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Highly integrated 28-channel T1/E1 LIU provides redundancy without relays

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(09/21/2005 12:25 PM ET)

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The chip manufacturer says...	eeProductCenter's Ismini Scouras says...
<p>Voyager Reinforces Exar's Position as a Leading Supplier of T1/E1, T3/E3 and SONET/SDH IC Solutions for Metro-Core and Metro-Access Markets</p> <p>FREMONT, Calif.— Exar Corp., a leading provider of high-performance, mixed-signal silicon solutions for the worldwide communications infrastructure, has further advanced its position in the T/E carrier and SONET/SDH space with the introduction of the industry's first integrated 28 channel T1/E1 LIU/framer with VT/TU Mapper/DeMapper and the M13 multiplexer. The XRT86SH328 (Voyager) is optimized for the tributary aggregation applications such as multi-service provisioning platforms, optical transport systems, routers and wireless transport systems.</p> <p>"Voyager's unparalleled levels of integration makes it the most cost effective and flexible LIU/Framer/Mapper in the market," said Bahram Ghaderi, vice president and general manager, Network and Transmission Products Division. "Coupled with Exar's other industry proven SONET/SDH and T/E carrier devices, customers can develop multi-chip solutions supporting a wide range of applications."</p> <p>The device provides significant board space savings due to an unprecedented level of LIU/Framer/Mapper integration. When three XRT86SH328s are combined on one line card, the device's unique innovative architecture delivers a complete OC-3/STM-1 solution that supports up to 84 T1 or 63 E1 port aggregation applications. The XRT86SH328 includes all the SONET/SDH framing functionality to provide an OC-3/STM-1 compliant interface. Also, the XRT86SH328 (Voyager) can be used as a chipset with Exar's XRT91L30 transceiver providing a SONET/SDH compliant serial interface at 155 Mbits/sec that can be directly connected to an optical module. In addition, the device utilizes Exar's proprietary R3 Technology™ (Reconfigurable, Relayless Redundancy) delivering key benefits to customers designing T1/E1/J1 interface cards.</p>	<p>With tremendous demand in the T1/E1 area, Exar has developed what it claims is the first integrated 28-channel T1/E1 (line interface units) LIU/framer with VT/TU Mapper/DeMapper and the M13 multiplexer for optical transport applications.</p> <p>Designed to process the section line and path overhead in the SONET/SDH datastream, Voyager, part number XRT86SH328, is a highly integrated device that helps reduce board space in a big way.</p> <p>But that's not all. Each LIU channel on the XRT86SH328 supports the company's R³ technology (reconfigurable, relayless, redundancy). With conventional methods, many relays are needed to provide redundancy in tributary aggregation applications such as multi-service provisioning platforms, optical transport systems, routers and wireless transport systems.</p> <p>"Relays are not reliable," said Raman Subramanian, director of strategic marketing, Networking and Transmission products. "If you're depending on a relay, the redundancy won't be that good." And for companies like Alcatel and AT&T that need to guarantee 99.9% reliability, redundancy is pertinent when their systems fail. To avoid losing data, redundancy allows data to be transferred to an alternate system.</p> 



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"Exar's T/E carrier and Sonet/SDH solutions have achieved significant success with top customers," said Raman Subramanian, director of strategic marketing, Networking and Transmission products. "This highly integrated solution will enable our networking equipment customers to design systems ranging from high-density cross-connects to pizza-box type systems with enhanced capabilities."

Distinguishing Features Voyager's high level of integration enables system designers to architect their systems in configurations that were not practical in the past. Instead of using separate LIU and framer modules, system designers now have the option of using a single module for both LIU and framer functionality, saving significant systems cost and board space.

Each LIU channel on the XRT86SH328 supports Exar's R3 Technology - introduced in 2002. Devices using R3 Technology are reconfigurable with integrated termination supporting all common T1/E1/J1 line impedances enabling customers to build a simple board and eliminate the need for external relays for 1:1 and 1+1 redundancy applications. This feature allows final device configuration to be made just prior to line-card installation. This unique capability prevents customers from having to unnecessarily stockpile an inventory of all configurations to accommodate changing market conditions.

Voyager's architecture supports SONET/SDH compliant T1/E1 de-synchronizers in the drop direction in addition to the jitter attenuator functionality in the add direction. This architecture addresses different types of rigorous network jitter requirements, which in the past required very expensive multi-chip solutions. Voyager also provides unique DS3 capabilities, which includes M13 functionality, by multiplexing 28/21 T1/E1's onto a DS3 signal for sending either on a serial DS3 interface or by mapping onto an STS-1. In addition, DS1's or E1's received from a DS3 signal can be mapped into SONET/SDH through VT/TU mapping (trans-muxing).

