The LHC has planned a series of upgrades culminating in the High Luminosity LHC with an increase in the luminosity by a factor of 5-7 times the LHC nominal value.

TileCal will undergo an upgrade to accommodate the HL-LHC parameters where the read-out electronics will be redesigned introducing a new read-out strategy.

The photomultipliers data will be serialized for every bunch crossing and transmitted to the PreProcessors in the back-end.

- Bandwidth upgrade from 165 Gbps to 40 Tbps.

Prototype detector modules (“Demonstrators”) have been constructed and exposed to different particle beams and at different energies, to evaluate the performance of the detector with the new readout system.
• Three different Front-End options are being evaluated: 3in1 with discrete components, FATALIC and QIE are custom ASICs.
• The PreProcessor is the core element of the back-end. Designed to provide backward compatibility with the current DAQ system and at the same time to permit to explore the new overall ATLAS readout architecture.
  — After Phase-II upgrade it will provide preprocessed information to the first level of trigger.
• A modified version of the ATLAS official DAQ software has been used during the tests with beam.
• Custom software packages in combination with the official ATLAS software framework are used for online monitoring and offline data reconstruction.