



## Using NI PXI for Improved Spectral Monitoring in China

### Author(s):

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### Industry:

Telecommunications

### Product:

LabVIEW, PXI/CompactPCI

### The Challenge:

Developing a solution for spectral monitoring of RF signals inside and outside government-regulated frequency bands.

### The Solution:

Using National Instruments software and hardware to develop an enhanced wideband radio receiver and monitoring system.

Chengdu Huari Telecommunications Company (Huari Telecom), a major developer and manufacturer of radio directional finding systems in China, required a solution to improve measurement speed for spectral monitoring, directional finding, and signal identification as well as to expand wideband signal and multiple-channel measurement capability.

In previous applications, we have used traditional radio receivers to integrate our system. These box instruments transfer data back to a host PC via GPIB. GPIB speed and low instrument measurement speeds prevented us from significantly improving the system. Plus, narrow bandwidth and a limited demodulation method limited the functionality we could provide to our customers.

We set out to design a software-defined radio platform system to enhance signal monitoring inside and outside government-regulated frequency bands while pinpointing the source of transmissions or interference. We developed, along with NI China local system integrator and National Instruments Alliance Partner, VI Service Network, the HR-100, a patent-pending wideband radio receiver and monitoring system based on the National Instruments PXI-5660 RF vector signal analyzer. We can use the system as both a radio receiver and an RF vector signal analyzer to monitor modern wideband digital telecommunications signals and conventional narrowband analog broadcast signals.

The entire system is comprised of the NI PXI-5660 RF vector signal analyzer, the PXI-8187 2.5 GHz Pentium 4 embedded PXI controller, and the PXI-1042 eight-slot PXI chassis. With the PXI-5660 and accessories, we now can increase the spectrum-monitoring speed and provide digital and custom-defined demodulation methods for future applications. In addition, our engineers can develop both phase-and-amplitude-based path-finding algorithms to antenna array signals. This feature significantly improves the speed and accuracy of path finding. Additionally, with NI PXI modular instruments, engineers can easily scale the new system from single to multiple channels.



Huari Telecom developed a software-defined wideband radio receiver and monitoring system based on the NI PXI-5660 RF vector signal analyzer.

The HR-100 system also offers multiple RF parametric functions, such as constellation analysis and time-frequency analysis.

Because our new system uses an open, software-defined radio platform, we now can perform standard and custom measurements that previously required several dedicated, stand-alone instruments. We also can make system updates to meet future wireless standards, which is critical as wireless standards rapidly change. The system recently passed the validation test of the China Radio Administration Bureau, the most authoritative governmental institute for radio management.

With the tight integration of PXI, we have improved spectral sweeping speed and developed a new directional finding algorithm based on the measuring phase of signals from the antenna array. With these new features, we have doubled system performance. NI products played a crucial role in our HR-100 patent-pending wideband radio receiver. By using commercial PXI technology and the PXI-5660 modular vector signal analyzer, we now offer our customers a cost-effective, scalable, and faster spectrum-monitoring system. We significantly improved the functionality and performance of our radio monitor and directional finding systems by using NI RF modules and the PXI platform.

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