

RADVISION's Robust, Proven H.323 and SIP Protocol Stacks Enable Analog Devices' Next-Generation Blackfin BRAVO Platform with Audio and Video Capabilities

HIGHLIGHTS

- Client:** Analog Devices, Inc.
- Application:** Analog Devices has evolved its Blackfin® processor into the BRAVO™ video Platform which delivers audio, streaming video, networked camera, and videophone capabilities.
- Product:** RADVISION SIP and H.323 Protocol Toolkits
- Benefit:** By incorporating RADVISION's SIP and H.323 communication protocol stacks, the engineers at Analog Devices could confidently add multimedia capabilities to the Blackfin BRAVO Platform quickly and without the development expense required for on-going, dedicated, in-house resources to maintain and update software.

Analog Devices Background

Analog Devices (ADI) specializes in high-performance analog, mixed-signal, and digital signal processing ICs. Founded in 1965, its focus has been to create ICs that enable portability, connectivity, and multimedia functionality. The ADI company brand is recognized throughout the electronics industry for innovative, high-performance technology and world-class engineering support. The company's current portfolio consists of more than 10,000 products that serve the needs of more than 60,000 global customers. It specializes in working directly with its customers to support their successful and unique implementations.

Analog Devices and RADVISION

The mission of the Software and Systems Technology Group at ADI is to take the company's state-of-the-art processors and provide the software required to deliver turn-key solutions to customers in the form of complete hardware and software reference designs that are standards-compliant and tested for interoperability. This value-added service means that ADI's customers can significantly reduce their time to market, since they no longer have to develop, integrate, and test various standard software modules. Instead, they can simply focus on software development to differentiate their products.

Recognizing that broadband connectivity was heading to the residential market, the Software and Systems Technology Group began working in earnest on its video conferencing and video telephony products about ten years ago. They selected the RADVISION H.323 Protocol Toolkit because RADVISION was the proven market leader that could ensure fully-featured robust code, knowledgeable service, and reliable interoperability.

"One of the major reasons we selected RADVISION was its significant market share in this business," noted Shankar Malladi, Engineering Manager at ADI. "Protocol stacks typically communicate with servers and other equipment, so being able to interoperate with other devices is of major importance. By choosing RADVISION, this challenge was a long way toward being solved already. Because the bottom line is, when your processor is talking to a server, chances are good that it is already talking to a RADVISION server."

ADI first began using the code on its SHARC® family of processors. Then the ADI group shifted its focus to working with the Blackfin processor, which was developed specifically for computational intensive video and communications applications.

RADVISION's SIP: A Logical Choice

When the team at ADI was ready to add Session Initiated Protocol (SIP) capabilities to the Blackfin products, they again chose RADVISION. "We selected RADVISION because we had first-hand experience with their commitment to providing quality, up-to-date code that still offers designers flexibility," explained Hans Waldmann, Senior Engineer at ADI.

ADI chose not to develop the code in-house primarily because of time and expense. Selecting the RADVISION Toolkits gave them quicker time to market. "This meant less development expense for us and we realized the additional benefit of having the latest updates with no worry about keeping up-to-date," said Malladi, "ADI's focus is on being an industry-leading semiconductor supplier, so we look for software to enable our customers to use our processors. We recognize that it would take a lot of effort to keep home-grown H.323 and SIP protocols up-to-date."

Powerful Toolkit Features

Two of the major benefits of choosing the RADVISION SIP Toolkit translated directly to ADI's customers—namely a log file and multiple application program interface (API) layers.

The SIP Toolkit log file provides designers with a list of events, and this offers significant time and aggravation-saving benefits during the debugging process. "This feature proved to be very useful in supporting our customers and helping them to debug their problems. Without it, the debugging process would have been much more time consuming," reported Waldmann.

Another good feature was the high-level APIs that allowed ADI engineers to develop specialized functions and features. "We can easily modify the message fields of the various messages, which gives us the flexibility needed to implement various customer specific requirements," noted Waldmann.

Customer Benefits

"We can depend on RADVISION to have robust code, to keep current with changes to the standards, and to identify and fix bugs quickly," explained Malladi. "RADVISION has name recognition, so when we suggest to a customer that they use our code, and our code is from RADVISION, it makes the selling job easier."

