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NAB Honors Telos Systems' Steve Church

Company Founder Is Saluted for His Impact in Telco and Audio Coding

BY RANDY J. STINE

CLEVELAND — “Hello caller, you’re on the air.”

It’s a greeting heard on thousands of radio stations across this country every day. However, without the engineering skill and determination of a young broadcast engineer in 1984, the now-simple act of putting a call on the air could have remained a challenge.

Steve Church, founder and chief executive officer of Telos Systems, developed the first broadcast studio product using digital audio technology. The Telos 10 telephone hybrid was a smash success as stations raced to replace clunky analog phone systems and speakerphones.

responsible for designing the first product to combine MP3 audio and ISDN telephone technology.

The self-taught electronics product designer released the Telos Zephyr in 1993, which allowed for transmission of high-quality audio without dedicated audio circuits and satellite paths. Then in 1997, he and business partner Frank Foti co-invented the Omnia.fm audio processor — thus, as the NAB put it, perfecting the DSP-based stereo generator and composite limiter.

Telos Systems, based in Cleveland, has



Steve Church, shown at the AES Convention in New York.

neer and part-time talk show host at WFBQ(FM) that he began work on the innovation that launched his equipment career. It was there, frustrated by phone lines that delivered poor fidelity and levels and as well as a low-frequency bubbling, popping sound, that he began two years of work on the Telos 10 digital signal processor hybrid.

“I was hosting a weekend call-in show and had strong motivation to make the phones sound better. We were using a speaker phone system that really was a big distraction

when putting calls on the air,” he recalled.

The technological breakthrough for the phone hybrid came after several fortuitous breaks, Church said.

DSP CHIP

“It was a very painful process to get where I wanted to go with it. I knew it was going to be through digital signal processing somehow, some way. But no one had ever used [DSP] before for radio broadcast. We think of digital being so ubiquitous today, but this was before even compact disc players.”

At the time the only DSP chip available was from Intel, but Church said he learned early in the development process that the Intel chip suffered from poor performance and wasn’t up to the task for his application.

“I had heard about another DSP chip from NEC, the Japanese company. However, there was only something like 20 prototypes of the NEC chip in the whole world. Well, I had to find one of those DSP chips,” Church said.

It turned out there was a NEC sales office in Indianapolis, a bit of a hotbed of audio technology thanks to the presence of

‘The future is audio over IP. VoIP and audio over IP will all be very closely connected throughout the broadcast structure.’

The Telos 10 is but one achievement on his résumé. Church, 53, takes his place this month among a select group of broadcast engineers as the recipient of the NAB Engineering Achievement Award, an honor bestowed for significant contributions to engineering. It’s a distinguished list that includes the likes of Carl E. Smith, Jules Cohen, Bob Orban, Hilmer Swanson and other luminaries.

“I’ve enjoyed every aspect of my career. It’s been very satisfying,” he said.

Church, considered an authority on telecommunications and audio coding, also is

50 employees and multiple divisions, including Omnia audio processors, Axia audio consoles and Linear Acoustic TV audio processors and encoders. Broadcasters in approximately 175 countries use its equipment, according to the company Web site.

Church, who was born in San Diego, began his broadcast engineering career in 1975 at WFMK(FM) in Lansing, Mich. He later worked at WWWW(FM) in Detroit as a broadcast engineer just prior to Howard Stern’s arrival in 1980.

But it wasn’t until Church moved to Indianapolis as full-time broadcast engi-

LOYAL COLLEAGUES

To hear Steve Church's collaborators at Telos Systems tell it, the winner of the NAB Engineering Achievement Award is brilliant but humble:

"Before Steve's Telos innovations cleaning up the quality of the telephone caller and balancing the presentation between caller and talent, telephone based talk radio was primarily a fringe-time feature on radio. ... And that's for just one innovation."

— Denny Sanders, Telos Systems general manager

"This is a treat for those of us who work closely with Steve. He's not the kind of guy who blows his own horn, but his ideas have truly changed the broadcast industry in subtle but significant ways."

— Michael Dosch, Axia Audio

"While I could easily write volumes about Steve and his accomplishments, probably one of the best he brought to my life, and our company, has been 'out of the box' thinking, working to be a paradigm changer and disruptive technology



Church is flanked by Omnia Audio President Frank Foti, left, and Axia Audio President Michael Dosch.

creator. All of this done with no trace of ego. He's a guy who can be dreaming out on the new frontiers of technology one minute, and then have an ad hoc chat with Pete Townshend of The Who about some abstract article he read in The Economist."

