

Airborne Telemetry

NBM-A664-2 NetDAS ARINC-664 (AFDX) Bus Monitor Module *Airborne Data Acquisition Products*

FEATURES

The NBM-A664-2 (AFDX) module monitors network traffic and extracts selected messages/words for addition to the NetDAS output data stream(s). The key performance features of the NBM-A664-2 are shown below:

- Operates as a "Bus Monitor" and tracks all traffic from an A664 (AFDX) network.
- Triggers on up to 1024 unique messages based on various network parameters
- Select any word from any buffered message
- Trigger list contained in FLASH memory
- Programming supported by Vista TEC
- Messages are time tagged to 1 microsecond resolution; time is provided on the TEBus by the NetDAS NDC formatter.



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DESCRIPTION

The NBM-A664-2 module provides bus monitoring capabilities supporting ARINC-664 Avionics Full-Duplex Switched Ethernet (AFDX) avionics bus networks. The module can acquire the full spectrum of traffic from the networks that it is monitoring. The core of the module is a high-performance FPGA that includes an embedded processor running application specific code. The application software integrates a TCP/IP stack for each input that controls the interface and collects data from the specified network. The module IP layer is responsible for reassembling fragments and ensuring that the complete message has been received before passing it onto the next higher layer.

Besides the standard data and time-tag (one per bus) parameters that the NBM-A664-2 supplies, status information providing source bus information and number of messages received are available for insertion into the PCM output.

To electrically interface to the network, the NBM-A664-2 module provides the necessary transformer coupling, and supplies a 37-pin connector with the differential Ethernet receive and transmit signals configured to ensure maximum signal integrity.

Network Data Processing

Overview

The NBM-A664-2 has the ability to support the processing of network data based upon the characteristics of ARINC-664 message protocols. The internal FPGA and embedded processor functionality can be changed to support a customer's unique processing requirements.

Parameter Selection

To select a parameter for insertion into the output data stream, the user defines a message (message block) based upon the Ethernet network characteristics and data identifiers (as multiple message types could be exchanged between the same two devices). Once done, the user assigns channel names, input payload location (byte offset), length (in bytes) and output frame position of the selected parameters that are to be inserted into the output frame.

The NBM-A664-2 uses a dual-ported RAM to support simultaneous writing and reading of parameters. In addition, the RAM is configured using a double-buffering method to allow a previously received message to be fully output before an update with new data is performed. This method ensures that the NBM-A664-2 updates the RAM only as fast as new channel data is read from the Dual Port Ram. This way, data integrity is always preserved as long as all the data requiring correlation is sampled in sequence in the PCM frame.

Modes of Operation

The NBM-A664-2 Ethernet Network Monitor is a "listen-only" module and does not interfere with normal network operation. The module can be configured for one of two different monitoring and processing modes.

Dual Channel Ethernet Monitor Mode

In standard mode, the NBM-A664-2 can monitor data from two independent networks.

ARINC-664 (AFDX) Ethernet Monitor Mode

The ARINC-664 architecture employs a redundant network methodology to ensure messages are received in a timely fashion. In this mode the NBM-A664 incorporates a redundancy management function to ensure that the first occurrence of a valid message is processed and the following occurrence is not.

Message Block Processing

The module is fully programmable and allows the user to select parameters from any number of messages that may be present on the network. These parameters are selected from various messages, which are defined by a unique combination of the source and destination addresses. Parameters can be 8, 16, 24 or 32 bits in length.

Status Information

Along with the stored data, the NBM-A664-2 also can provide the following information:

- **Message Time:** The NetDAS TEBus backplane provides continuous 1 microsecond time that allows any module to perform application-specific time-tagging functions. For network monitoring, the NBM-A664-2 time tags each message as it is received and makes it available as separate parameters for insertion into the PCM output stream. Each message has its own unique time word parameters that allow the user to differentiate when each message has been received.
- **Status Bits:** Each message has a unique status word associated that provides the following information:
 - **Overflow:** whether a message has been received multiple times before the last received copy was output.
 - **Stale:** the same copy of a message is being output prior to the receipt of the next. This information is provided on a message basis rather than a word-by-word basis due to the message-coherency restrictions that ensure that a full message is output prior to an update from the next incoming-message.

Time Tagging

The NetDAS formatter continuously places time on the internal TE BUS at a rate of 100 times per second and simultaneously runs a 1 MHz Clock. From these two signals, each NetDAS module has the ability to generate time-tags that are accurate to one microsecond for their specific application. On the NBM-A664-2, each incoming message causes the internal circuitry to latch time from the internal TE Bus. This time-tag is an additional parameter that can be placed into the output PCM data.

