

WA01

A high-density 155 Mb/s framer with integrated T3 and T1 framers and VT1.5 mapper

Highlights

- * Delivers a high-density, highly integrated solution that translates into significant space, power consumption, time, and dollar savings
- * Provides SONET termination, VT1.5 termination, DS3 mapping and M13, and DS3/DS1 framing within a single device
- * Offers optional slip buffering in both transmit and receive directions
- * Interfaces with the WA02 high-density HDLC communications processor through the pin-efficient OSIF bus
- * Services channelized/unchannelized T3 or SONET payloads on the line side
- * Provides OSIF, H-MVIP/H.100 TDM, or serial DS3 interface on the terminal side
- * Leverages the proven technology and advanced architecture of a succession of increasingly integrated Framer/MUX products

Introduction

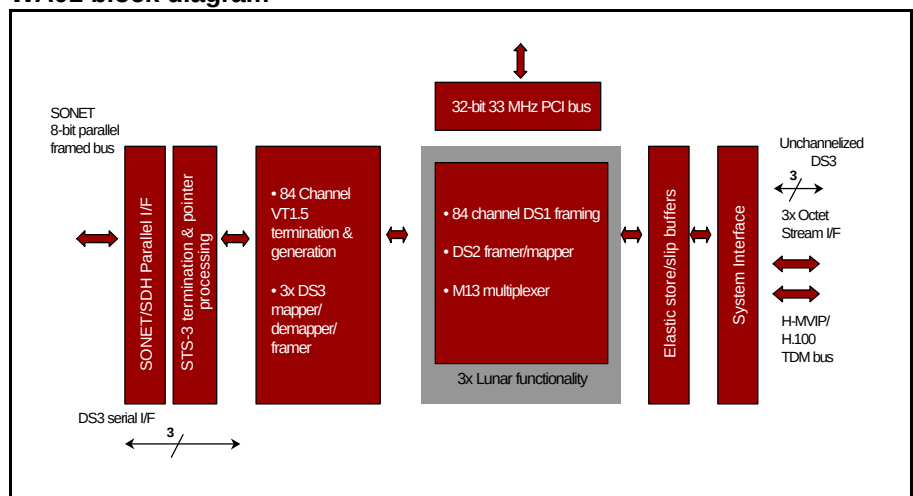
The Nortel Networks WA01 is the next step in an aggressive Framer/MUX technology roadmap that builds on the success of the Lunar architecture, the first-to-market, highest-density/lowest-port-cost T1 framer/multiplexer in its category.

Leveraging the reliability and stability of proven, highly integrated solutions, WA01 increases the size of pipe that an OEM can handle with fewer devices than any competing solution on the market today. Empowering users to dramatically reduce component and

space needs, the WA01 also addresses power issues, and adds more functionality/throughput to larger boards.

Designed for forward compatibility with other devices in the WAN Access portfolio, WA01 is available as a stand-alone, or as a paired solution with partner component WA02, a high-density HDLC communications processor. Together, the WA01 and WA02 represent an optimal termination solution with outstanding interoperability and seamless connection through the pin-efficient Octet Stream Interface (OSIF) bus.

