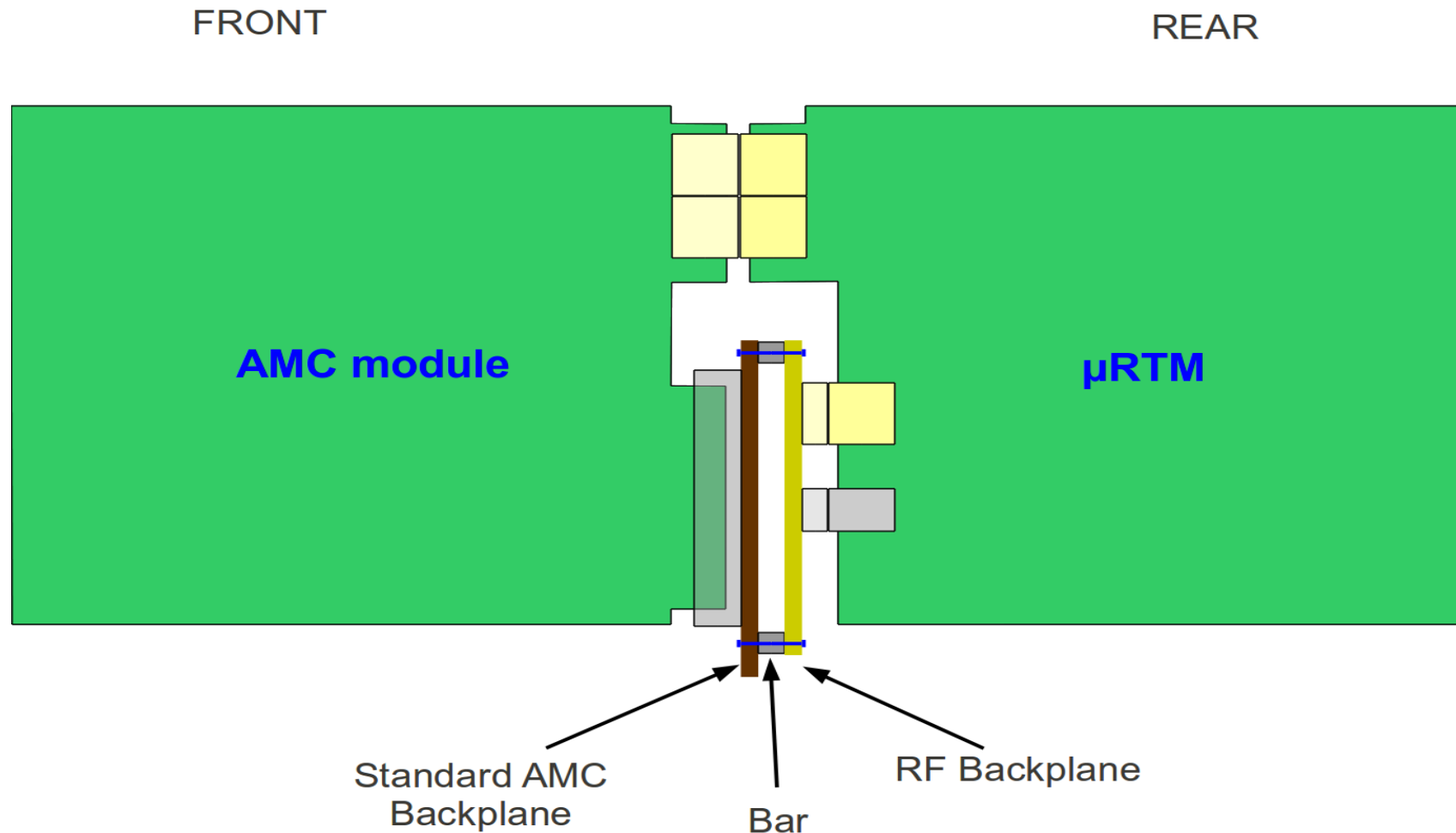
xTCA Crate for LLRF – rear view



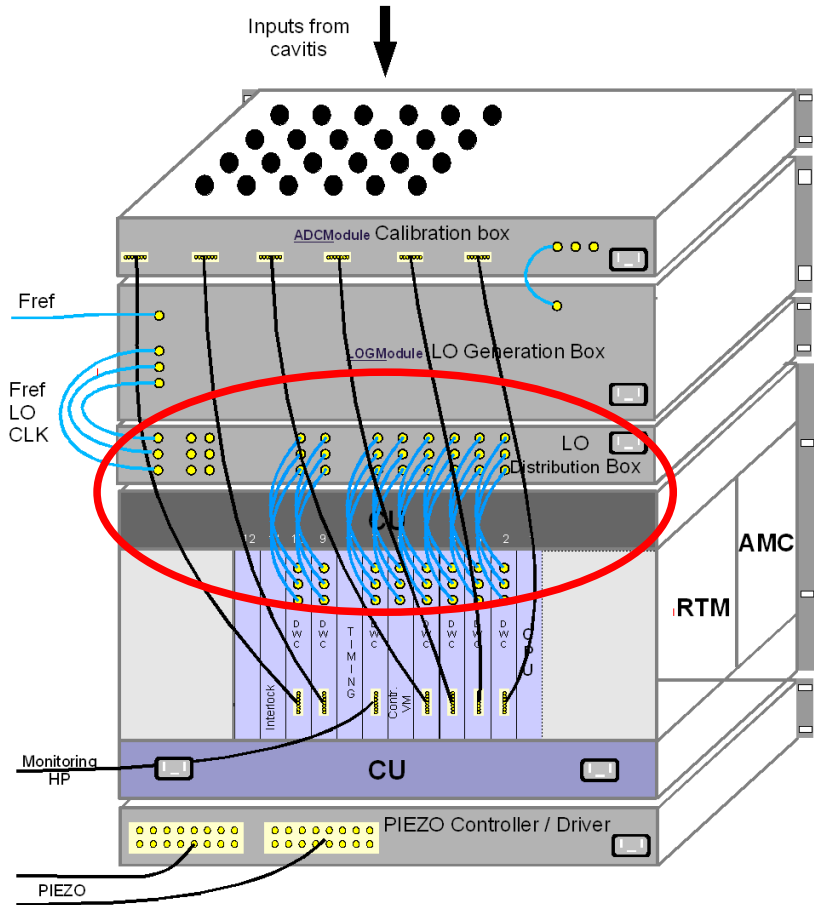
xTCA Crate - backplane



