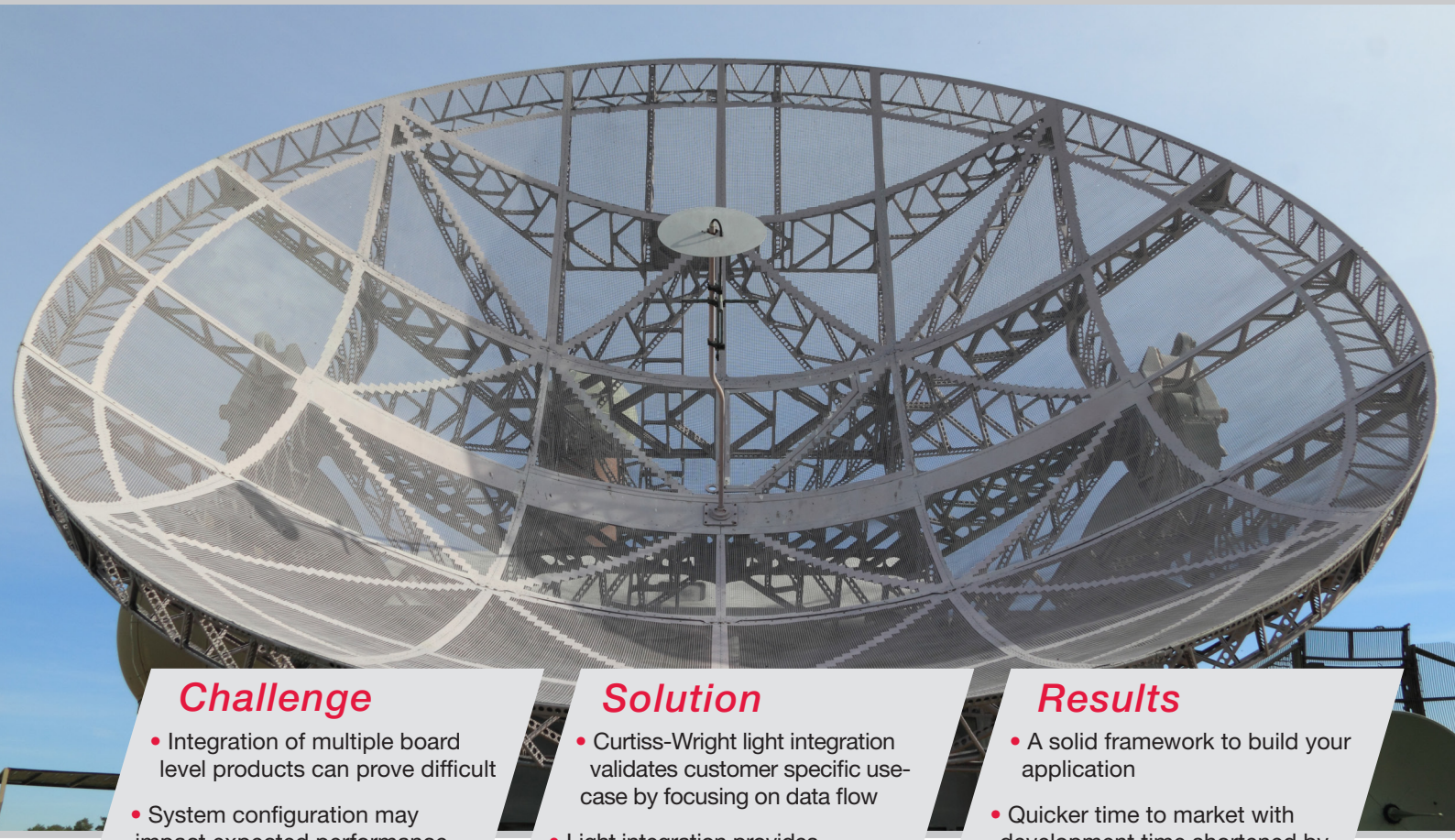
CASE STUDY

Meeting Performance Benchmarks Using Light System Integration for Radar Applications

CURTISS-WRIGHT



Challenge

- Integration of multiple board level products can prove difficult
- System configuration may impact expected performance and functional behavior
- Need basic framework quickly to focus on algorithm development

Solution

- Curtiss-Wright light integration validates customer specific use-case by focusing on data flow
- Light integration provides example data flow
- Light integration resolves any issues found

