

Synchronous Ethernet to Transport Frequency and Phase/Time

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Traditional Ethernet networks operated using local clocks with relatively low accuracy compared with traditional optical network (SONET, SDH) clocks. As such, Ethernet is not inherently suitable for transporting synchronization information (i.e. frequency and phase) in a telecom sense.

In 2005, the ITU initiated a study on transport of synchronization information (frequency, phase/time and signaling) over Ethernet links, similar to the manner in which optical links have traditionally been used for this purpose. The goal of this work was to facilitate a transition from the traditional optical (SONET, SDH) network to the newer data-centric, packet-based networks which are primarily based around Ethernet, in a manner that would allow existing usage of synchronization information to continue; a good example of such a case is the transport of timing information to cellular base-stations, which was traditionally done using a TDM link, and could now be done using a data link.

This has resulted in the definition of a new technology called Synchronous Ethernet, which is capable of carrying telecom-quality synchronization information over Ethernet links. This paper provides an introduction to this technology suitable for the general reader. It then provides background on the relevant standards, and on an underlying messaging protocol, which may be followed up for further information.

This article also addresses the emerging problem of time (i.e. phase) transport, which is now becoming an interesting additional task for synchronization networks. It provides the rationale for this task, and gives an example of how this may be accomplished in a manner similar to the existing IEEE 1588 PTP protocol using a mechanism called Time Synchronous Ethernet. The casual reader will get a useful understanding of these emerging technologies from this paper.

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