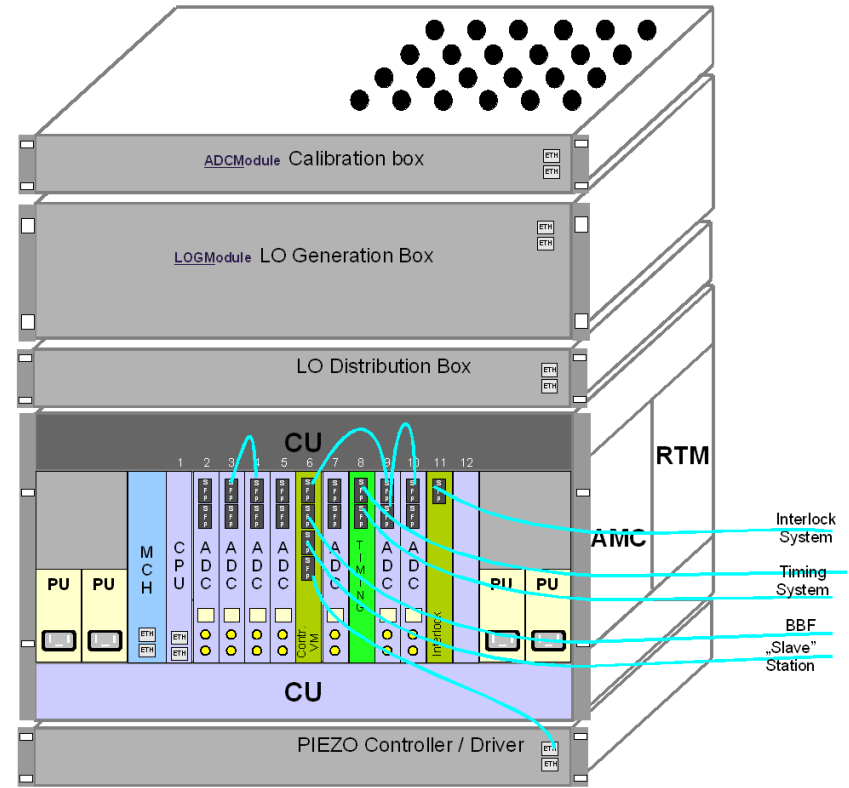
xTCA Crate – RF backplane



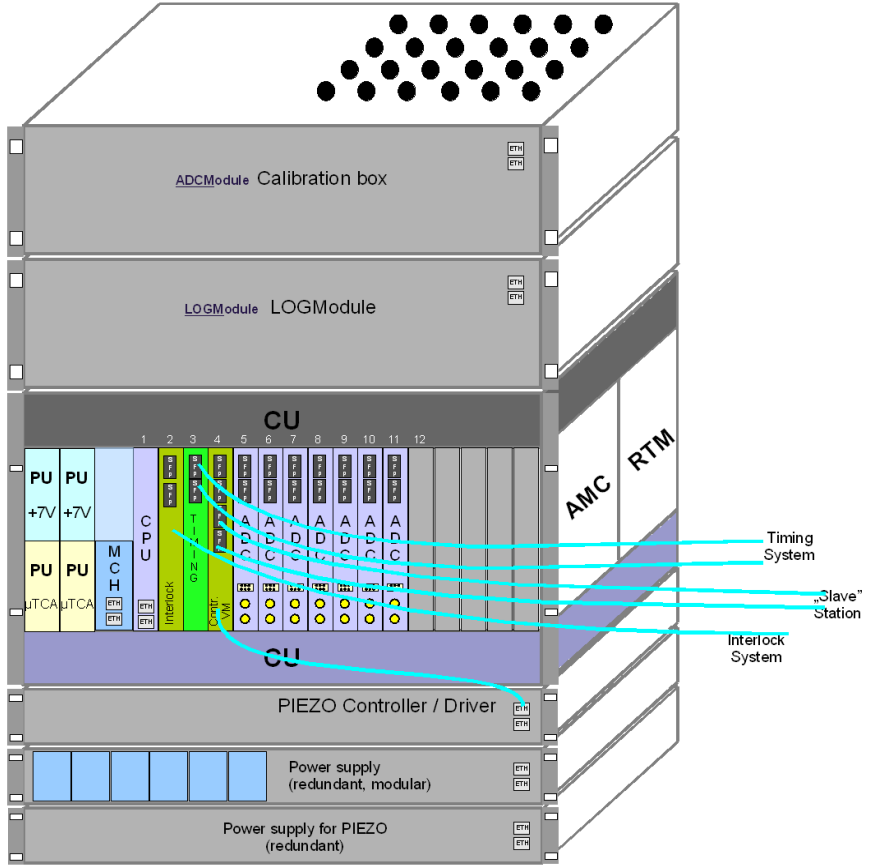
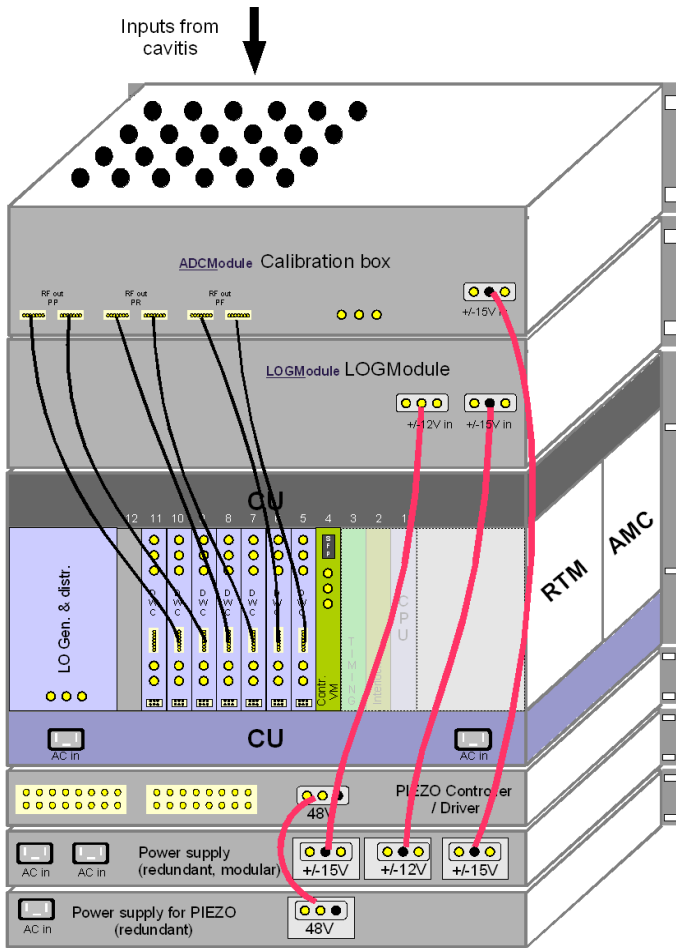
Rack layout



