Software Requirements Specification (SRS)

*VeriStand 1553 Driver*

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# Introduction

This document contains the software requirements for the VeriStand 1553 driver that supports the AIT 1553 interface card for use in National Instruments Real-Time PXI platform.

## Purpose

The purpose of this Software Requirements Specification (SRS) is to document the feature set that the driver supports.

## Definitions, Acronyms, and Abbreviations

### Acronyms and Abbreviations

AIT – Avionics Interface Technologies, Inc

VSI – Viewpoint Systems, Inc

### Definitions

MIL-STD-1553

<http://en.wikipedia.org/wiki/MIL-STD-1553>

## References and Links

[www.aviftech.com](http://www.aviftech.com)

[www.viewpointusa.com](http://www.viewpointusa.com)

# Overall Description

## Product Perspective

For users of VeriStand, this driver provides a way to interface with the MIL-STD-1553 avionics bus using AIT 1553 hardware. VeriStand is a system used for HIL applications and is a configurable system rather than a programming environment. No programming is necessary to use VeriStand to interface with the 1553 hardware. Although the driver is intended for use in the RT environment (tested with RT), it can be used in a non-deterministic windows environment.

## Requirements for Product Use

### Software

This device was created for use with NI VeriStand 2013.  To use this custom device you must have the following software installed:

* NI VeriStand 2013 or later
* NI-VISA
* AIT MIL-STD 1553 LabVIEW Driver 2.37.0 or later
* The download provided with this Add-On

### Hardware

This driver was tested with the following hardware:

* NI PXI-RT Controller and Chassis
* AIT PXI-C1553-2 (or similar)

## Theory of Operation

This driver is an in-line custom device that launches five parallel loops (for TX and RX on each sub-section: BC, BM, RT) and communicate to/from them with RT FIFOs. The in-line portion going at the NIVS rate does no driver calls; it just reads and writes the RT FIFOs. At initialization the custom device uses the Minor Frame rate of the BC and sets the loop rates for BC, BM, and RT to twice that speed. Data read from the hardware is passed back to the inline driver through the RT FIFOs and similarly, data for output is passed to the asynchronous loops through RT FIFOs. Two buffers (In and Out) are used to manage the data coming from/going to the FIFOs.

# Requirements

The driver software works in conjunction with the AIT Flight Simulyzer configuration utility form AIT. This file defines all the messages and protocols that are necessary to operate the hardware. The driver extracts information from this file when loaded into the system definition file in order to know how it is configured. It will then present the user with a skeleton of defined messages where the user can define channels.

## System Definition Requirements

### Database Support

#### The driver shall allow the user to load an AIT flight simulyzer configuration file. The definition of the configuration is made in the Flight Simulyzer. Once loaded into the device in VeriStand, parameters can be added. In order to preserve the ability to modify the Database without losing parameters, an export feature is available. A text file named the same as the Database is created alongside, with a “–Parameters” suffix added. Upon loading of a Database, if a parameter file is present, the two will be merged.

E.g.

Test 1553 with Acyclic RTRT SIM RT.xml

Test 1553 with Acyclic RTRT SIM RT.xml -Parameters.txt

### Channel Definition

#### The driver shall allow the user to define channels against any supported messages. Both Receive and Transmit Messages shall allow channel definition.

### Channel Configuration

#### The driver shall allow a channel to access any data in its parent message using the following configuration items:

1553 Message Data items are of type 16 bit integers. Using the following items, a channel can be computed.

* First Word

Which 16 bit word to start on

* Start Bit

Which bit in the 16-bit word to start on

* Number of Bits

How many bits to use

* Signed/Unsigned

Is the result signed or unsigned

* Scale Factor

Multiplier applied to the channel value

* Offset

Offset applied to the channel value

### Channel Save/Recall

#### The driver shall allow the user to export defined channels to a separate file such that they can be recalled when the database is reloaded.

### Channel/Bus Support

The driver shall support one channel/bus.

## RT Driver Functions

### Major Frames

The driver shall support one major frame.

### Buffer Depth

The driver shall support a buffer depth of one (1).

### Message Support

#### The driver shall support BC-RT messages

BC Send to RT

#### The driver shall support RT-BC messages

Request RT to Send to BC

#### The driver shall support RT-RT messages

RT to RT Transfer (The BC does not have to see the RT-RT data)

### Acyclic Frames

The driver shall support the ability to trigger acyclic messages.

### Errors and Status Support

The following status information shall be supported by the driver

* Bus Controller

RT-BC – Both Supported

Bus Monitor

All messages in the BM support error and status words

* Remote Terminals

BC-RT – Supported

### Data Timestamps

Timestamping shall return the time in seconds (U32) and fractional microseconds (U32)

Bus Controller

BC-RT – Not Supported

RT-BC – Not Supported

RT-RT – Not Supported

Bus Monitor

All messages in the BM support Timestamping

Remote Terminals

BC-RT – Not Supported

RT-BC – Not Supported