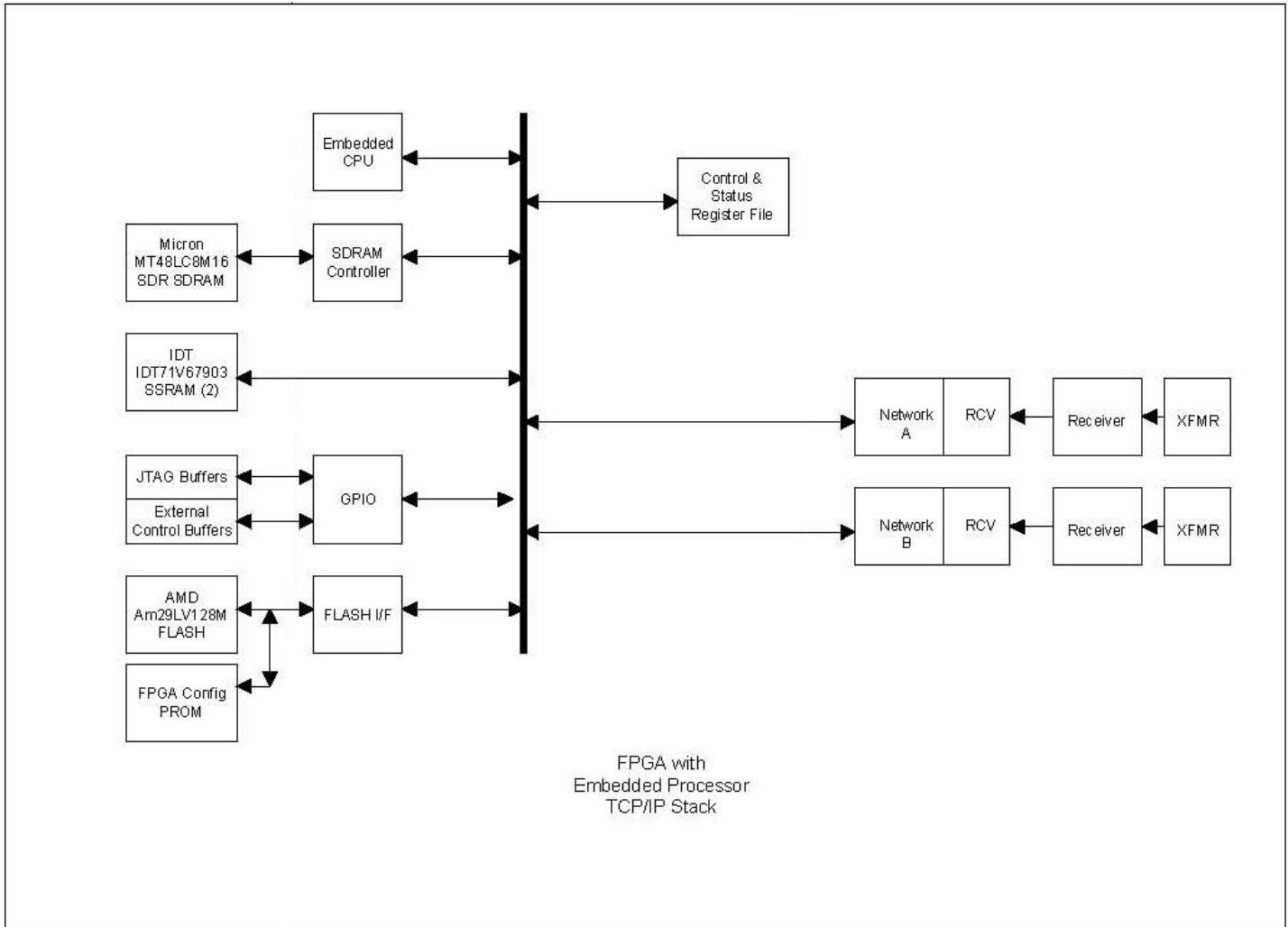
SPECIFICATIONS

Control / Status	
Inputs	
Number	2
Input Level	Refer to IEEE802.3 Fast Ethernet 10 Base-T / 100 Base-Tx (10/100 Mbits/s) RJ-45 Fast Ethernet Interface Compatible

Control Specifications

Electrical and Physical	
Power	
+3.3V	900 ma
+15V	5 ma
-15V	5 ma
Physical	
Dimensions	3.5" x 2.5" x 0.39"
Weight	70 grams

Electrical and Physical Specifications



NBM-A664-2 Functional Block Diagram

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