

A SDN based approach for the ATLAS data acquisition network

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ATLAS is a high energy physics experiment in the Large Hadron Collider located at CERN.

During the so called Long Shutdown 2 period scheduled for late 2018, ATLAS will undergo several modifications and upgrades on its data acquisition system in order to cope with the higher luminosity requirements. As part of these activities, a new read-out chain will be built for the New Small Wheel muon detector and the one of the Liquid Argon calorimeter will be upgraded. The subdetector specific electronic boards will be replaced with new commodity-server-based systems and instead of the custom SLINK-based communication, the new system will make use of a yet to be chosen commercial network technology.

The new network will be used as a data acquisition network and at the same time it is intended to allow communication for the control, calibration and monitoring of the subdetectors. Therefore several types of traffic with different bandwidth requirements and different criticality will be competing for the same underlying hardware. One possible way to address this problem is using a SDN based solution.

SDN stands for Software Defined Networking and it is an innovative approach to network management. Instead of the classic network protocols used to build a network topology and to create traffic forwarding rules, SDN allows a centralized controller application to programmatically build the topology and create the rules that are loaded into the network devices. The controller can react very fast to new conditions and new rules can be installed on the fly. A typical use case is a network topology change due to a device failure which is handled promptly by the SDN controller. Dynamically assigning bandwidth to different traffic types based on different criteria is also possible. On the other hand, several difficulties can be anticipated such as the connectivity to the controller when the network is booted and the scalability of the number of rules as the network grows.

This work summarizes the evaluation of the SDN technology in the context of the research carried out for the ATLAS data acquisition system upgrade. The benefits and drawbacks of the new approach will be discussed and a deployment proposal will be made.

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