WA01 block diagram



Preliminary
Information

Preliminary Information

Exceptional functional density

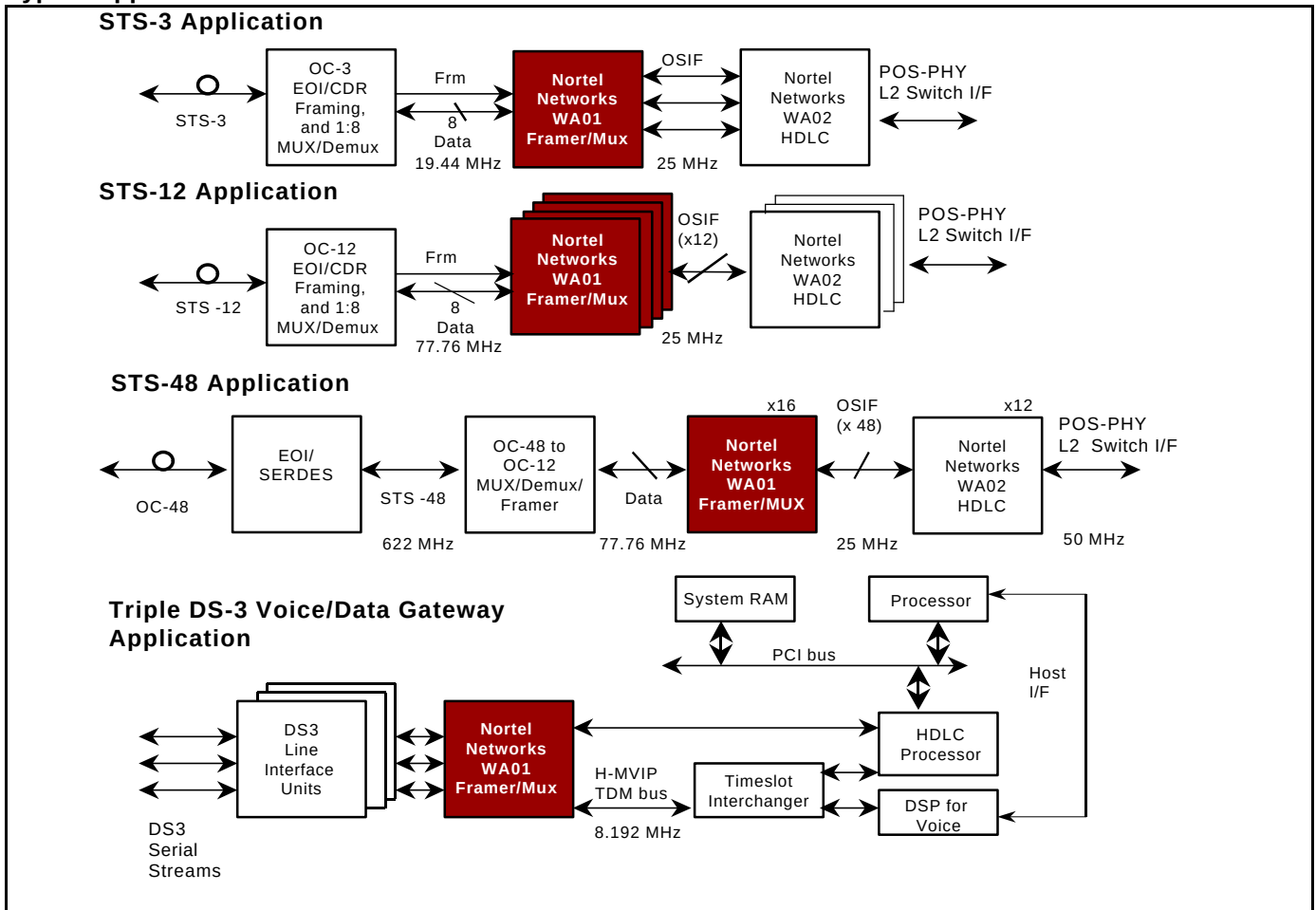
Designed to solve space constraint problems through increased density, WA01 enables systems designers to dramatically reduce pin count, circuit board space requirements and power consumption for increased system integration and lower design costs. WA01 is capable of terminating an entire STS-3 (OC-3) payload down to the DS0 level, with each of the three STS-1 payloads in the STS-3 independently mapped as an asynchronous DS3 or 28 VT1.5 streams. For the highest functional density solution using the fewest devices, the pairing of a single WA01 with a single WA02 allows users to handle three DS3 payloads of bandwidth at 135 megabits per second of full duplex aggregate bandwidth. For a higher aggregation solution the WA01 terminates 1/4 of an STS-12, allowing users to handle an entire STS-12 with four WA01 devices paired with three WA02 devices. For higher aggregation still, this chipset is well suited to STS-48 termination, allowing users to handle an

entire STS-48 with 16 WA01 devices paired with 12 WA02 devices. This represents the highest density solution, with channelization down to DS0, available on the market today.

Feature-rich flexibility

WA01 satisfies the need for a variety of traffic handling and interface (I/F) options including OSIF and the H-MVIP/H.100 compatible TDM I/F. Slip buffering is available in both transmit and receive directions, or can be bypassed. For traffic handling options, WA01 fully terminates three DS3 channels down to DS0, DS1, or DS3 level, or terminates one channelized STS-3 or 1/4 of a channelized STS-12 containing DS3 or VT1.5 down to DS0, DS1, or DS3 level.

