Input / Output Cloud Computing and Networking for Radars

Mr. Patrick MECHIN
TechwaY S.A.S.
Tel : + 33 (0)1 64 53 37 90
E-mail : patrick.mechin@techway.fr

Abstract:

Extracting acquisition stages from real-time calculators and leverage on high-speed network technologies to increase multi-sensor RADAR integration

New RADARs feature multiple sensors with even growing capabilities in signal bandwidth which makes system integration complicated.

Today's state of the art computers for RADAR involve high-frequency analog to digital interface associated with FPGA technology which executes the upfront data processing and filtering to extract the RADAR useful signal bandwidth.

I INTRODUCTION:

FPGA (Field Programmable Gate Array) technology with its capacity to process data flow in parallel with multiple instances of the same filtering algorithm is effectively required. FPGA main benefit is to reduce the data-bandwidth of the information transferred to the back-end general purpose processor for RADAR application.

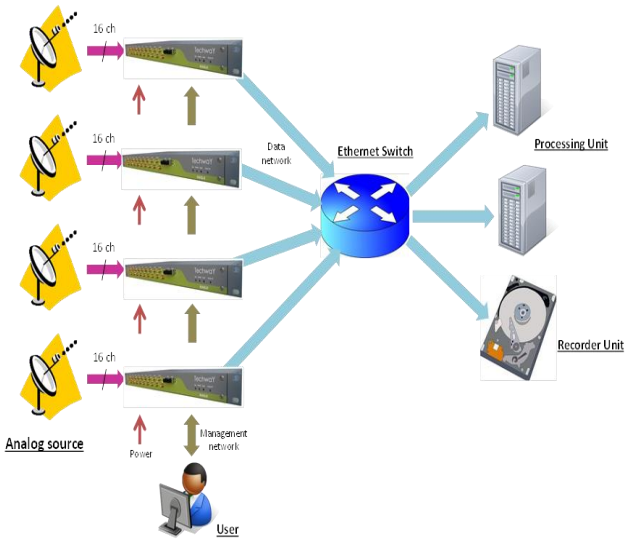
Digital front-end with FPGA processing capabilities has become the paradigm to build powerful real-time RADAR front-end.

Nevertheless, installing such a digital front-end in a general purpose RADAR computer is a technology challenge. Current possibility to use normalized computer buses, like VME or VPX, is the most common way to insert ADC & FPGA capabilities into a computer.

In such systems, RADAR designers still have to deal with data-bandwidth issues. In particular, how to best manage the signal data-flow on system buses and how to best share the systems resources with the constrain of maintaining real-time performances of the global machine.

In addition, one of the major issue is how to organize scalability. Indeed, when more processing and/or more input signals are required, RADAR designers are also constrained by this type of architecture.

II SOLUTION



A new concept developed based on fully independent and versatile data-acquisition front-end with embedded FPGA processing capabilities. Front-end can be an industrial PC , with latest FPGA PCI Express form factor card, programmable at a higher level rather than HDL.

This concept allows to remove custom built solutions based on acquisition cards (like VME/VPX) with an external "boxes" (like industrial computers) which feature multichannel acquisition input, FPGA processing and 10G Ethernet communication network and make it user friendly with PC based solution.

As NAS (Network Attached Storage) does for hard drives through network communications. New solutions extract acquisition stages of real-time calculators to share it on standardized communication network.

This new concept is design to be cooperated by RADAR Integrator, not electronic engineers. This solution is "pre-integrated system" with user-friendly web interface for command–control and pre-programmed DSP (Digital Signal Processing) filters which are available to RADAR engineers through user-friendly menus. No need to program the FPGA.

RADAR designers can easily configure our solutions thanks to data-processing algorithms included and

intuitive WEB interface or SNMP commands to automatize the configuration.

This new concept offers many scalability possibilities both for the number of input channels you need to manage or the quantity of processing power you need to have.

Thanks to 10 GbEth standardized communication interfaces. It is easy to add many configured boxes in your system and replace tens or hundreds of acquisition cards which implies saving of place and energy.

III CONCLUSION

These technologies drastically simplify the systems integration effort of multichannel applications. The use of FPGA technology delivers state of the art performances to your systems.

This new concept/solutions are used by major players as European Space Agency, THALES group for RADAR projects. Other customer likes Airbus Defense uses this concept as solutions in satellite test benches.

The purpose of this article is to demonstrate how our network concept is a modern alternative to existing embedded systems to build scalable real-time computers.

We also demonstrate how with its pre-program features of these box allows a shift of the skill needed, from electronic engineers to RADAR system engineers, to build RADAR Computer.

We believe this new solution will drive new paradigm for upcoming multichannel real-time computers.

BIO DATE OF AUTHOR

Mr. Patrick Mechin, Educated with a Master in Engineering in Electronic from University Pierre& Marie Curie (PARIS) and an Executive MBA from ESSEC Business School (PARIS) and spent the entire career in Electronic Embedded Industry.

Started his career as Electronic Engineer at Thales, moved to various positions and worked as COO of former VMETRO which is now part of CWC.

In 2003, he created TechwaY specialized in advanced computing platform for real time embedded applications.