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CMS RPC Link System fiber planning and qualification

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During LHC Long Shutdown 3, the new RPC Link System will be installed. The new Link System will allow us to exploit the high time resolution of the detector from the current 25 ns, due to a limitation in the electronics of the existing system, to the order of 1 to 2 ns with the upgrade. Utilizing the performance of the new electronics will require a low attenuation loss fiber optic infrastructure for high-speed data transmission at the rate of 10 Gbps, which will be replaced with current optical links. It is worth mentioning that the new electronics include, by default, two redundant channels for data transmission on the master link board and two redundant channels on the control boards. Profiting from redundancy requires detailed planning to define the number of fiber optic lines needed, the choice of the number and location of patch panels, the available optical power budget due to different connectors and transmission distances, the fiber type, etc. This poster will show how all these factors led to the current design for the fiber optic infrastructure and how this can serve as an experience for detectors with similar needs.

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