SYSGO
EMBEDDING INNOVATIONS

FIRST PORTABLE AFDX

First Portable AFDX at a glance

- Fully AFDX compliant solution
- Software-Only implementation
- Configuration through host
- Based on COTS Hardware
- ICMP & SNMP on AFDX Node
- Easily portable host driver

AFDX – the Next Avionic Data Network

"Avionic Full-Duplex Switched Ethernet" (AFDX/ARINC664) is a deterministic aircraft data network bus system for public avionic transportation, railway and military systems. The network is based on standard IEEE802.3 Ethernet technology. The benefit of using commercial off-the shelf (COTS) Ethernet components is to lower overall costs for the aircraft network. Hardware components, cables and test equipment for Ethernet are field proven and much more affordable than the previously used avionic specific solutions. Ethernet itself won't meet avionic network requirements. Therefore, AFDX extends the Ethernet standard by adding Quality of Service (QoS) and deterministic behavior with a guaranteed dedicated bandwidth. This avionic data network was first used in the Airbus A380 and A400M. Airbus and Boeing will extend the usage of AFDX in future developments.

First Portable AFDX

With Portable AFDX, SYSGO offers the first completely genuine software implementation of AFDX. Portable AFDX consists of the AFDX Node implementation and a very small footprinted host driver. ICMP and SNMP run on the AFDX Node without host assistance. The configuration of the AFDX Node can be done through the host driver which uses a XML based configuration file. This flexibility enables Portable AFDX to be used in several environments simply by changing the configuration.

Software vs. Hardware Solution

Data network stack solutions can be implemented in hardware or in software. When software is an option, and the budget is an issue, the advantages of the software solution can far outweigh the hardware based solution.

Hardware Solution

Companies involved in the AFDX specification design are all hardware development driven. These companies naturally chose to develop dedicated, custom AFDX hardware solutions using ASICs. But hardware solutions suffer for many reasons:

- Hardware obsolescence
- Design failures require new chip design
- More expensive than COTS hardware
- Not easily adaptable to special customer requirements

Software Solution

The portable AFDX solution from SYSGO is strictly software based and runs on COTS hardware. The advantages of a software solution are quite obvious:

- Future proof – Code can be adapted to any future requirement.
- Hazard free – Implementation issues can easily be detected and fixed.
- Flexible – AFDX Node can be dynamically configured from the host system.
- Affordable – COTS hardware is less expensive and the reusability of the software solution makes it even more affordable.

Technical Details

Host Driver is layered for easy porting
High throughput and small footprint combined with easy portability was the design aim of the host driver. The result is a three layer architecture where only the very small Glue Layer has to be adapted when porting to another OS. The host driver API offers all functionality to easily configure the AFDX Node. The BITE API is also incorporated in the driver API (see details at right). PikeOS and Linux drivers as well drivers for other Avionic RTOS's are available.

ICMP and SNMP reside on the AFDX Node
Because ICMP and SNMP both reside on the AFDX Node, the host OS dependency is minimized. Having both services on the AFDX Node also leaves more computing time for the host.

IM & RM
Integrity Management and Redundancy Management are basic components of the AFDX Node. The Portable AFDX from SYSGO includes a comprehensive implementation of these components, guaranteeing impressive performance.

DO-178B Implementation
Based on SYSGO´s DO-178B certification experiences, the implementation of the Portable AFDX product strictly undergoes DO-178B Level B certification.

Drivers available for PikeOS and Linux
Any other safety critical operating system can be easily adapted by SYSGO or the customer if not already available.

Configuration Service and MIB
The configuration service interprets the configuration information given by the host and takes all actions necessary to initialize the AFDX Node as defined. The management information base is responsible for storing information about network packet errors to ease in-flight and in-shop maintenance.

Debug and Trace possibilities
The AFDX Node is also available as an instrumented version, incorporating a debug stub and tracing capability. This enables the use of standard software development environments (IDE) as well as checking the timing behavior without pricy hardware analyzers.

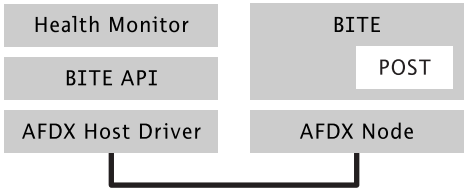

Figure 1: Portable AFDX BITE Integration

Reference implementation on PowerQUICC II PMC module
The first reference implementation for our customer is based on a airborne proven PowerQUICC II PMC module.

100% AFDX performance
Portable AFDX from SYSGO offers 100% AFDX performance. The performance calculation is based on the AFDX performance specification.

BITE already included
- Built in Test Equipment (BITE) incorporated in the AFDX Node.
- BITE solution includes Power on Self Test (POST).
- Host driver API includes BITE API to be used by the systems health monitor.

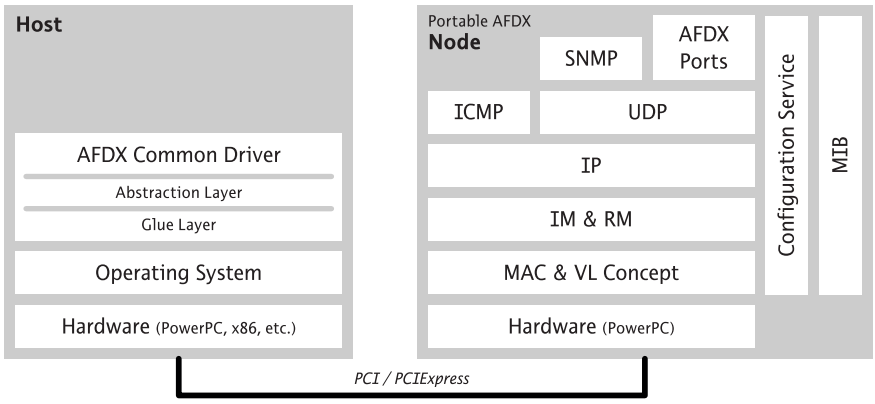

Figure 2: Portable AFDX Detail

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