Frequency Control Products and Gigabit Ethernet

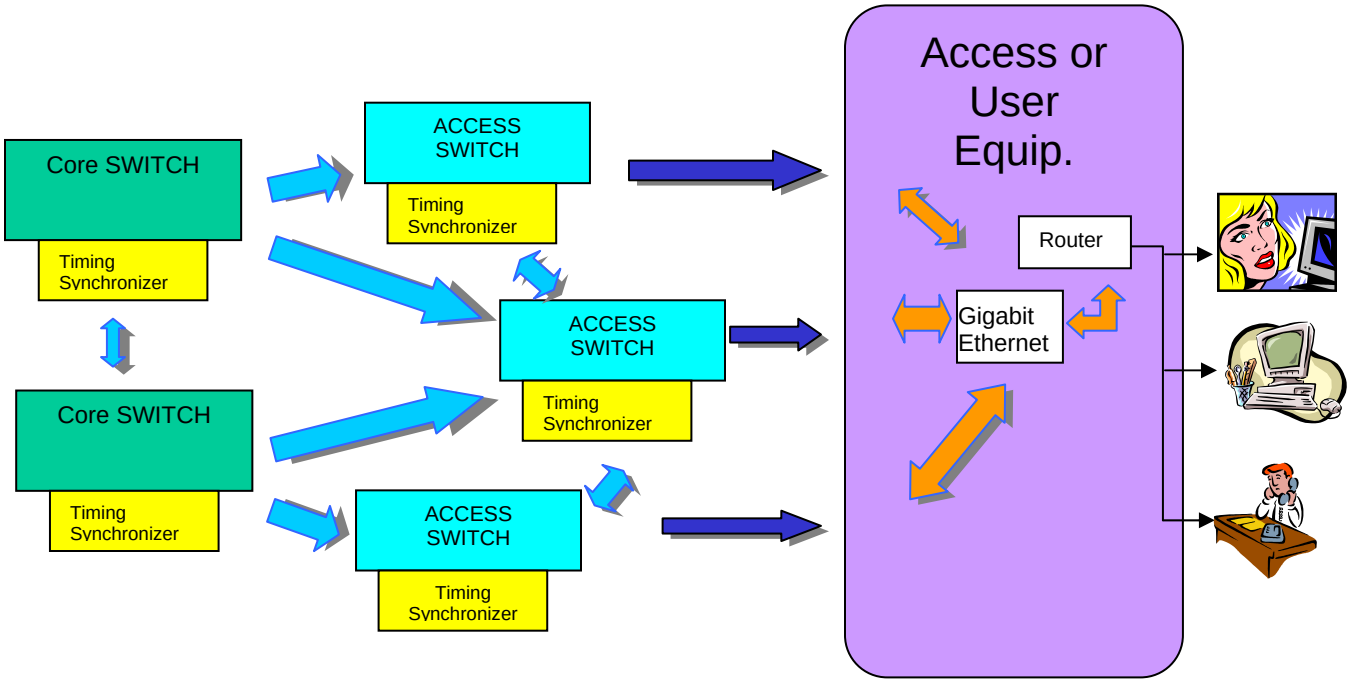
Introduction

In a current vertically integrated era, where applications such as complex data and video along with voice, are increasing in demand, advanced technologies of high-speed information transfer require continuous improvements of information sharing systems. The World Wide Web has become an essential tool in our daily life when it comes to accessing various types of information/business databases, video conferencing or manufacturing networks. Enabling efficient communication flow over existing infrastructure has become challenging in order to satisfy demanding user requirements. High-speed data/video and voice channels along with effective routing systems have been created as a result.

Data Networks

For the purpose of this discussion, we can associate the flow of information within network channels to water flow within very complex system of pipelines of different shapes and sizes. Long haul channels that transfer information from state-to-state or city-to-city are called “TRUNKS”. Trunks connect multiple central office locations while utilizing fiber optics and high bandwidth cabling meshes along with high-speed routers and core switching systems. This accommodates the transfer of heavy masses of data packets (also called high band width data transporters). Once data packets reach a given central office destination (close-by to the final destination of the end user), they are transferred through soft-switching equipment to narrower data transport channels ultimately leading to the end-users (subscribers).

In many cases the subscribers are located within enterprises (i.e. business organizations, hospitals, office buildings, etc.) that share internal communication lines and network channels to support several business activities. In such cases, an internal high-speed network is typically installed.



Ethernet Standard

Ethernet has evolved into the most widely implemented networking protocol today. Fast Ethernet increased the data speed from 10 Megabits per second (Mbits/s) to 100 Mbit/s to and from the users terminal. Gigabit Ethernet was the next iteration, increasing the speed to 1,000 Mbit/s. The initial standard for Gigabit Ethernet was issued by the IEEE in June 1998 as **IEEE 802.3z**.

Gigabit Ethernet access equipment is available in different speeds and bandwidth. Most common systems operate with 3.125Gbits/sec and 10Gbits/sec. 10 Gigabit Ethernet over twisted pair has just been completed, but as of June 2006, the only currently available adapters for copper wire requires special cabling and is limited to 15 meters for point-to-point communications. Major Gigabit Ethernet manufacturers include Cisco Systems, Broadcom (chipset manufacturer), Netgear, D-Link, Intel, Adtran and others.

How does CTS support Gigabit Ethernet Products?

As demands for networking and access applications grow, equipment manufacturers require high frequency reference clocks, sourced from clock oscillators at +/-50PPM accuracy with very low noise jitter performance of <1pS RMS over 12KHz to 20MHz bandwidth. Common frequencies required (may vary based on the chipset or design approach used by each equipment manufacturer) are listed below.

- **3.125 Gbit/sec system**; 25MHz, 50MHz, 62.5MHz or 125MHz (in LVCMOS output technology)
- **10Gbit/sec system**; 156.25MHz (in LVCMOS or LVPECL output technology)

CTS Models CB3LV or 635 with LVCMOS or LVPECL (respectively) are clock oscillators that are suitable for Gigabit Ethernet applications. Both product families are RoHS compliant. The following web link offers access to CTS data sheets for each model, http://www.ctscorp.com/components/xo.asp.

Model Name	Frequency Range	Overall Frequency Stability	Temperature Ranges	Jitter	Package Size
Model CB3LV	1.5 - 160 MHz	± 50 ppm standard (tighter stabilities available)	-20 to 70°C -40°C to 85°C	<0.5pS	7.5 x 5.0 x 1.8 mm 0.295 x 0.197 x 0.071 inch
Model 635	19.44 – 212.5 MHz	± 50 ppm standard (tighter stabilities available)	-20 to 70°C -40°C to 85°C	<0.5pS	7.5 x 5.0 x 1.8 mm 0.295 x 0.197 x 0.071 inch

Photograph of CB3LV Clock Oscillator

Written by: Ronen Cohen
Date: 07/12/2006