The major benefits to ADI's customers are: quick time to market, robust software, good support, and interoperability with other vendor's products. Many of ADI's customers are telecommunications service providers. They test and deploy the digital signal processors in the field with their other equipment. "It could be quite a painful process without good robust software that interoperates easily," said Malladi. "RADVISION has proven to the industry that it is a very reliable supplier, particularly in terms of interoperability."

The Benefits of Automatic Implementation

One area that risks putting the squeeze on time to market is implementation. The team at ADI was interested in streamlining their development process, so they were very pleased with the SIP Toolkit's PRACK Extension support and advanced domain name system (DNS) queries.

PRACK Extension Support

"This was helpful in that it was automatically implemented by the stack. If that were not the case, we would have had to spend significant effort in implementing this ourselves," said Waldmann.

SIP is a request-response protocol that defines two types of responses—provisional and final. Whereas final responses were sent reliably under the initial RFC 3261 specification, provisional (providing information on the progress of request processing) responses were not. Real-world implementations quickly revealed that reliably transmitting provisional responses was necessary for a number of applications, especially those interoperating with the public switched telephone network (PSTN). As a result, the RFC 3262 SIP extension was developed to incorporate the provisional response acknowledgement (PRACK) method.

For final responses, the reliability mechanism works by mirroring the current reliability mechanisms for 2xx final responses to INVITE. Those requests are transmitted periodically by the Transaction User (TU) until a separate transaction, ACK, is received that indicates reception of the 2xx by the user-agent client (UAC). The reliability for the 2xx responses to INVITE and ACK messages are end-to-end.

In order to achieve reliability for provisional responses, the RADVISION SIP Toolkit uses a similar methodology. Reliable provisional responses are retransmitted by the TU with an exponential backoff. Those retransmissions cease when a PRACK message is received. In essence, the PRACK request plays the same role as ACK, but for provisional responses.

There is one important difference, however. PRACK is a normal SIP message, like BYE. As such, its own reliability is ensured hop-by-hop. Also like BYE, but unlike ACK, PRACK has its own response. If this were not the case, the PRACK message could not traverse proxy servers and remain compliant to specifications.

In this technique, each provisional response is given a sequence number. The PRACK messages contain a "RAck" header field, which indicates the sequence number of the provisional response that is being acknowledged. The acknowledgments are not cumulative, and the specifications recommend a single outstanding provisional response at a time, for purposes of congestion control. Since ADI has many customers in the telecommunications field, PRACK extension support is a key advantage.

Advanced DNS Queries

Advanced DNS queries locate SIP servers in the network that are using Server (SRV) and Naming Authority Pointer (NAPTR) for outgoing requests. The RADVISION SIP Toolkit uses DNS procedures to allow a client to resolve an SIP uniform resource identifier (URI) into the IP address, port, and transport protocol of the next hop. It also uses DNS to allow a server to send a response to a backup client if the primary client has failed.

"The advanced DNS queries feature was also very helpful to us, in that it is automatically implemented by the stack. This made our implementation much simpler," said Malladi.

Ease of Implementation

Much like the implementation of H.323 several years ago, the implementation of the RADVISION SIP protocols at ADI went well. The company has a unique challenge in that it uses a proprietary operating system, so it could not fully benefit from the eleven operating systems that the SIP Toolkit supports. As a result, they needed to customize the RADVISION code.

Throughout the customization and implementation process, however, they "felt like we received good support from RADVISION," reported Waldmann, "To begin with, it is a well-structured code with good documentation. It is clear that RADVISION has thought through its customers' processes and has structured the toolkit in such a way that it can support their customers well."

About RADVISION

RADVISION (Nasdaq: RVSN) is the industry's leading provider of high quality, scalable, and easy-to-use IP communication products and technologies for converged voice, video, and data over IP and 3G. The company offers a strong and comprehensive product line of infrastructure, developer platforms, and professional services that enables vendors and service providers to develop and deploy a wide variety of high-revenue multimedia solutions and services.

Today across the globe, RADVISION-powered equipment can be found powering advanced IP-based communications and entertainment services such as IP telephony, 3G video telephony, IP video streaming, residential video calling and broadband remote surveillance/monitoring.

For more information please visit our website at www.radvision.com.

For more information about Analog Devices products, please visit www.analog.com.

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