

Spectrum's flexComm signal processing technology enables Hughes Network Systems' leading-edge satellite services

By Frank Van Hoof

Hughes Network Systems (HNS) is a market leader for satellite-based private business networks. HNS is a pioneer in the development of high-speed satellite Internet access services, which it markets globally under the DirecPC and DIRECWAY brands, and is a major supplier of mobile satellite networks and user terminals.

In November 2000, Spectrum Signal Processing's flexComm solutions were chosen as standard equipment for use in HNS' DIRECWAY and PES earth stations.

HNS requirement #1: High bandwidth processing power

HNS' DIRECWAY satellite application involves bi-directional data communications (upload and download) over a satellite network. Each HNS customer sends data signals up to a satellite. These data signals are multiplexed together on the satellite and beamed down in one large data stream to an HNS earth station. That earth station has the daunting task of separating out the data that was mixed together on the satellite, ensuring its accuracy, and sending it to its final destination.

Spectrum's solution

When HNS was planning its most recent DIRECWAY earth station equipment upgrade, it selected Spectrum Signal Processing's flexComm product line, specifically the flexComm Barcelona-HS (hot-swap) CompactPCI board (see Figure 1). Barcelona-HS, designed for high-availability wireless signal processing applications, provides the power of four 1600 MIPS Texas Instruments C6201 DSPs and 64 Mbytes of SDRAM in a single 6U CompactPCI slot. It also provides three mezzanine sites: one industry-standard PMC site, plus two high-bandwidth Processor Expansion Module (PEM) sites. These PEM sites permit direct hardware access to the four Digital Signal Processors (DSPs) on the board. Barcelona-HS' open architecture provides HNS with an easy path to customize the board so that it can meet HNS' precise requirements.

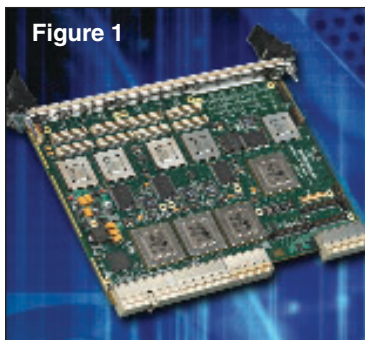


Figure 1

HNS requirement #2: Quality and reliability

HNS is constantly updating its infrastructure to maintain its competitive edge. New services with increased satellite bandwidths, higher user data rates, and bi-directional satellite terminals require significantly increased processing capacity in the earth station. The need for fast future upgrades makes software-programmable platforms highly desirable. And high reliability system design is essential if the 5-nines (99.999 percent uptime) are to be achieved

and a high level of customer satisfaction maintained. Let's face it, no one wants to lose a satellite signal during his or her favorite television show.

Spectrum's solution

Spectrum's solution to high reliability was achieved through a combination of techniques:

The first was the use of CompactPCI hot-swap technology and associated software, which permits the replacement of faulty cards without powering down the system.

The second was extensive ISO9001 design and production quality control, both at HNS and at Spectrum, to minimize the likelihood of any board failures.

Finally, the entire system was engineered to minimize any potential single points of failure. Used in conjunction with a Motorola CPX8216 family CompactPCI chassis, this system has demonstrated the ability to achieve HNS's goal of 5-nines reliability.

flexComm's Barcelona-HS hot-swap feature is critical to HNS maintaining its high service levels. Picture this: 200 DIRECWAY customers are surfing the Web over the HNS network and there's a need to replace one Barcelona HS board that is handling four customers. A new Barcelona-HS board can be easily swapped in without the need to power down the chassis and disconnect the other 196 customers. This is one way HNS maintains maximum uptime and high customer service levels.

HNS requirement #3: Quick time-to-market

HNS needed to quickly expand its bi-directional satellite services without impacting other internal engineering projects. Designing, testing, and building the signal processing subsystem in-house would have taken HNS about six to nine months. In-house design would have also meant that some in-house software engineering resources would have been pulled off their projects to create a board that would operate under multiple operating systems.

Spectrum's solution

Spectrum's shipping platform allowed HNS to begin software and firmware development immediately. Interfacing with multiple

areas of HNS' engineering departments ensured that Spectrum met HNS' timelines and strict outsourcing requirements. Spectrum's:

- Hardware engineering teams worked with HNS designers of I/O cards to ensure compatibility and good design practices.
- Software engineering teams worked with multiple HNS teams for each specific implementation of the common platform.
- Operations group worked closely with HNS' business and logistics groups to ensure that each program could meet HNS' time and cost targets.

At HNS, like many other companies, focusing on and expanding services offers a higher return than engineering functions. Spectrum offered HNS a mechanism to free up its internal resources to focus on enhancing services instead of hardware design and manufacturing.

HNS requirement #4: Simple upgrades to equipment

Software upgradeability and design flexibility is a key feature of HNS's new earth station equipment. The satellite communications marketplace is constantly changing as new features and services are introduced, however, replacing earth station hardware every six months is not an acceptable upgrade technique.

Spectrum's solution

By using Spectrum's programmable signal processing hardware plus other programmable devices, HNS' new system is highly software upgradeable: upgrades can be performed and new services can be added simply by loading in new software.

Hughes Network Systems has succeeded in creating a new leading-edge satellite earth station product. Leveraging off Spectrum's *flexComm* wireless processing products and taking advantage of other industry standards and commercial products, HNS has produced a highly reliable, flexible, and cost-effective earth station infrastructure to power the next generation of satellite applications.

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