Quench Protection System

AB-CO services required from now to colliding beams …

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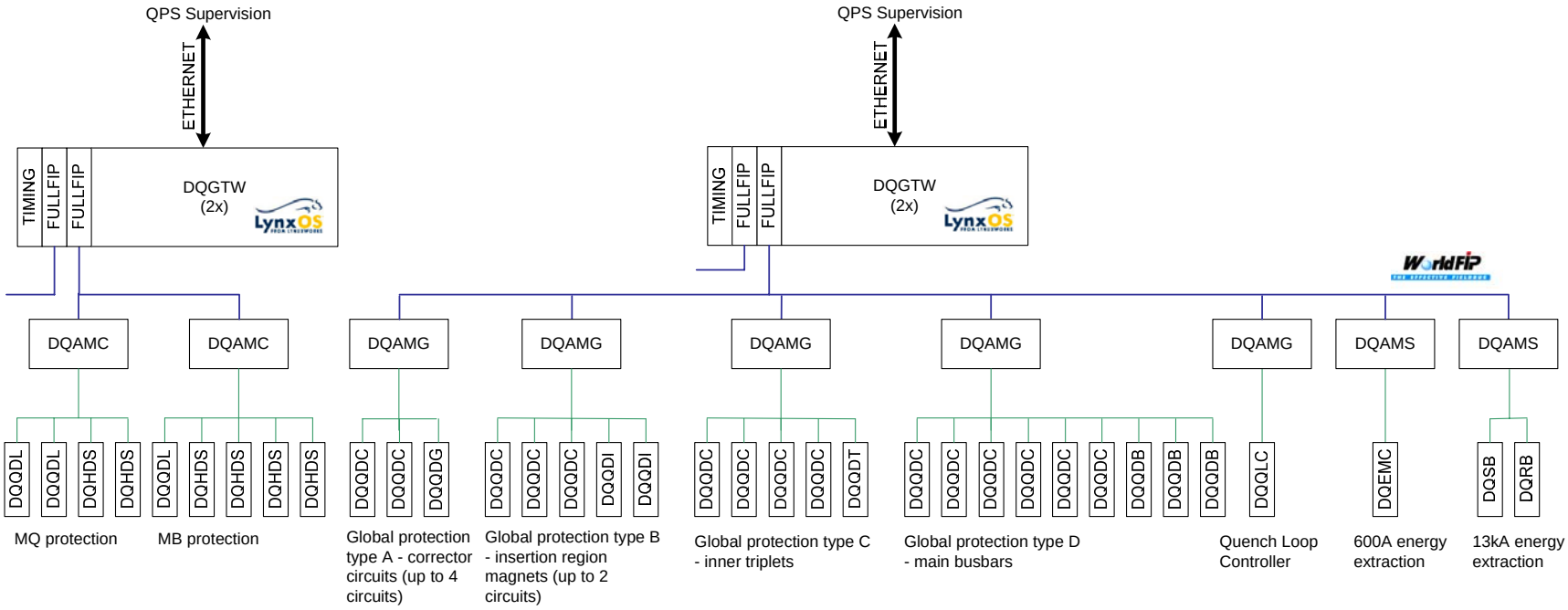
Interfaces between QPS and AB-CO

- Databases
  - Configuration databases
  - Storage of data generated by the various QPS systems
- Fieldbus
  - Network, gateways, drivers, consultancy
- QPS supervision
  - Software interface between QPS controllers and gateways
  - Supervision application
  - Logging, alarms and timing
  - Post mortem
  - Automatic procedures
- Powering interlocks (see 2nd presentation)

QPS controls layout



➔ Equipment per sector:

- 4 x gateways controlling 6 fieldbus segments with up to 60 clients
- 201/205 DQAMC type controllers
- ~29 DQAMS type controllers
- ~30 DQAMG type controllers

