

ALS Superbend Controls

Requirements and Design

Alan K Biocca

Controls in Project

- Superbend Power Supply Controls
- Superbend Magnet Monitoring
- Superbend Cryosystem Monitoring
- QFA Quadrupole Controls
- QDA Quadrupole Controls

Requirements Categories

- Standard
- Evolutionary
- New

Standard Requirements

- Safety, equipment protection
- Reliability, maintainability
- 10 hz readout & control rates
- Ramping not controls-limited
- Compatibility with existing applications
- Utilize off the shelf, Standards

Evolutionary Requirements

- Using Compact PCI
 - developed for controls expansion, upgrade
 - already in use on Harmonic Cavity system
- Settable Ramping Rate Control
 - existing ramping rates are static

New Requirements

- Resolution, Settability
 - 1 part in 60,000
- Stability & Noise
 - 1 part in 60,000 long term
 - 1 part in 200,000 short term

Power Supply Review

- Review suggested using 18 bit DAC
- Validated our proposal to use embedded controller in supply

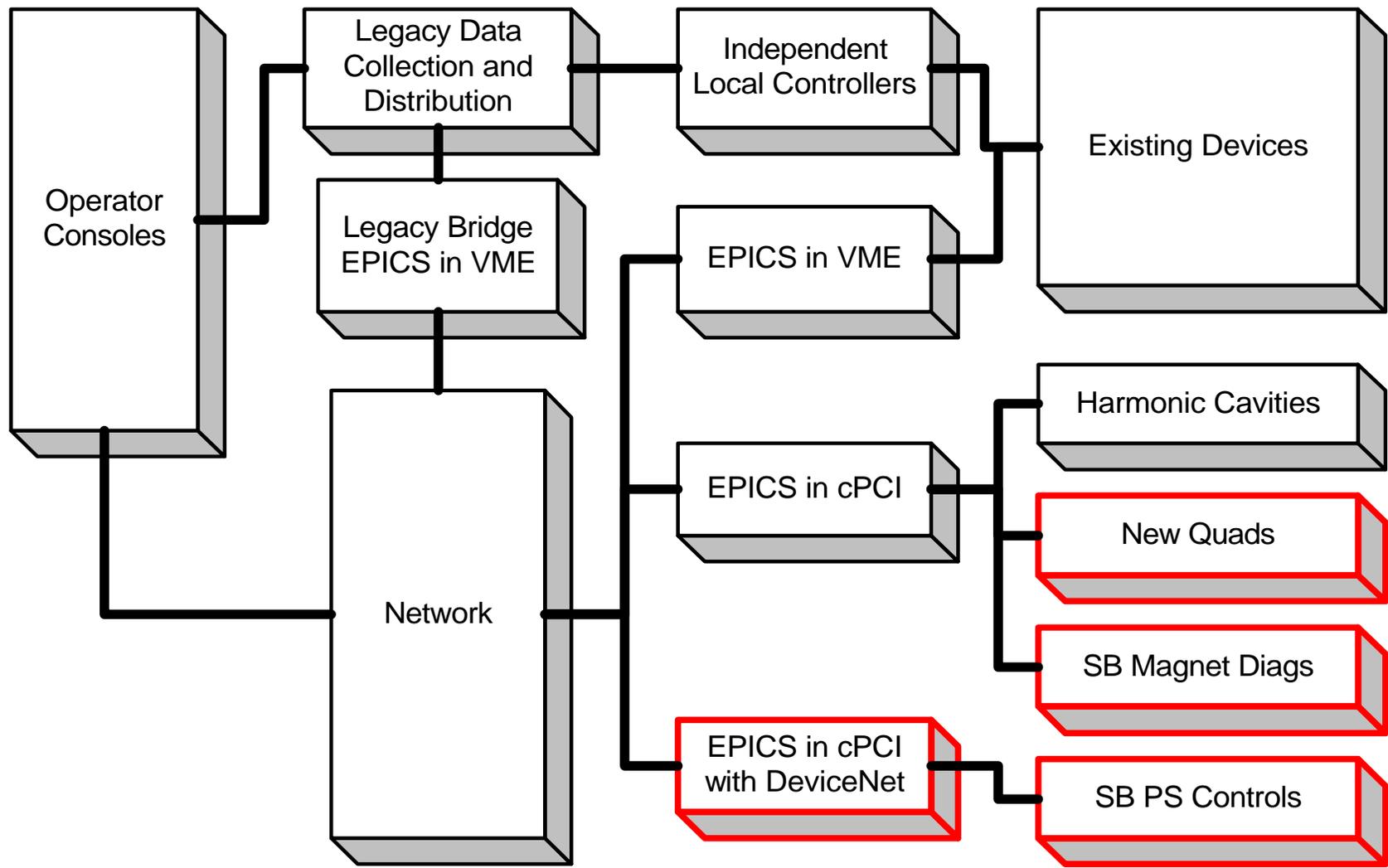
SB Supply Controls Design

- 18 bit DAC (existing design)
- Embedded PLC in supply
 - Commercial hardware
- Standard Field Bus interface
 - DeviceNet (superset of CANBus)
- 10 hz control/readout
 - 50 hz loop, ramping step

Scope of New Development

- DeviceNet
 - use commercial hardware and software
 - start this early
- PLC embedded software
 - work with vendor, get sourcecode
- Superconducting / Cryo User Interfacing
 - Alarm Issues

ALS Control System with SuperBends



Acronym Soup

- PLC programmable logic controller
- QFA QDA quadrupole magnet families
- cPCI compact peripheral component interconnect
- DAC digital to analog converter
- SB superbend
- CANbus controller area network
- VME versa module eurocard
- EPICS experimental physics and industrial control system
- GPIB general purpose interface bus