Typical applications



The next step in a continuing evolution

As part of an evolving succession of solutions that leverage the unique patented architecture of the Lunar, WA01 provides users with the opportunity to begin working with, or further existing knowledge of Nortel Networks Framer/MUXes in anticipation of continuing innovative advances. All solutions are supported by fully documented evaluation kits and a customer-focused applications engineering team.

Typical applications

The Nortel Networks WA01 device -- as a stand alone or paired solution with WA02 -- is typically suited for use in Remote Access Concentrators/Servers, Frame Relay Switches, High/Mid Range Routers, and ATM Switched Add-Drop Multiplexers/Digital Cross-Connects.

Functional description

The Nortel Networks WA01 device provides an OC-3 termination function for applications requiring the decomposition of an STS-3 rate stream into 64kbs DS0s, DS1 streams, or DS3 streams. The WA01 is intended for SONET-based applications that map/demap DS3 and/or VT1.5 tributaries within the SONET payload envelope. A mixture of payloads is allowed on a per-STS-1 basis. Each of the three STS-1s within the STS-3 can contain either an asynchronously mapped DS3 payload or 28 Virtual Tributary (VT1.5) streams. Higher rate SONET streams can be accommodated by using multiple WA01 devices along with the appropriate higher-order SONET framer and multiplexer. The WA01 also supports non-SONET-based DS3 applications by providing a direct connection to the DS3 framer.

In VT mode, each VT pointer is processed and the embedded DS1 signal is extracted from the VT payload. In the DS3 mode, each DS3 signal is extracted from the STS SPE (synchronous payload envelope) and is then passed to a framer and M13 multiplexer function where its constituent DS1 channels are demultiplexed. In either mode, the individual DS1 signals are extracted and passed to a framer supporting SF (D4) and ESF frame formats, robbed-bit-signaling, and embedded Facility Data Link (FDL) messaging channels.

The WA01 performs section and line overhead processing at the STS-3 or STS-12 level and performs full STS path termination for the 3 STS-1 streams. The terminal side interface consists of three OSIF (Octet Stream Interface) buses - one for each STS-1 - for communication with Nortel

Networks termination devices, and an H-MVIP/H.100 compatible TDM bus for interface with other service termination devices.

In the transmit direction, data from the terminal side interface is mapped into individual DS1 streams where D4 or ESF framing is applied. The resulting DS1 streams are then muxed into a framed DS3 stream or mapped into a VT1.5 channel. In either case, the VT1.5 or DS3 channels are then mapped into an STS SPE multiplexed with the SONET STS overhead traffic and output towards the optical fiber over an 8-bit wide parallel interface at either 19.44 or 77.76 MHz.

The WA01 supports non-SONET applications through three DS3 serial interfaces. These interfaces may be used to connect directly to three DS3 streams from an LIU, bypassing the STS-3 processor. The same decomposition function is performed on the DS3 streams as is performed in the case in which the DS3s are extracted from or inserted into the SONET SPE.

Features

SONET processor

- provides a parallel 8-bit line interface at 19.44 MHz or 77.76 MHz compatible with many standard OC-3/OC-12 transceivers and higher-order SONET muxes
- processes either an entire STS-3 or 1/4 of an STS-12
- provides pointer processing and payload identification for all three STS-1 embedded streams within the STS-3 signal
- terminates and monitors STS-3/STS-12 section and line overhead
- terminates and monitors path overhead
- provides serial interfaces to support data communication, orderwire, and user channels
- detects LOS, LOF, AIS, LOP, RDI, PLM, TIM and other SONET alarms
- generates section, line, and path overhead controlled through PCI target interface
- provides APS support through serial interfaces