1. CPU
2. ADC - Pref
3. ADC - Pref.
4. ADC - Prob
5. ADC - Prob
6. Contrl.+VM
7. ADC - Monitoring
8. Timing
9. ADC - Pfor.
10. ADC - Pfor.
11. Interlock



Rack layout



simplified cabling



Sharing resources with DESY

Application	AMC Type	RTM type
Timing	Timing receiver	---
Klystron	SIS8300	8 Rf receivers, 2 diff in
3.9GHz monitoring	SIS8300	9 RF receivers @ 3.9GHz
1.3GHz monitoring	SIS8300	9 RF receivers @ 1.3GHz
Coupler Interlocks	DAMC2	ADCs, tests, sources
BPM	DAMC2	---
Toroid	DAMC2	ADC
Beam Loss Monitor	DAMC2	ADCs
Wire Scanner	DAMC2	2 different signal conditioning
Beam Arrival Monitor	SIS8300	Optical in
EBPM	SIS8300	Optical in
Fs LASER sync	SIS8300	Optical in
Fs motors	DAMC2	Stepper card
Spectrometer	DAMC2	32 ch ADC
Machine Protection System	DAMC2	Signal conditioning
Kicker	DAMC1	---

DESY partners :

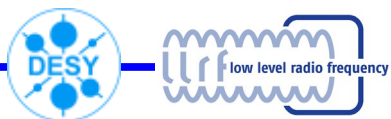
MCS,
MSK,
FEB,
FLC,
FLA,
MDI,
MIN,
MHF-SL,
EXP-DAQ,
SLAC,
TDS, RAEGAE, AMTF

Industry partners:

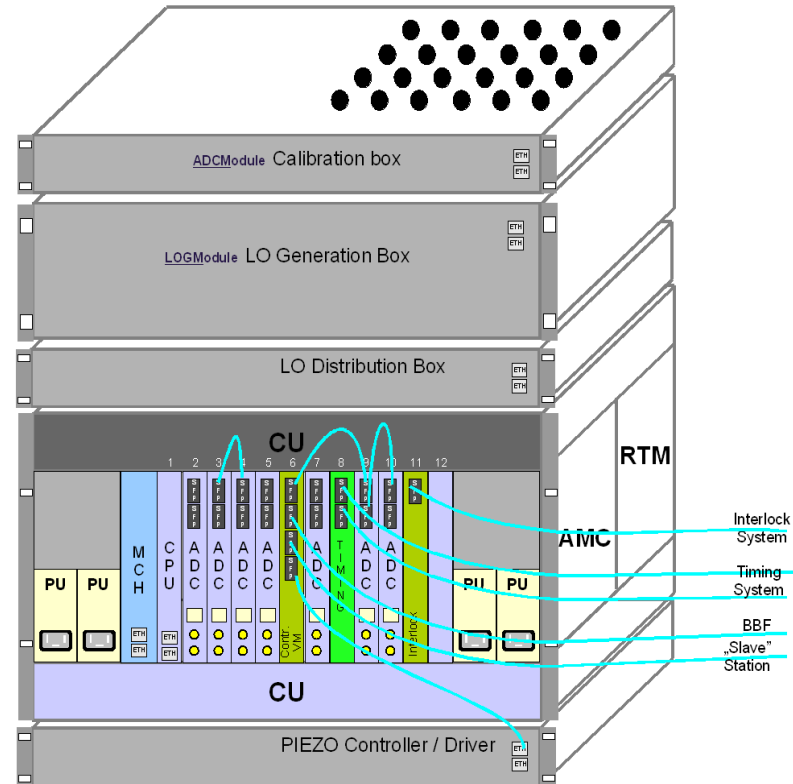
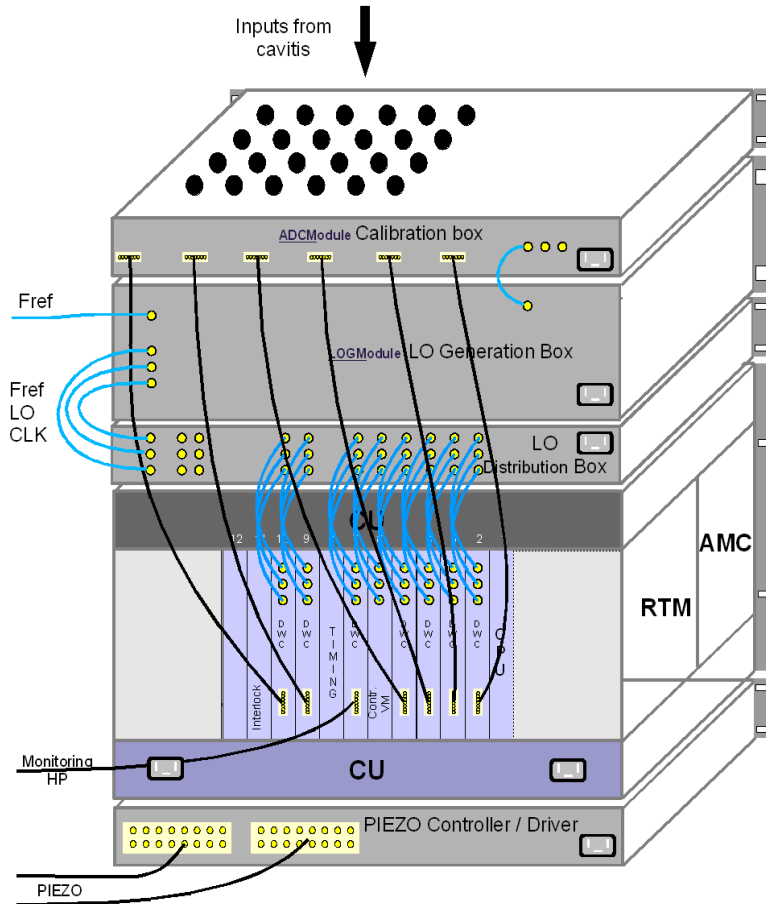
struck innovative
systeme