Databases

- Maintenance and update of the existing databases
  - QPS signal names
    - Required for QPS supervision, post mortem, logging etc.
  - QPS equipment
    - LHC functional layout database
  - Configuration tools for controls software
    - Fieldbus definition (bus arbiter), variable generation …
  - Links to other LHC databases (MTF, cablothèque, etc.)
- Storage of QPS data
  - Post mortem database
  - Logging & alarm databases

Fieldbus

- Network qualification in LHC to be completed
  - To be done prior to installation of QPS equipment
  - Successfully done for sector 8/1, where QPS installation will start
- Support (soft & hardware) during QPS individual system tests (from 10/2005 onwards)
  - Network, gateways, timing (LHC slow timing with 1 ms precision), drivers, diagnostic tools
  - Gateways & drivers also required for QPS test benches until end of 2006 (surface tests)
  - Sector 8/1 will be the 1st occasion to test the QPS fieldbus under realistic conditions (60/120 controllers per bus / gateway)
    - Surprises, which may require additional support, cannot be excluded
- Fieldbus support of course to be continued during LHC hardware commissioning and beyond

QPS supervision I

- Software interface between QPS controllers and gateways
  - Task shared between QPS (controller level) & AB-CO (gateway level)
    - Includes development of the QPS expert console
  - Development of the gateway interface application “sub-contracted” to AB-OP
    - Results are excellent but availability may be not sufficient for the next 6 months, when several milestones have to be completed
  - Task completed for 1 out of 3 basic QPS controller types
    - Interface for next controller type (DQAMG) must be available and tested by the end of November 2005, the last one (DQAMS) by January 2006
  - Additional support required for
    - Maintenance & update of the gateway software (long term support)
    - Debugging during individual system tests & LHC hardware commissioning (until 2007)

QPS supervision II

- Supervision application (PVSS)
  - Application for LSSL8 must be tested and operational beginning of January 2006
  - In general QPS supervision applications must be fully available prior to the testing & commissioning of the interlocks
  - The supervision application for the main circuits should be available for the final phase of the QPS individual system test
  - Handling of the QPS POWER PERMIT signal to be integrated into the supervision application (see also 2nd talk)
  - Once commissioned, long term support, maintenance and update required throughout the LHC lifetime

QPS supervision III

- Logging, alarms and timing
  - Scope and content defined
  - Services must be available prior to the testing of the interlocks and the subsequent cool-down of the machine
    - LSSL8: beginning of January 2006
- Post mortem data base
  - Unfortunately not available yet as it would be helpful for the QPS surface tests
  - Required from end of November 2005 onwards
  - Superconducting circuits cannot be powered without a running post mortem system
- Post mortem – data retrieval and analysis (see also Felix's presentation)
  - Data viewers & browsers
  - Analysis tools
  - These applications can be validated within the QPS surface tests

QPS supervision IV

- Automatic procedures for QPS
  - Procedures for QPS individual system test
    - Batch processing of commands to be sent to QPS equipment
    - Prior to LHC commissioning but as well during LHC exploitation (monthly test of QPS)
  - Procedures for LHC hardware commissioning
    - Sequencer application
    - Interlock testing and commissioning
    - Battery tests and commissioning of corrector circuits
  - Definition of the procedures by AT-MEL, implementation by AB-CO
    - Definitions for QPS individual system test currently in preparation
    - LSSL8 can be commissioned without automatic procedures
    - Procedures must be available for the hardware commissioning of sector 8/1

Conclusions

- QPS functionality depends essentially on the services provided by AB-CO
  - There will be no powering etc. without these services properly running
- Collaboration between QPS and AB-CO so far smooth and effective
  - Delays and problems have been handled in a flexible way
  - There will be less flexibility once QPS individual system test and LHC hardware commissioning has been started
- QPS controls requirements have been defined in a long term process involving all concerned parties
  - No new requirements and/or service requests so far but individual system tests and hardware commissioning may lead to additional requirements
- A few potential future bottlenecks (not yet showstoppers) have been identified