

Highlights

- **TN8022 Vitals**
 - Dual-port 10GBase-T PHY
 - Backwards compatible with 1000Base-T and 100Base-Tx
 - Full IEEE Std 802.3an Compliance
 - 25x25mm², 676-ball FCBGA package
 - 1.0mm ball pitch
 - Typical Power:
 - 3.5 Watts/port at 100m
 - 2.5 Watts/port at 30m

- **TN8022 Key Features**
 - **EEE (Energy Efficient Ethernet)**
 - PHY goes into low power sleep mode when there is no traffic
 - Fast zero-packet-loss transitions (within microseconds) in and out of Low Power Idle mode
 - Can even be used with MACs that do not support EEE
 - **AVS™ (Adaptive Voltage Scaling)**
 - Further reduces power consumption by 10% in typical cases
 - Allows adjustment of digital core 0.8V rail voltage level for power consumption optimization
 - **MACSec Core**
 - Provides 802.1AE compliant link level security to meet IPv6 security requirements
 - **Any-to-Any Interface Configuration**
 - 10GBase-T/1000Base-T/100Base-Tx
 - 10GBase-KR / XFI
 - 10GBase-KX4 / XAUI
 - **Test & Debug**
 - Advanced Cable Diagnostics
 - More effective in-the-field cable and network connection debug
 - On-die Temperature Sensor
 - With warning & auto-shutdown option for optimizing system management & thermal design
 - Built-in Manufacturing Tests
 - Improve yield, increase reliability, and lower cost
 - **Other**
 - Low Latency: < 2.0μs
 - Support for CAT5e, CAT6, & CAT6a cables

Application: Server NIC

PLX Product: *TN8022 – Dual-Port 10GBase-T PHY*

Key Benefit: *Easy, Low-Cost Migration from 100M/1GBase-T*

A Server NIC (Network Interface Controller or Network Interface Card) is an on-board controller or add-in expansion card that connects a server to the network. The NIC is both a physical layer (OSI layer 1, aka PHY) and data link layer (OSI layer 2, aka DLL) device as it manages both the physical transmission of the bit stream (i.e. signal) as well as the logical data packet protocol between two given Ethernet ports. Due to the ubiquity of the Ethernet standard, many server motherboards have a network interface controller built into the motherboard. For some systems, the number of Ethernet ports integrated onto the motherboard is not enough, and an expansion card is needed, such as the ones shown in Figure 1 below. Figure 1 only shows single- and dual-port expansion cards, but larger expansion cards with 8 or more ports exist as well. For other systems, the integrated controller is not fast enough and an upgrade to a higher bandwidth NIC card is needed.



Figure 1. Single and Dual-Port 10Gb/s NIC Adapter Cards

Today's bandwidth requirements are orders of magnitude greater than those of even 5 years ago, and this trend will continue. With the emergence of cloud computing services, driven by both the consumer (social media, streaming/sharing, e-commerce, etc.) and enterprise (backup/failover, data analysis, remote access, etc.) sectors, the bandwidth demands of the data center are exploding. Consequently, companies are looking to maximize the performance of their data centers by upgrading to 10Gb/s.

The Move to 10Gb/s

As companies get ready to upgrade their data centers to 10Gb/s or to expand their 10Gb/s capabilities, most will find themselves in one of two camps: 1) those with 1000Base-T or 100Base-Tx data centers, and 2) those with existing 1Gb/s or 10Gb/s optical fiber data centers. In either of these cases, it is advantageous for companies to transition to a 10GBase-T data center moving forward.

The Base-T protocols (100Mb/s, 1Gb/s, or 10Gb/s) employ low cost twisted-pair copper cables such as CAT5e, CAT6, and CAT6a to transmit data. In contrast, optical, or fiber-optic data centers transfer data by transmitting light over a thin, transparent fiber made of pure glass – a much more expensive technology. In the past, the primary reason data centers chose to implement the more expensive fiber-optic technology was that it used to be the only way to transmit at high bandwidth over long distances. This is no longer true.

Today, with 10GBase-T, data centers can achieve the same high-bandwidth 10Gb/s performance for up to 100 meters at a much lower cost. Optical cables also plug into expensive optical modules that can cost anywhere from several hundred dollars to \$1000 or more. Furthermore, fiber optic data centers carry some long-term reliability concerns as lasers tend to wear out over time, something that is not a concern with twisted-pair copper cables.

For companies with existing 1Gb/s or 100Mb/s data centers, the migration path to 10GBase-T is seamless. The 10GBase-T protocol itself requires for the backward compatibility to 1000Base-T and 100Base-Tx. Consequently, companies can easily forklift their entire install base from 100Mb/s or 1Gb/s to 10Gb/s. Moreover, with Base-T

technology, it is easy to migrate from CAT5e cables to CAT 6, or CAT6a. If these companies instead wanted to transition to an optical data center, the entire data center would have to be replaced. In short, a 1000Base-T or 100Base-Tx data center can be upgraded to a 10GBase-T data center at a fraction of the cost of moving to a 10Gb/s optical data center.

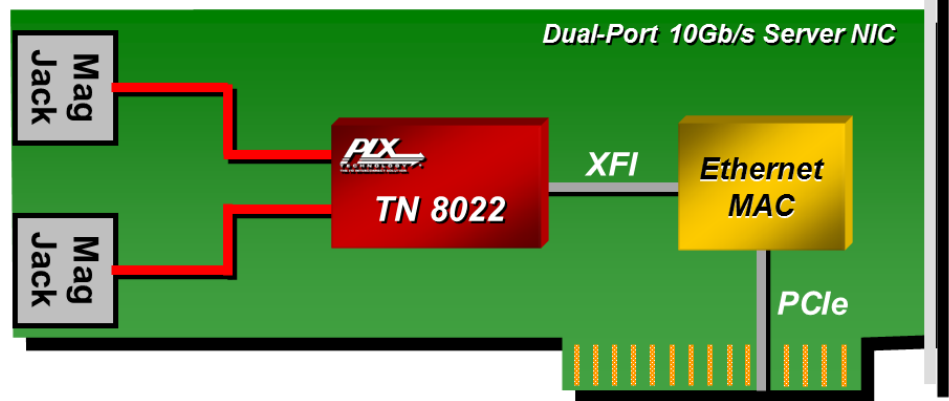


Figure 2. Server NIC Block Diagram

Available Today!

The TN8022 is in full production and shipping today. Along with the TN8022, PLX Technology also offers the below 10GBase-T PHY devices:

Device	Ethernet Ports	Availability
TN8020-A3-FCLB	1	Full Production
TN8020-B0-FCLB*	1	Sampling Q1-2012
TN8022-A3-FCLB	2	Full Production
TN8022-B0-FCLB*	2	Sampling Q1-2012
TN8044-A3-FCLB	4	Full Production
TN8044-B0-FCLB*	4	Sampling Q1-2012

*The B0 silicon revision adds more features and is a pin-compatible (form, fit, & function), lower power, cost-optimized revision to the fully qualified A3 silicon revision. Customers can start designing with the A3 today and seamlessly transition to B0 in Q1 of 2012.

For more information on the TN8022 device, please visit the PLX website at www.plxtech.com/8022.

- Product Brief
- Data Sheet
- Application Notes
- Reference Schematics
- Firmware Downloads
- Video Tutorial: Demo 300 Meter Reach with 10GBase-T Transceiver