



RADIO WORLD



RADIO ENGINEERING IN CRISIS

*Is it? And what are
companies doing about it?*

January 2020

From the Publishers
of Radio World



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Radio Engineering in Crisis?

If we're not there, we're getting closer; what's being done about it?



Paul McLane
Editor in Chief

By **Paul McLane**

Is our industry's technical profession — particularly in the United States — in crisis?

If so the critical point has come upon us slowly and with ample warning. For as long as I've been helping lead Radio World, 24 years and counting, broadcasters and technology leaders have expressed concern to me, and publicly at industry conferences, about

where the next generation of engineers would come from.

Yet now I sense fresh and more urgent concern about the question, with more awareness at upper levels of management and ownership. And I have a sense that companies and broadcast associations are devoting more resources to developing answers, perhaps because job openings are going unfilled.

So for this ebook, I talked to several experts in commercial radio, public radio and technical education.

I asked whether the number of qualified engineers is in fact declining as many age

and retire; whether employers are able to hire and develop new ones; how companies are balancing the needs of RF vs. IT; and what choices are available for technical training.

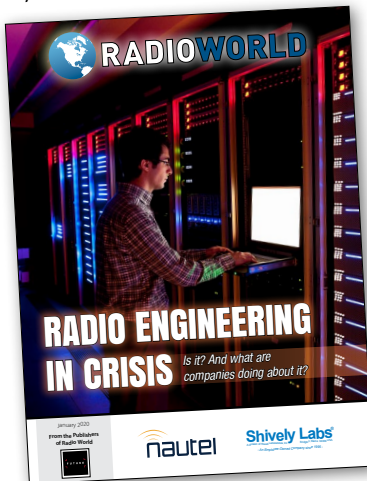
I also sought to learn whether broadcast groups are changing how they manage product buying and infrastructure design with a shortage of technical talent in mind.

John Poray of the Society of Broadcast Engineers gave me insight into membership data. Geary Morrill of Alpha Media USA, who chairs SBE's Education Committee, told me how he applies SBE certification resources to training fresh talent. Larry Wilkins updated me on successes enjoyed by the Alabama Broadcasters Association with its engineering classes.

Mike Cooney and Roz Clark shared their insights as high-level technology executives at two of the industry's leading commercial radio companies. Michael Beach of NPR Distribution offered perspectives from the world of public radio. And Professor Steven Keeler gave me the benefit of his experience as a technology educator. You'll read their insights in the first article below.

Note, technical executives at two of the nation's biggest engineering employers declined to answer my questions, citing time limitations. I

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was interested in asking them about long-term plans for network operations centers at their companies, though I was able to explore that question with others.

Also, as this ebook was nearing completion, iHeartMedia rattled the industry with news of “a new technology transformation and new organizational structure.” At this writing it remains unclear what that will mean for engineering and tech management at IHM, though it seems highly likely that centralization is an important part of that story.

In the second section of the ebook, I invited SBE President Wayne Pecena of Texas A&M University to write

his own commentary and talk about how the society has responded to the employment and education challenges. Then Larry Wilkins lists seven traits of a good engineer; and consultant Gary Kline helps managers and candidates prepare for topics that may come up in a job interview.

My thanks to our sponsors Nautel and Shively for supporting this particular ebook and the discussions it contains. As always I welcome your input about this ebook or any Radio World content. Email me at radioworld@futurenet.com.

Industry at Large Is Waking Up to the Real Decline in Number of Engineers

Eight years ago, John Poray, executive director of the Society of Broadcast Engineers, told an NAB Show audience that membership data led him to conclude that the rate of young people coming into the business fell “far short of what is needed to replace those who are retiring or leaving the field.”

When I spoke to him in January 2020, Poray said that’s still the case. While he declined to use the word crisis, he said the issue of developing technical talent is a “pretty serious problem.”

The average age of SBE members around the turn of the millennium was about 50. Over the first decade of the 2000s it increased to 54 years old; after the second decade it stands at 59. This average includes TV members; but in radio, clearly the workforce continues to age; and many engineers are working beyond traditional retirement.

“There’s plenty of work in full-time jobs for people who are 70 if not beyond, which means the potential for somebody leaving abruptly due to health is probably increased,” Poray said. Meanwhile fewer people are entering at the beginning of the career pipeline due to competition for jobs, higher salaries and better hours.

Of course, consolidation, station clustering and industry economics mean fewer job openings. “What used to take four or five engineers now seems to take one; there’s less demand, which helps balance off the issue of less supply. But most people would agree that the supply and demand issue is still there; and we’ve probably seen

all the clustering that you’re probably going to see, at least on the radio side; I’m not sure how [radio companies] can get any leaner than they are now.”