ELMA 50 years
1960-2010
Your Solution Partner

Courtesy: K.Rehlich / MCS



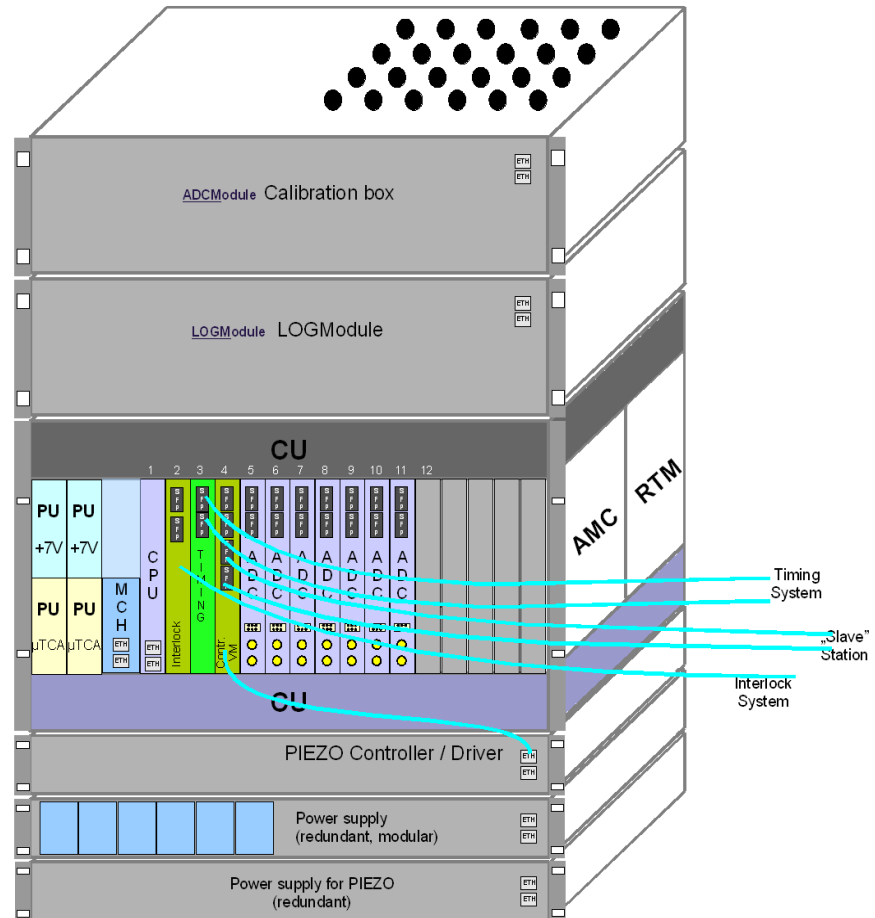
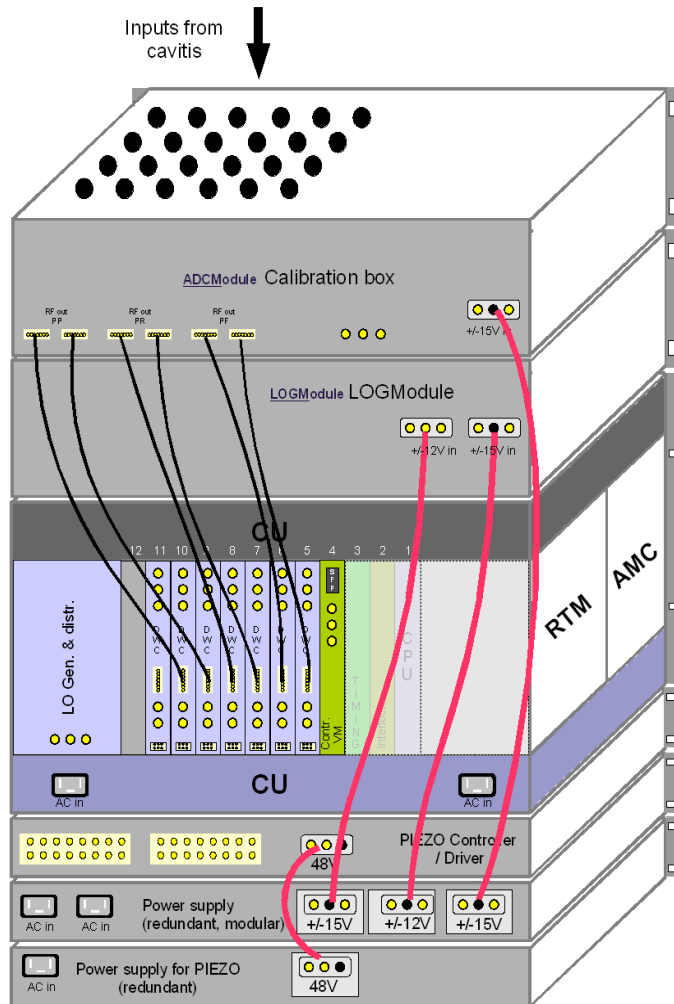
Power supplies in the LLRF rack