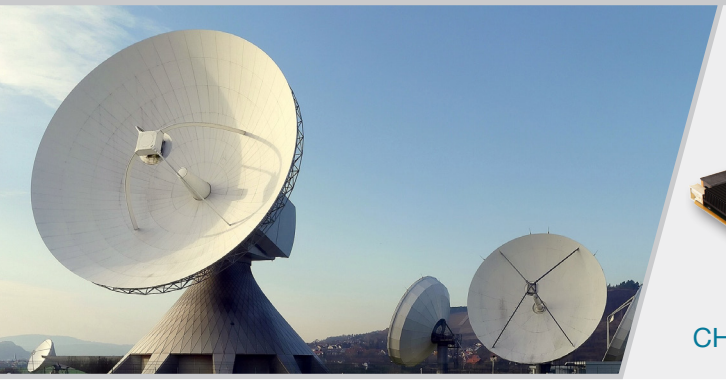
Results

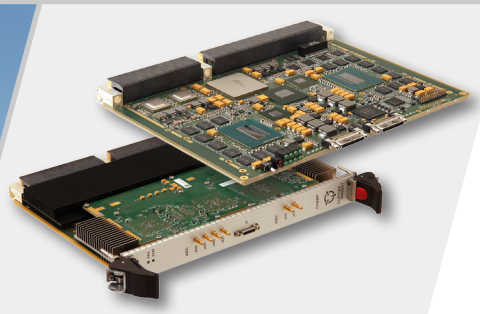
- A solid framework to build your application
- Quicker time to market with development time shortened by 4-8 weeks
- Effort focused on algorithm development and nearly $200-400K saved

Challenge

When purchasing board level modules to build a system, it can be challenging to get modules configured in the most optimal way. Many companies will have a team of software, hardware, FPGA and system engineers targeted to work on the program. With teams averaging 10 employees, these project-specific groups could be costing $50,000 per week or more. Valuable time can be spent getting the basic framework set up, leading to unexpected costs or alternatively, expensive turn-key systems are purchased with little to no options for customization.

A large radar developer wanted to build a radar system based on a large number of DSP processor modules interconnected via a 40G switch, some FPGA modules, and an FMC. The customer wanted a base example design that demonstrated all the interconnections needed in the system worked and supported the necessary bandwidth. The customer understood the sooner the team became productive, the more cost effective the development would be.





CHAMP-WB and CHAMP-AV9

Solution

Over the last few years, Curtiss-Wright Defense Solutions has developed an initiative called light integration to provide a framework for customers to start development. The primary application of light integration is to focus on the data flow of the customer's particular use case and validate their specific configuration of hardware, software and firmware work as intended, both functionally and with the expected bandwidth.

For this specific radar program, Curtiss-Wright worked with the customer to define the set of requirements they wanted to see implemented. This ensured any key risk areas were addressed and the customer received the specific guidance needed to optimize their solution. Using a large number of Curtiss-Wright CHAMP-AV9 DSP Processor modules interconnected via the VPX6-1958 40G Switch, some CHAMP-WB FPGA modules and a third-party FMC, Curtiss-Wright put together a system and configured it to support the desired use-case and then validated the desired tests. The key tests were:

1. Demonstrate RDMA between all processor nodes on 6 processor modules interconnected via the 40 GbE Switch and measure bandwidth.
2. Demonstrate PCIe DMA on the FPGA module transmitting data to one of the processor modules at the necessary speed as well as interrupt handling by the processor.
3. Demonstrate 1 GbE connectivity throughout the system.
4. Demonstrate SATA inter-connectivity to a 3rd party drive.

This light integration option gave the customer the confidence their specific data paths would function as needed and would meet their performance benchmarks.

Results

Curtiss-Wright created the necessary firmware images and some application tests to demonstrate the key functionality the customer wanted to see. These tests were demonstrated to the customer on their hardware, and the customer was trained on how to run the tests with the underlying configuration needed for the tests to run successfully. When the modules were shipped to the customer, they also received all the tests and related documentation, allowing the customer to take this information and recreate the tests back at their facility. This provided them with a solid baseline configuration to work off of for their development. During this effort there were also a couple of minor issues found due to the configuration they needed. These items were identified and work-arounds or fixes were found for all of them.

The customer was thrilled with the light integration, and managed to save themselves a lot of bring up time they otherwise would have incurred. Without this assistance, the customer was facing at least another four to eight weeks to get to the same point. Alternatively, they would have spent $200,000 to 400,000 between turn-key systems and the added development time, or even simply implemented in a sub-optimal way, impacting the resulting performance.

Light integration took the task of initial bring-up and bounded it to the cost of the light integration effort and eased the uncertainty of integrating unfamiliar modules.

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