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Multi-Gigabit Wireless Data Transfer for High Energy Physics Applications

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The future of connectivity is wireless, and the HEP community is not an exception. The demand for high capacity data transfer continues to increase every year at a significant rate. For example the tracking detectors require readout systems with several thousand links that has to handle a data transfer of multiple-gigabit/s each. We propose to use the millimeter-wave band between (57-66 GHz). This 9 GHz band is very attractive in order to achieve high data transfer rate.
This talk present current development of the 60 GHz transceiver chip for HEP applications. Studies of antenna and data transmission will be shown.

Summary

The future of connectivity is wireless, and the HEP community is not an exception. The demand for high capacity data transfer continues to increase year over year at a significant rate. This is a continuously race where technology and applications developers push into higher and higher bandwidths. For example the tracking detectors require readout systems with several thousand links that has to handle a data transfer of multiple-gigabit/s each. Also, due to the high granularity of these links, stringent requirements are also specified on space, material and power consumption. Wireless technique have also developed extremely fast the last decade and are now mature for being considered as a promising alternative to cables and optical links that would revolutionize the detector design. In this context has the WADAPT (Wireless Allowing Data and Power Transmission) consortium been formed to identify the specific needs of different projects that might benefit from wireless readout techniques. The millimeter-wave band (mmw) is defined where the wavelength varies from ten millimeters (30 GHz) down to 1 millimeter (300GHz). In this consortium we will concentrate on data transfer communication in the 60 GHz band (57 GHZ - 66 GHz). This license free 9 GHz band is very attractive in order to achieve a high data rate transfer. In addition it provides a small form factor, material reduction, high material penetration loss, narrow beam width and high path loss. These features, and due to the operation in a very well controlled environment with line-of-sight operation, makes the 60 GHz band optimal for short range operation as in a detector environment. This talk present current developments of the 60 GHz transceiver chip for HEP applications. Studies of antenna and data transmission will also be shown. An International collaboration for an R&D on wireless readout is sent to CERN, and is now under evaluation.

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