1. CPU
2. ADC - Pref
3. ADC - Pref
4. ADC - Prob
5. ADC - Prob
6. Contrl.+VM
7. ADC - Monitoring
8. Timing
9. ADC - Pfor.
10. ADC - Pfor.
11. Interlock

no redundancy, many AC plugs

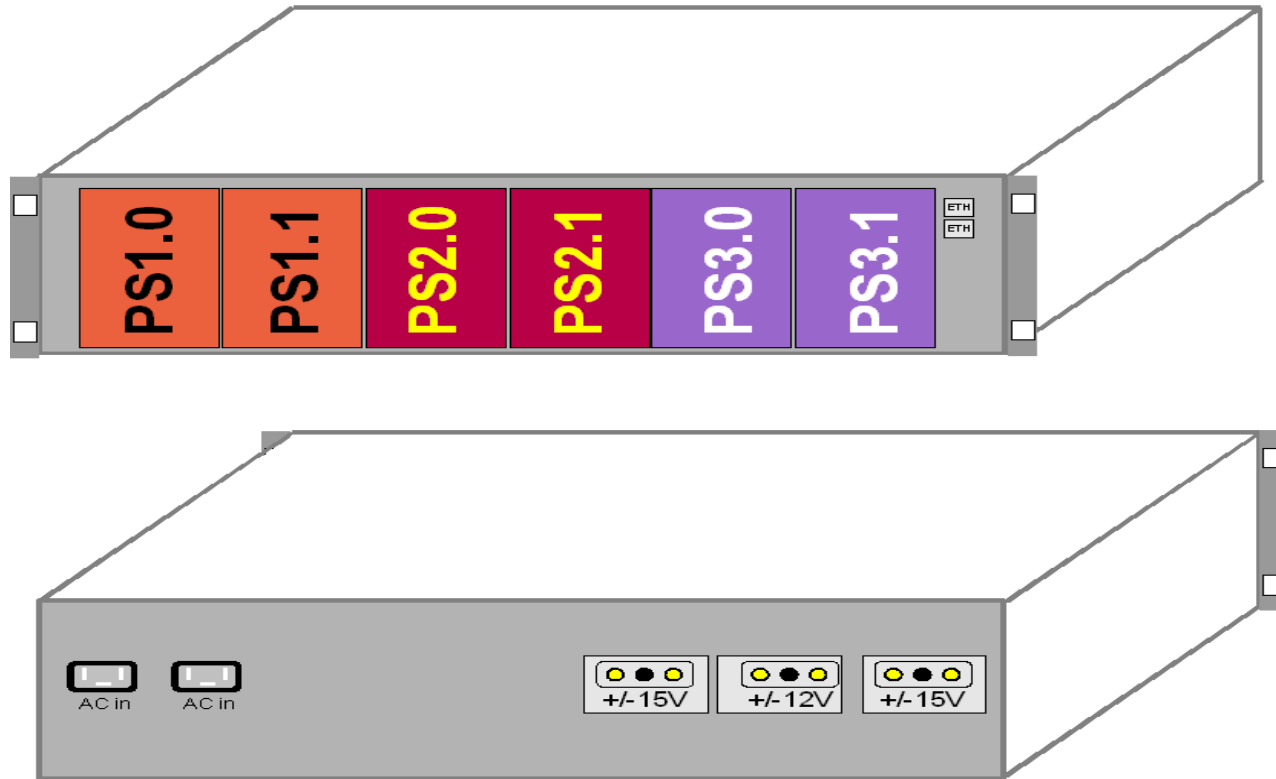