— Frank Foti, Omnia Audio

research and development arms of Western Electric and RCA, as well as a Delco Electronics manufacturing plant.

"I went and paid a visit to the one salesman NEC had in Indy, and turns out he was a big fan of the radio station and my show. I told him what I needed and he wrote a letter to the main office asking for one of the DSP prototype chips. I think he told them I was working on a ground-breaking project, but embellished a bit," Church said. "Anyway, he got it for me and as it turned out I got the only chip allocated to the United States."

Church went to work but soon ran into other obstacles, he said.

"There were no tools. You need tools for getting audio in and out of the chip and tools for writing software to run off the chip. It was a huge struggle."

Eventually Church converted a Radio Shack TRS80 personal computer into a development system for writing code for the NEC chip.

"The chip had an EPROM, but I still had to figure out how to program it," he added. EPROM stands for erasable programmable read-only memory.

After fits and starts, Church perfected the technology and launched the Telos 10 digital hybrid; call-in talk radio has never been the same, according to industry observers.

Meanwhile, Church shifted from Indianapolis to WMMS(FM) in Cleveland in 1985 to become director of engineering. However, entrepreneurial drive won out and Church left in 1988 to work solely on his fledgling business.

Church had sold one of the first Telos 10 hybrids to Foti, who was then chief engineer at WHYZ(FM) in New York. Foti, who was building proprietary audio processors of his own, would launch Cutting Edge Technologies; in 1992 their companies merged and eventually produced the Omnia family of audio processors for broadcast and streaming applications.

In 1993 Church unveiled the Zephyr, the first product to combine MPEG Layer 3 audio and ISDN telephone technology in one product, according to the NAB. He is credited by colleagues as bringing MP3 technology into the United States after visiting with research organization Fraunhofer in Germany.

MP3 AUDIO CODEC

"I saw the potential of MP3 and really locked onto it. We thought it was the best audio codec, first over ISDN and then as a means to do music on the Internet. It was very gratifying to see it take off in the United States," Church said.

According to the NAB's award announcement, "Church is also credited with designing Zephyr NET, the first ISDN-based program distribution network and the first low-cost alternative ad-hoc audio distribution system in the world. For streaming audio, Church invented the hardware MP3

'I saw the potential of MP3 and really locked onto it.'

encoder with a built-in audio server, the Audioactive Hardware Streaming Encoder, which for the first time enabled streaming for radio stations as we know it today."

Church — who cites Maj. Edwin Armstrong, inventor of frequency modulation (FM) broadcasting, as a major inspiration — also created the first standards-based audio-over-Ethernet transmission system for broadcast in 2003. The protocol, called Livewire, used standard Ethernet as a transmission backbone and off-the-shelf switching components to create real-time, uncompressed audio routing systems.

Livewire eventually became the core technology for Axia IP Networks, which

sells studio control surfaces and routing switchers.

“The future is audio over IP,” he says today. “That story will unfold over the next few years. There will be an evolution in audio studio design. We’re not there yet.” Voice and audio over IP, he continued, “will all be very closely connected throughout the broadcast structure.”

Speaking of the future, the condition of the economy is never far from Church’s mind these days, especially the financial condition of major broadcast groups, he said.

“Of course you have the macro influence in that the economy in general is in a seri-

ous funk. Broadcasting is highly dependent on consumer spending, and that, combined with the big broadcast groups having to pay down lots of debt, is causing lots of trouble,” he said. “Thus, the broadcast equipment business is hurting.”

Despite the downturn here, Church singles out India, Asia and most of Europe as strong markets for Telos and its sister companies.

Church never had formal technical training in college, instead taking finance, economics and philosophy classes at several schools, mostly at Buffalo University.

He has spent much of the past decade living in Riga, Latvia, and finds life in the

Baltics fascinating. He found Latvia while traveling to Estonia in 1996 to visit a Telos sales office.

“I found Riga to be very appealing and charming. The people were very nice. There is a large segment of DSP experts and audio people there in a research institute at the local university that we hire for projects.

“It’s actually been a very beneficial relationship both personally and professionally,” he added. Church met his wife Lana in Latvia; they recently married.

This year’s Engineering Achievement Award for Radio will be presented to Church at the Technology Luncheon during the NAB Show in Las Vegas.