L3’s NBM-1553 module monitors two dual-redundant MIL-STD-1553B buses and makes user-selected data words available for output.

L3 Telemetry & RF Products (L3 T&RF) NBM-1553 is a “listen-only” device and does not interfere with normal bus operations. The module design incorporates DDC IP in a Field-Programmable Gate Array (FPGA) with transformers and transceivers to provide a highly integrated/compact bus monitoring solution. Multiple NBM-1553 modules may be incorporated into a single NetDAS stack when there are a large number of 1553 buses to monitor.

The NBM-1553 module can acquire the full spectrum of MIL-STD-1553B data. The user selects the parameters that are to be extracted from any of the 2048 unique command words that are available on a 1553B bus and defines where they should be placed into the output stream; alternatively, the placement of the words can be automatically performed by the Vista TEC software package. A command word is defined by the unique combination of its remote terminal address, direction and sub-address. The selection of parameters from each of the two buses is completely independent.

The NBM-1553 module uses a triple-buffering mechanism to ensure message coherency. This prevents the module from updating the output buffer for a particular message until all words have been output and the next complete message has been received. This buffer management prevents mixing words of different message instances and causing erroneous processing results. The module provides status parameters for each command to allow the user to monitor the message receive rate and whether any abnormal conditions (stale, overflow, bus errors) have been incurred in the monitoring and buffering process.

FEATURES

- Operates as a “Bus Monitor” and tracks all traffic from two dual-redundant MIL-STD-1553B buses
- Bus interface transformer design in accordance with 1553 Bus monitor requirements
- Multiple NBM-1553 modules can be included in a NetDAS stack
- Fully programmable by L3’s Vista TEC software
- Messages are time tagged to 1 micro-second resolution with time from the internal NetDAS TE Bus backplane
- User selects the parameters to be extracted from any of the messages
- User can define placement of acquired data in the output stream or Vista TEC can do it automatically

Use of U.S. DoD visual information does not imply or constitute DoD endorsement.
Overview Continued
The NBM-1553 module has available the following items for output in addition to the message data words:

- **Message Time:** The NetDAS TE Bus backplane provides continuous 1 microsecond time that allows any module to perform application-specific time-tagging functions. For 1553 bus monitoring, the NBM-1553 time tags each message as it is received and makes the time stamp available as a set of separate parameters for insertion into the output stream. Each command word has its own unique time word parameters that allow the user to differentiate when each message has been received.

- **Status:** Each message provides unique status words associated with each monitored command word:
  1. **Message Count Value:** Each filtered message will cause a count to be incremented. This can be used to determine whether the message has changed (a stale condition) or whether messages are being missed (an overflow condition). It is an 8-bit value that cycles from 0 to 255 and then back to 0.
  2. **Bus:** A bit will indicate whether the message is from Bus A or B
  3. **Error:** A bit will indicate whether there was an error in the message
  4. **Low-level bus and message processing status from the DDC Core**

This information is provided on a message basis rather than a word-by-word basis due to the message-coherency restrictions that ensure a full message is output prior to an update from the next incoming message.

**SPECIFICATIONS**

**Input Characteristics**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Channels</td>
<td>2 Independent Dual Redundant</td>
</tr>
<tr>
<td>Input Channel Type</td>
<td>MIL-STD-1553B bus transformer coupled</td>
</tr>
<tr>
<td>MIL-STD-1553B Bus Speed</td>
<td>1 Mbps</td>
</tr>
<tr>
<td>Physical Layer</td>
<td>RS-485</td>
</tr>
<tr>
<td>Topology</td>
<td>Transformer isolated party-line bus</td>
</tr>
</tbody>
</table>

**Internal Characteristics**

- TE Bus input/output interface and memory interface
- EEPROM memory controller
- 2 SRAM memory arbiters and controllers
- 2 DDC 1553 Interface cores
- Initialization sequencer that loads DDC core parameters and Look-Up Tables (LUTs) at power up
- Message error detection
- Valid message to message number look up
- Rotating triple buffer message control

**Output Characteristics**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output</td>
<td>Internal TE Bus</td>
</tr>
<tr>
<td>Word Position</td>
<td>User defined or Vista TEC default</td>
</tr>
<tr>
<td>Content</td>
<td>Any word from any message into any available output word position</td>
</tr>
</tbody>
</table>