Per Vices Corporation

CASE STUDY

Per Vices SDRs and Storage Solution for Spectrum Monitoring and Recording

PROJECT OVERVIEW/GOALS

To use our stock Cyan platform combined with a high performance storage solution to capture a large amount of spectrum across multiple channels and store the raw data.

CHALLENGE

This project had unique challenges that enabled capabilities that are often required for spectrum monitoring and recording applications. The challenge was the capture, transfer, handling, and storage of a very large amount of data at very high data rates.

SOLUTION

The final solution consisted of a combination of our Cyan 8RX 1GSPS SDR along with a custom built storage solution with a combination of high performance FPGA accelerator NICs, NVMe drives, SATA drives, and enough RAM to support the performance requirements. By using our stock Cyan platform, we were able to save the customer a significant amount of time and costs and allowed us to focus on the design and integration of a suitable storage system architecture. The final solution resulted in the two units being delivered to the customer, fully configured for their application, and with an example program to demonstrate performance.

CUSTOMER BENEFITS

FULLY COTS SOLUTION

4GHz
instantaneous RF bandwidth

Lossless
data transfer at 122 Gbps

Removable
storage

$500k+
savings in cost

STEPS TAKEN

The customer contacted us and we had discussions about the project. We determined that the stock Cyan platform would be a good fit for their project and also saved them considerable NRE costs and time. Following the discussions concerning the radio resources, we continued the discussions around a suitable host/storage system that would meet all of their needs and we found a solution that met both their technical requirements and budgetary requirements.

WHY PER VICES

The customer was evaluating different options but ultimately chose Per Vices as the preferred designer and manufacturer for this project. This decision was made due to the following significant factors:

- The performance of the Cyan platform; including the bandwidth, tuning range, number of channels and digital backhaul

- Availability of COTS stock product that met their radio needs and the demonstrated experience in delivering a system that could meet their data storage and processing needs

- No additional development costs were required

- Fast and effective communication between both parties' engineering teams

- Reduction in supply chain complexity by having a single vendor provide a complete solution that involved both the radio and data storage/host system

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CHALLENGE AND SOLUTION

The requirements associated with this project called for 8 channels capturing at least 480MHz of data at 16 bits I and 16 bits Q and storing that data for a duration of 10 minutes. The result called for a sustained data capture and transfer rate of 122.88Gbps of data and the storage of ~9.3TB of high speed data with lossless performance.

The end product consisted of multiple pieces of hardware. In total, there were two pieces of hardware required for this project; the SDR and the host/recording unit (Figure 1). This solution allowed us to meet the customer requirements associated with data capture, data handling, data storage, and ensuring sufficient resources were available for processing the data.

As part of the work, we designed a suitable architecture for the data storage system that ensured the data being transferred from the SDR to the host/storage system was able to be streamed to disk. Due to the considerable amount of data and the speeds at which the data was being transferred, great care was taken to ensure that we were not saturating the write speeds associated with the NVMe drives. The end solution met all requirements while offering example applications and removable hard drives for easy servicing in the future.
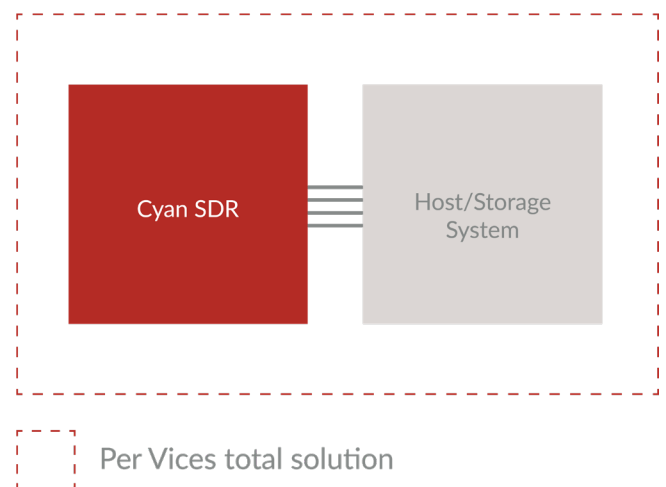
HOW WAS IT ACCOMPLISHED?

During the course of the discussions we had multiple calls and exchanges with the customer to ensure we fully understood both the RF requirements (bandwidth, number of radio chains, operating frequency, etc.) as well as their data storage requirements (how much data needed to be stored, the processing capabilities required, the preferred data format, etc.) to ensure we fully understood the project objectives.

As the RF project objectives were met with our stock Cyan solution, the primary focus was on designing and building a host/storage solution that

Figure 1.

Cyan SDR

Host/Storage System

Per Vices total solution

would be capable of handling the very high data rates. This required multiple discussions with several manufacturers to determine the best path forward. Ultimately the solution included a server system with an FPGA accelerated NIC with onboard RAM, 40G licenses, a series of NVMe drives, and a significant amount of integration effort to ensure the software would fully utilize the hardware capabilities.

Do you have a new or existing spectrum monitoring and recording/storage project?

Let us know and we may be able to help with either the radio resources or the complete solution including data storage. We have done this for many customers and usually can help you **save time, costs, and reduce the overall complexity** of your system and your supply chain.