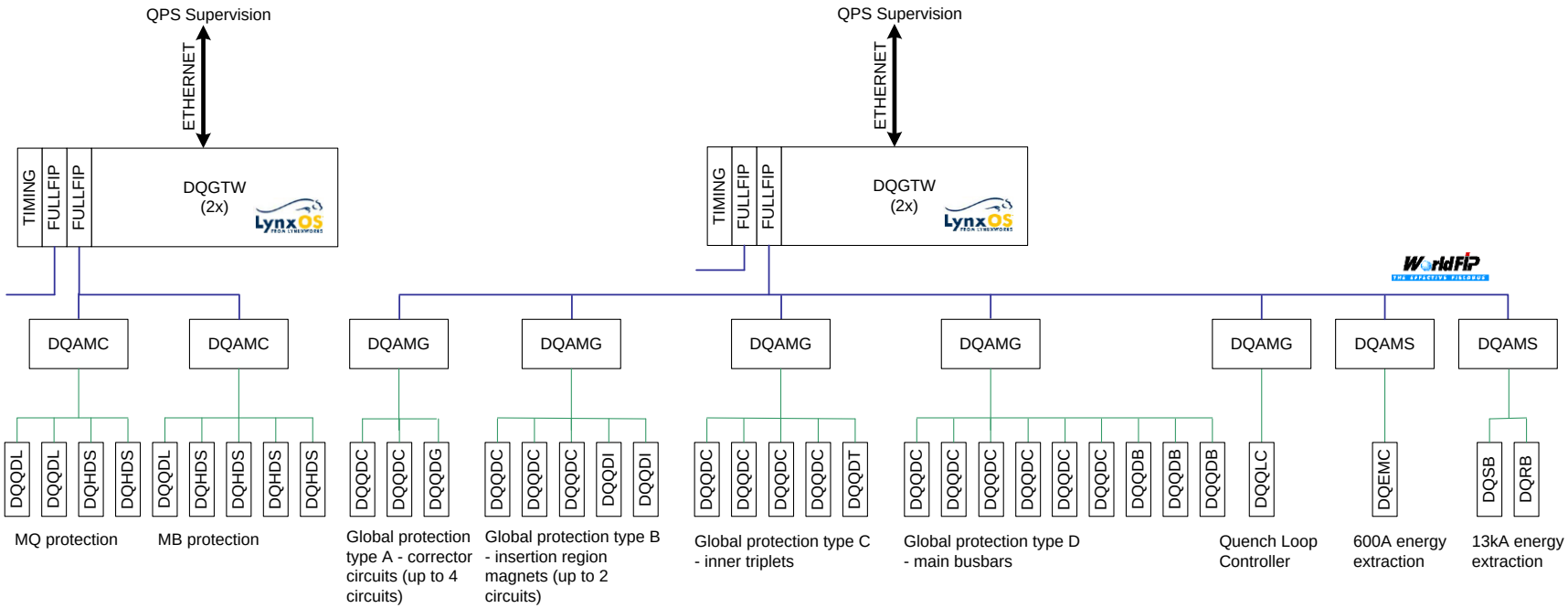
Signal Exchange between QPS and PIC

- Hardwired signals:
  - ST_CIRCUIT_OK (issued per circuit by QPS) → ST_ABORT_PIC (received by PIC)
  - Provokes a fast power abort of the concerned power converter
  - Transmitted via current loops integrating QPS, PIC and PC
- Software signals:
  - ST_PWR_PERMIT signal to be verified prior to powering of a circuit
  - Signal issued per circuit thus avoiding masking of signals during hardware commissioning
  - Signal is TRUE in case the related QPS systems and their supervision are available and ready for powering
  - Integrity of a superconducting circuit (e.g. after a quench) not covered by the signal
    - To be checked with the help of post mortem analysis

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

QPS controls layout and generation of the PWR_PERMIT signal

- Each QPS controller calculates a local ST_PWR_PERMIT signal based on the information collected from the associated equipment (quench detectors, quench heater power supplies …)
  - Signal is transmitted permanently and time stamped
  - Signal is by definition FALSE if controller not in LOGGING state
- The ST_PWR_PERMIT of a circuit is calculated on the supervision level based on predefined tables and exchanged between QPS PVSS & PIC PVSS
  - $ST\_PWR\_PERMIT_{Circuit} = \Sigma ST\_PWR\_PERMIT_{Controller}$
  - In case of the main circuits the involved controller signals are routed through several gateways (up to 4)
  - Signal is not interlocking – a change of its state from TRUE to FALSE creates an alarm
  - The signal has to be verified in case of repetitive powering cycles
    - Implementation (software interlock?) to be discussed
- Signal generation and exchange to be checked within LHC hardware commissioning