Power supplies in the LLRF rack



redundant power supply

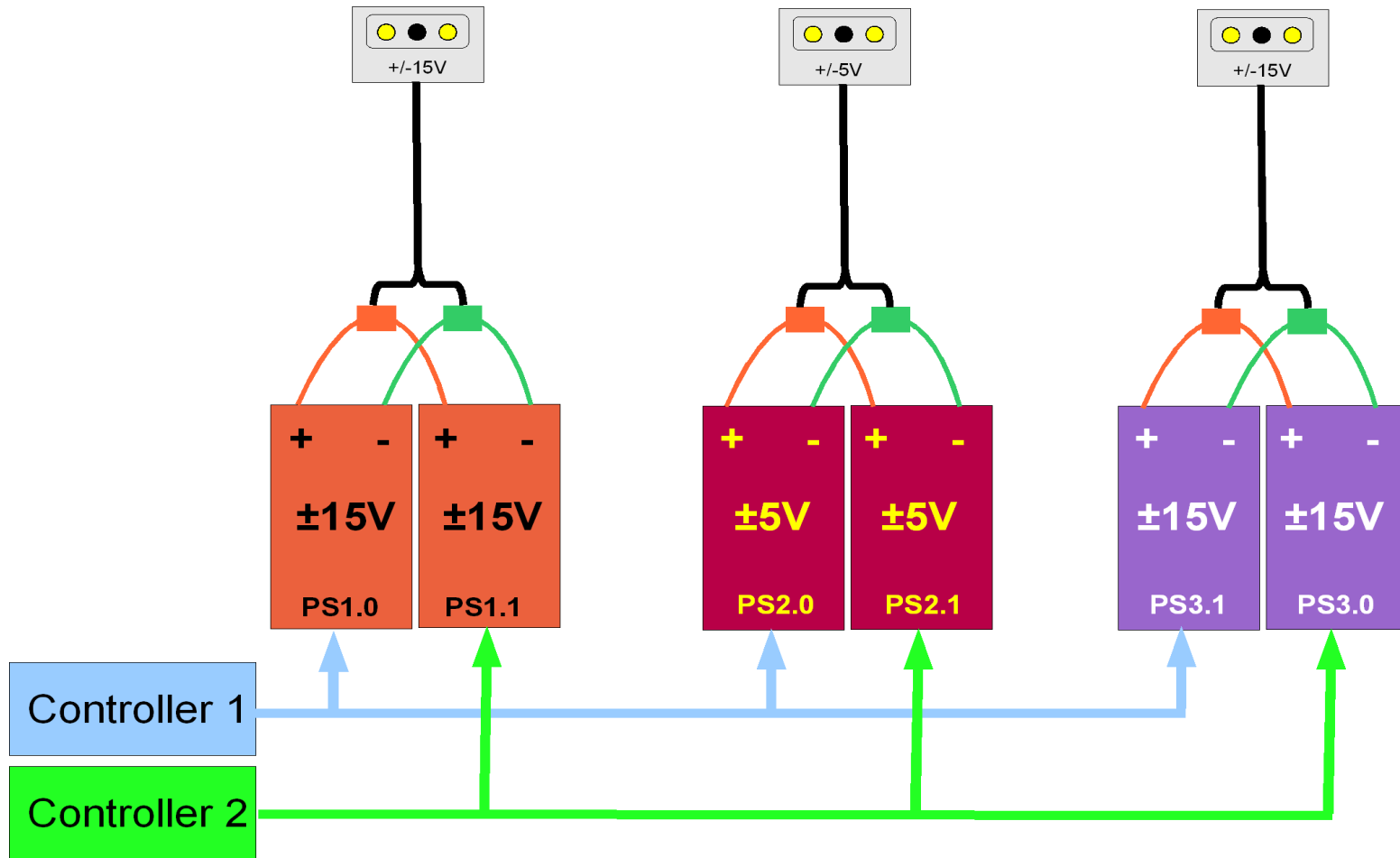


19" power supply

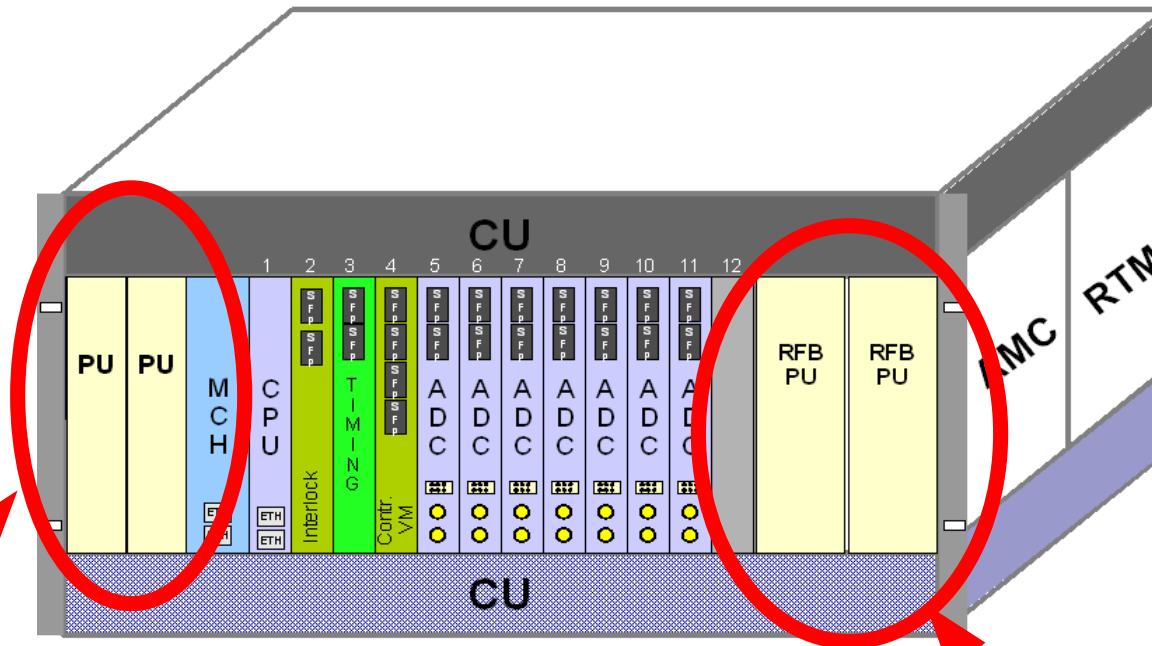


- Modular
- Internal AC distribution
- 2 independent controllers (ETH)