Another unique advantage of the XRT86SH328 is the capability to mix T1's or E1's on any one of the LIU interfaces without requiring additional timing devices to support this mixed mode capability. In the past system designers were limited to the feature set of individual LIU and Framer devices for supporting this mixed mode solution which required very expensive timing components on their board design.

Applications When Voyager is combined with Exar's other SONET devices into a multi-chip solution it delivers a wide range of design options for Add/Drop Multiplexer and DS1 aggregation systems. In an Add/Drop Multiplexer application, as shown in Figure 1 [link added later] systems using the Exar devices can support a 4-chip solution for an 84/63 channel T1/E1 aggregation with OC-3/STM-1 output. When used together with XRT94L43, Exar's 12 channel STS-1/DS3 aggregation device, Voyager can provide an OC-12/STM-4 solution mixing T1/E1 and STS-1/DS3 line interfaces on the same line card, Figure 2 [link added later].

Product Details Voyager integrates 28 T1/E1 LIU's and framers along with a SONET/SDH framer, VT/VC mappers, M13 Multiplexer and DS3/E3 framer. This allows the customers to deploy a single line card that supports the simultaneous mapping and transport of both T1 and E1.

Exar also made Voyager reconfigurable. Since T1 lines are used in the United States, and E1 in Asia and Europe, manufacturers have had to build two different systems.

"They have to have inventory of two products because they have to change components on the board. What we did in our device is [give the designer] the ability to reconfigure the software so they can build one system and they can reconfigure the system to E1 without changing any components on the board," Subramanian said.

Voyager's high-function integration and relayless features make it an attractive choice for customers designing T1/E1/J1 interface cards.

"The reason we are the industry's first is there is nobody today in the marketplace that offers the line interface unit combined with the other access controllers, such as framers, mappers, and multiplexers," Subramanian said.

"The competition in the market supplies two or three separate solutions," which results in higher cost, debugging time, and power consumption, he said.

The mixed-signal IC provider uses standard CMOS technology to manufacture Voyager. To achieve greater function integration and lower power consumption, the company switched to 1.8-micron technology from 3.5-micron.

"If I take the power consumption for [existing solutions] and compare it with our offering, it is a 20 to 25% power savings," he said.

The XRT86SH328 operates at 3.3-V/1.8-V with 3.3-V tolerant I/Os over the industrial temperature range.

It integrates 28-channel T1/E1 LIUs, DS1/E1 framers, as well as SONET and DS/3 framers. It also integrates a desynchronizer with an internal pointer leak algorithm, which removes the jitter due to mapping and pointer adjustments from the T1 and E1 signals that are demapped from the incoming SONET/SDH datastream.

The desynchronizer circuits do not need any external clock references for its operation. An integrated clock synthesizer eliminates the need for external PLL, and offers one bill of materials. The chip also provide DS3 capabilities, including M13 functionality, by multiplexing 28/21 T1/E1's onto a DS3 signal for sending either on serial DS3 interface or by mapping onto an STS-1. The DS1s or E1s received from a DS3 signal can be mapped into SONET/SDH through VT/TU mapping.

When three Voyager chips are combined on one line card, they create a complete OC-3/STM-1 solution that supports up to 84 T1 or 63 E1 port aggregation applications. The XRT86SH328 has all of the SONET/SDH framing functions to provide an OC-3/STM-1 compliant interface.



[See related image](#)

Samples of the XRT86SH328 are available in 30 days. In 1,000-piece quantities, the device costs \$151 each. It is available in a PBGA package.

Each channel of the LIU can be selected to operate independently in T1 or E1 mode. Each T1 and E1 channel offers a user programmable arbitrary pulse generator as well as an integrated clock synthesizer that supports a wide range of input clock frequencies.

The device incorporates DS1/E1 framers for performance monitoring in both egress and ingress directions. Each of the 28 T1 or E1 uses an internal de-synchronizer with a pointer leak algorithm to remove the jitter due to mapping and pointer adjustments. The device provides mapping of up to 28 T1/21 E1 streams asynchronous into VT/STS-1 or TU/STM-1. Each of 28 T1/E1 channels includes a PRBS generator and detector. On the system side, Voyager supports either a telecom bus or clock and data interface.
Prices, Packages, Availability, and Additional Information

Samples of the part are available in 30 days. The XRT86SH328 in a 568 PBGA operates at 3.3V/1.8V with 3.3V tolerant I/O's over the industrial temperature range. In 1,000 piece quantities the XRT86SH328 is \$151. Additional information on this product can be found <http://www.exar.com/product.php?ProdNumber=XRT86SH328> and other Exar T1/E1 products at <http://www.exar.com/area.php?areaID=2>.

For more information, go to: www.exar.com/product.php?ProdNumber=XRT86SH328

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