

Firmware Upgrade Framework for MTCA.4

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Every MTCA.4 system includes dozens of various, programmable devices. Besides management controller (MMC) most of the modules are equipped with devices like FPGA, MCU or DSP acting as payload controllers. During firmware development particular devices are reprogrammed using dedicated developer tools and programmers. However, upgrading of the modules one by one or connecting separate programmers for every device is not acceptable in final production system. The situation is especially difficult when the system is composed of hundreds of modules and installed in not accessible place as is the case with control system of XFEL.

The presentation shows framework developed at DESY for the needs of remote firmware upgrade in MTCA.4 systems. It is mainly dedicated for programming of non-volatile memories for FPGA devices, because they are most commonly used in modules installed at FLASH and XFEL experiments. The framework allows to program both SPI and JTAG memories. It consists of two main parts: IP core for FPGA responsible for memory programming and software tools (application and scripts) for initialization and supervising of firmware upgrade process. The communication between hardware and software components is based on PCIe interface.

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