Preliminary Information

Each DS3 framer and M13 MUX

- frames to the incoming DS3 signal and detects alarms such as AIS and IDLE
- extracts X-bits and provides an indication for FERF (Far-End Receive Failure)
- muxes and demuxes 28 DS1 streams into one DS3 stream
- supports M23, C-bit parity, transparent, unchannelized, and subrate DS3 formats
- each DS3 framer provides access to all 672 DS0 channels when configured in full channelization mode
- supports both an HDLC-based Path Maintenance Datalink and a Bit-Oriented FEAC communication channel
- external DS3 interface provides for direct connection to the DS3 framers, bypassing the SONET processor for non-SONET applications
- supports fractional DS3 by outputting a framed DS3 stream for programmable bit manipulation via external logic

VT1.5 termination service

- provides pointer processing for all 84 VT1.5 tributaries within the 3 STS-1 payload envelopes
- detects VT path alarms such as LOP, AIS, RDI, and PLM, and monitors VT path overhead
- supports asynchronous mapping of DS-1s into the VT payload. Frame rate differences accounted for using bit stuffing techniques

DS1 path termination service

- provides provisionable frame detection and monitoring for all 84 DS1 streams in either SF(D4) , or ESF modes on a per-channel basis
- provides a DS1 transparent mode with optional Frame bit monitoring for clear-channel DS1 support
- provides robbed-bit signaling support
- supports ESF data-link Bit-Oriented Messages (BOM) and HDLC-based PRM messages
- provides per-channel FIFO depth of 128 bytes to support FDL messaging
- detects and declares AIS, RAI, OOF, SEF, and COFA defects as well as CRC and frame bit errors

- provides a one-second interrupt for latching of performance monitoring counters
- implements signaling freeze upon detection of OOF or DS0 AIS
- provides microprocessor-forced, per-DS0 programmable trunk conditioning

DS1 generation

- supports framing in SF(D4) or ESF formats
- provides an HDLC transmitter and BOM generator for ESF data link insertion
- supports transmission of AIS or RAI along with a programmable per-DS0 idle code insertion
- provides an 128-byte FIFO per channel for ESF data link transmission

General

- packaged in a 27x27 mm 352-pin fine-pitch G-BGA with 1 mm ball pitch spacing
- three separate OSIF bus interfaces on terminal side - one for each STS-1 - running at 25 MHz for efficient transfer of octets and signaling data
- alternative 21x2 -bit full-duplex H-MVIP/H.100-compatible terminal side interface that provides industry standard bit-serial interface at 8.192 MHz
- three 6-pin serial DS3 interfaces on terminal side that provide alternative interface for termination to DS3 level
- per-channel slip buffers on Rx and Tx terminal side, with option to bypass in OSIF mode
- separate frame mode mappings allowed (SF or ESF) for each DS1 stream
- programmable Remote Test Unit (RTU) for pseudorandom test pattern insertion and detection
- support for line, diagnostic, and payload loopbacks at the DS3 subsystem level
- support for line and payload loopbacks at the DS1 subsystem level
- 32-bit PCI bus operating at 33 MHz for configuration, control, and status
- 1.8V supply for low power dissipation with 3.3V I/O signals
- IEEE 1149.1 test port for boundary scan, internal SCAN, and Memory BIST

Preliminary Information



For additional information on Nortel Networks products and services please contact your local representative.

Nortel Networks

High Performance Optical Component Solutions

attn: Marketing Department

2745 Iris Street

6th Floor

Ottawa, Ontario

Canada K2C 3V5

Brixham Road

Paignton

UK

TQ4 7BE

Tel: 1-800-4 NORTEL

44 1803 662948

Fax: 1-613-763-8416

44 1803 662801

Email: opticalcomponents@nortelnetworks.com

www.nortelnetworks.com/hpocs

Copyright 2000 Nortel Networks Corporation. All rights reserved.

Nortel, Nortel Networks, the Nortel Networks corporate logo, and the globemark design are trademarks of Nortel Networks Corporation. Any third-party trademarks are the property of their respective owners.

Preliminary information documents contain information on products in their formative or design phase of development. Features, characteristic data and other specifications are subject to change without notice. Contact Nortel Networks for current information on this product.

The information contained in this document is considered to be accurate as of the date of publication. No liability is assumed by Nortel Networks for use of any information contained in this document, or for infringement of any patent rights or any other proprietary rights of third parties which may result from such use. No license is granted by implication or otherwise under any patent right or any other proprietary right of Nortel Networks.