USAGE OF DATA TRANSMISSION AND TIME SYNCHRONISATION NETWORKS IN ITER DATA ACQUISITION AND CONTROL SYSTEMS [[1]](#footnote-1)\*)

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One of the main goals of ITER construction is to obtain scientific data that will help in solving physical and technological problems that arise on the way to generating electric energy using controlled thermonuclear fusion. For machine control, data acquisition and time synchronization, the ITER device provides a set of specialized networks called Plant Operation Network (PON), Synchronous Databus Network (SDN), Data Archiving Network (DAN) and Time Communication Network (TCN).

PON is a general-purpose communication network that uses the TCP / IP protocol and provides asynchronous command transfer and data exchange between technological systems. DAN is an archival network with high bandwidth that allows transferring data from fast controllers to the CODAC Data Archiving System. SDN is needed to provide real-time feedback in the ITER device.

As part of the ITER, many specialized measuring systems (diagnostics) will provide acquisition of scientific data. All diagnostics must be precisely synchronized to ITER-Time (with precision of 50 nanoseconds RMS or less), and all the received information must be timestamped, which is necessary for further analysis and establishment of correlations between the received data. With this purpose a specialized TCN network has been developed at ITER to allows for a robust implementation of the Precision Time Protocol (IEEE 1588-2008), as well as specialized software to support the standardized equipment (primarily the PXIe-6683H timing board).

This report covers the ITER network infrastructure, describes the features and provides usage examples for each network. The requirements specified by the ITER network infrastructure for data acquisition and control systems are analyzed. ITERs’ proposed APIs for these networks are reviewed. Examples of approaches to the development of specialized software utilizing the ITER network infrastructure are given.

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1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/XLVII/E/ru/JG-Pishchulina.docx) [↑](#footnote-ref-1)