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# KM3NeT On-shore Station and Broadcast Customization of White-Rabbit Switches Towards Optimizing Communication Resources for Shared Control Link

KM3NeT collaboration aims to build a cubic-kilometre scale neutrino telescope at the bottom of the Mediterranean Sea. KM3NeT is composed of an On-Shore Station which connects via an optical network to a matrix of underwater sensors, called Digital Optical Modules (DOMs). Bulk data will continuously flow from the sensors to the On-Shore Station and only a limited amount of bandwidth will be used for Slow Control. Therefore the physical topology of the optical network is asymmetric in order to significantly reduce the cost of the undersea electrical/optical cable. The same network is used to synchronize the sensors (within 1 ns) using White Rabbit technology. The requirements for timing accuracy and the asymmetry of the network make the system highly complex. Every single DOM has a unidirectional 1Gb/s uplink through which it delivers the acquired data to the On-Shore Station. The on-shore station has a unique unidirectional 1 Gb/s downlink to reach all the DOMs, this is called the broadcast or Slow Control (SC) link. This topology highly reduces the communication resource cost, but it requires customizing the communication elements and modifying the White Rabbit (WR) protocol that is embedded in them, especially at the On-Shore Station side. The present article explains the On-Shore station of KM3NeT and the modifications needed in the WR switches in order to implement the broadcast in detail.

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