19" power supply



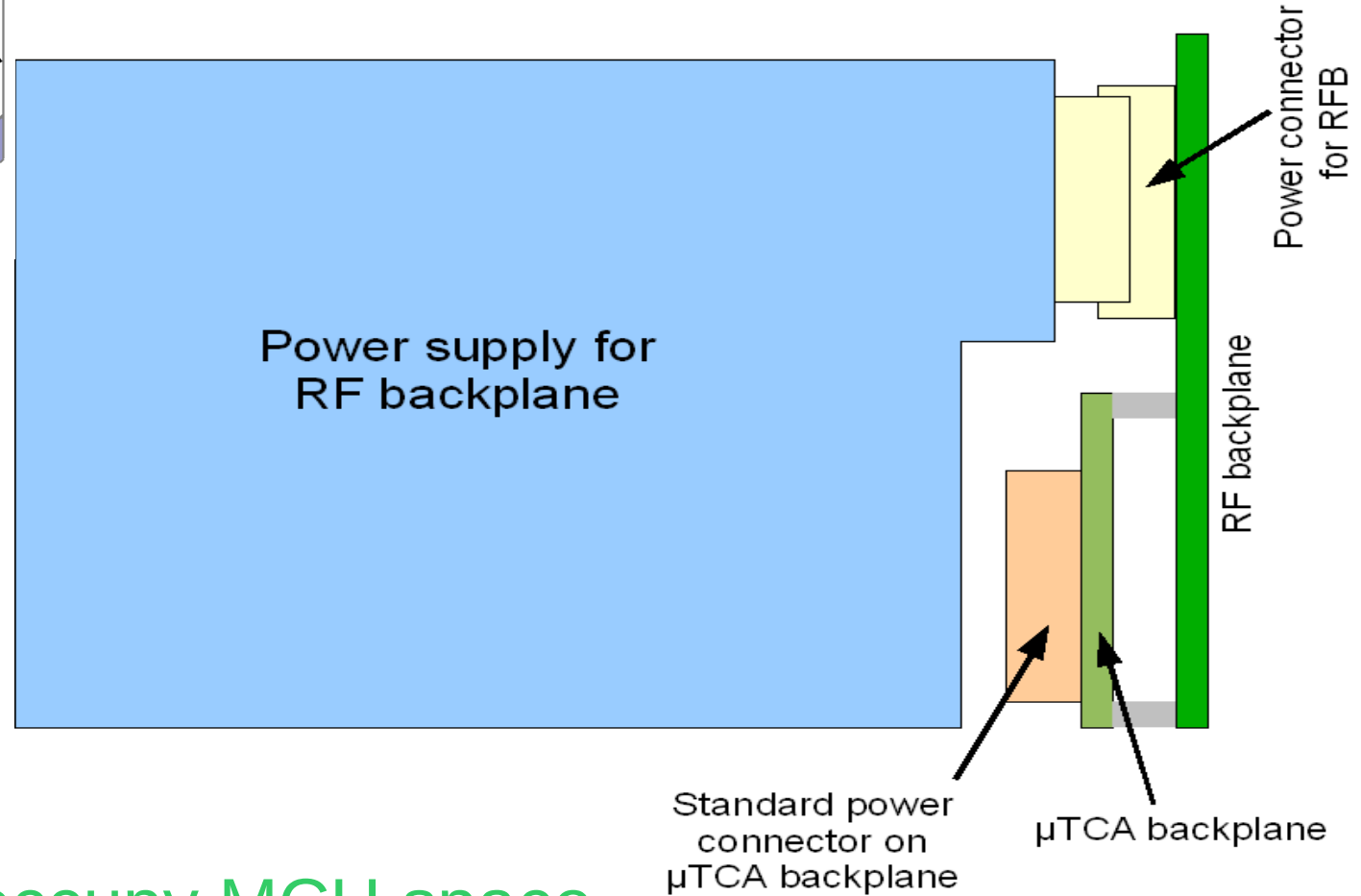
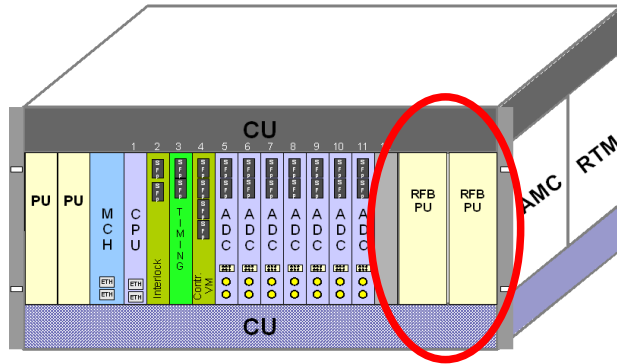
Power supply in the μ TCA Crate



New development (industry), rear AC plug

New development (DESY supported by industry), rear AC plug

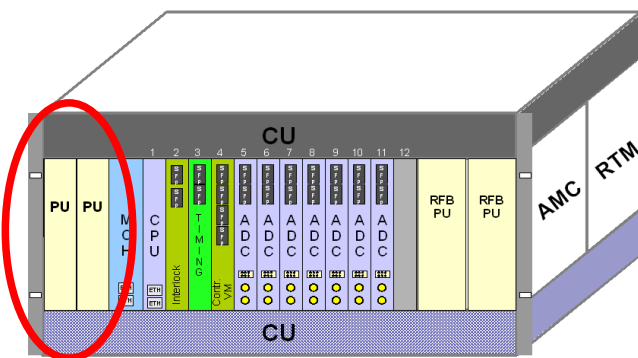
μ TCA Crate – power supply for RF backplane



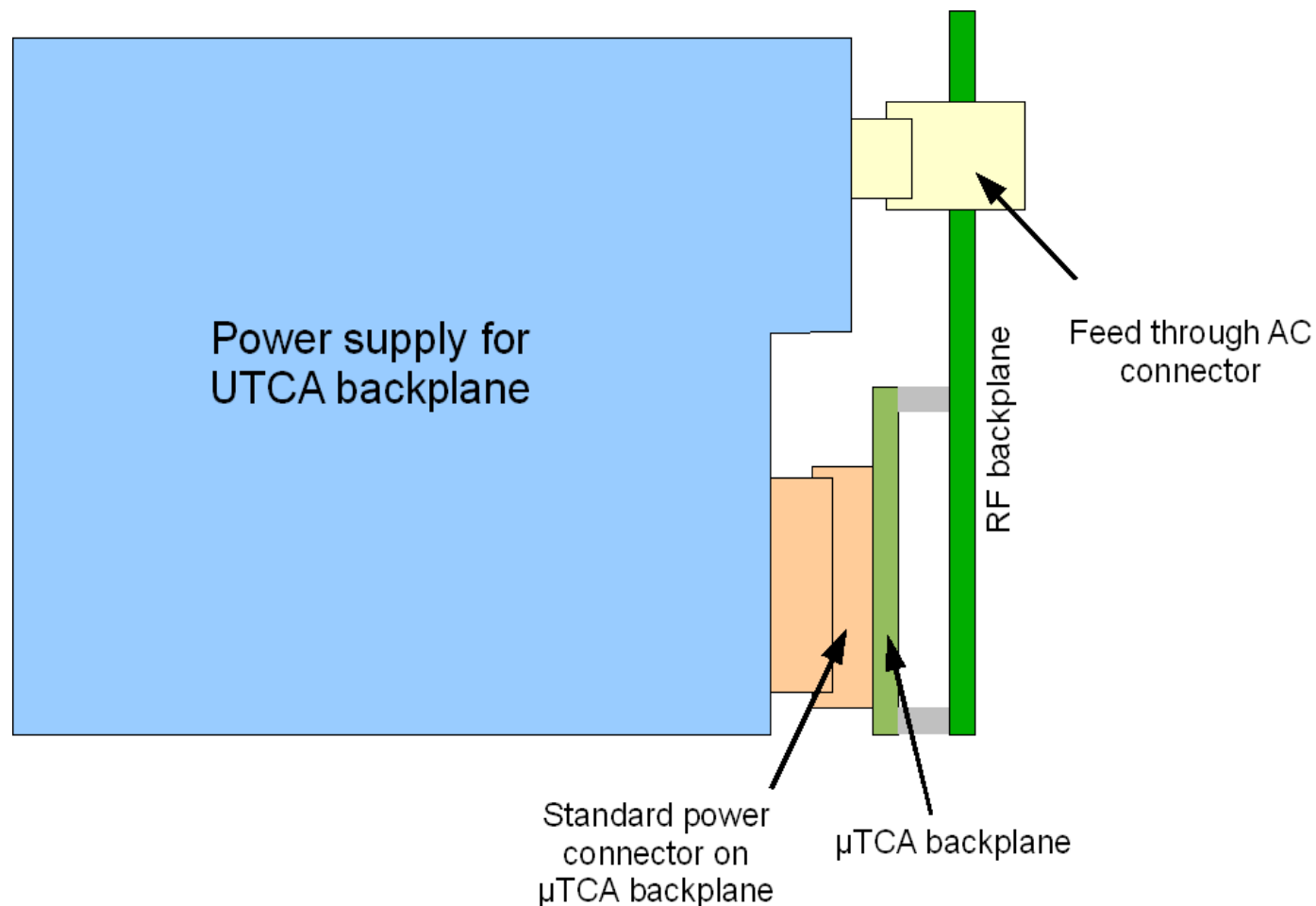
width – may occupy MCH space



μ TCA Crate – power supply for the crate

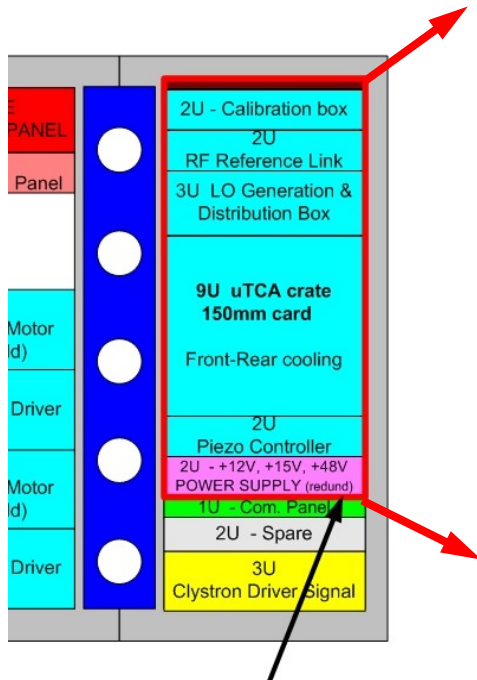


New development
(industry), rear AC plug



μTCA based LLRF - status

Summary of LLRF module and uTCA progress status:



- ADCM (Advanced Drift Calibration Module):
- REFM (Reference Module):
- LOGM (LO-Generartion Module):
- uTCA – Rack (LLRF boards):
 - ➔ DWC8300 (Down-Converter):
 - ➔ SIS8300 (ADC Digitizer):
 - ➔ uTLC (LLRF Controller):
 - ➔ uTLC VM (LLRf Controller):
 - ➔ uRFB (RTM backplane):
- PIEZOM (Piezo driver):
- Power Supply

Design state

Design state

Design state

Delivered, test state

Delivered, test state

Delivered, test state

Delivered, test state

Manufacturing

Manufacturing

Delivered, during tests

Specification / Ordering state