JOBS GO UNFILLED

How big is the available population of radio broadcast engineers, in North America or globally? It may not be possible to know. But SBE membership data gives us a sense.

Society membership for radio and TV was 4,900 in 2019, the first in many years when that number fell under 5,000. “Radio has taken the bigger hit,” Poray said. “When I came here [in 1992], radio membership was about 50 percent; now radio is at best 30 percent of our membership. The loss is due to far fewer radio engineers than there used to be.”

Ninety percent of SBE members renew each year, and the society attracts several hundred new ones annually, but others don’t renew. And members die — 40 to 50 in each of the past two years. (The membership includes around 700 Life Members, who are retired from active work.)

Given these data points, Poray estimates that SBE membership now includes 1,300 to 1,400 radio engineers, most of them in the United States. But as for how

JOHN PORAY



many other (non-SBE) working engineers or technical staff are out there, in the U.S. or elsewhere, it is not easy to say. For what it's worth, Poray hazards a guess that SBE has 70% of the active broadcast engineers and technicians in the industry, across radio and TV, in the United States.

(U.S. Department of Labor statistics on radio industry technical employment are not particularly helpful because they include jobs beyond what most people reading this would define as a broadcast engineer or technician.)

But is there a shortage? Poray says informal indicators suggest that there is.

"Our SBE JobsOnline service always has jobs on it; some stay on for the maximum 60 days, and stations renew them to list again, which suggests to me that they're not filling open jobs." (I counted 43 active jobs in early January.)

The impact seems greater in small- and medium-sized markets, he said; in an older-skewing employment pool, he suspects working engineers are more rooted to their communities, so stations in smaller towns may struggle to get them to move.

Reinforcing the sense of a shortage, Poray often hears from members about difficulties replacing valued assistants even after months of advertising.

"When they do find replacements, they are typically more on the IT side, with the hope that they're going to train them on the RF side. A lot of stations have made that choice; five or 10 years ago, the first choice was RF. Now most stations, radio or TV, will go for the IT guy and hope that the legacy engineer on board will teach them the RF side. Or they'll hire that out to a contractor or consultant."

SCHOOLS NEED STUDENTS

So where should the industry turn to train up more people?

I told Poray it seems like there were fewer schools actively teaching broadcast technology, either two- or four-year programs. He said the number of SBE certified schools indeed has shrunk from a recent high of 15 to eight now (six in the United States and two in Canada), plus one associated with the U.S. military.

"The others closed; it wasn't profitable or cost-effective to run those programs because they had few students who were interested; and it cost a lot of money for instructors — and for equipment."

He said it's hard for schools to keep their facilities current with technology such as HD Radio and AoIP networking, and they are especially unlikely to invest that money if the potential number of students is low.

SBE has responded by nourishing its own education-



An online promotional image. Graduates of the NAB Education Foundation's Technology Apprenticeship Program earn SBE Certified Broadcast Technologist certification.

al resource offerings. These include one-off webinars, online university courses, in-person Ennes workshops and a leadership development course.

The society has sought to include more information for "newbies" in those offerings, not just advanced material. It also launched a monthly Web Extra, essentially a chapter meeting via the internet for people who aren't inclined to go to a chapter meeting, don't live near a chapter or can't get time off. That kind of digital engagement may be more appealing to younger engineers than traditional in-person meetings, Poray said, though the latter definitely still have a role.

A particularly successful initiative has been the SBE MemberPlus program, now in its third year. Members pay a higher membership fee (\$175 total instead of \$85) to get access to SBE's library of archived webinars.

"We've seen over 1,000 members make that switch in the first year; and it's more this year." Registration to webinars has increased dramatically as a result.

"We've seen companies tell their engineers, 'Look, we'll pay that \$175 dues, because you're going to get all that education for free, and we want you to take advantage of that.' We had people telling us, 'Our companies will pay for dues; they just don't want to be nickel-and-dimed for other stuff, one-off webinars at \$59 apiece.' So now for \$175, they have access to close to 90 webinars and all kinds of broadcast technology topics."

In 2019 SBE added 16 webinars to the archives. Five are scheduled in the first quarter of 2020.

THE ROLE OF STATE ASSOCIATIONS

Looking beyond SBE to what other organizations are doing, Poray is appreciative of efforts of individual employers like iHeartMedia to create programs to recruit actively and train technical staff internally.

Under iHeart's COOP program, college electrical engineering students spend part of their education as paid interns at the company, typically in two separate semesters. Further, since 2014, iHeart has offered a two-year Market Engineering Manager Development Program that

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uses online and hands-on training to bring assistant engineers on staff up to full management capabilities. The goal is to put eight to 12 people through each of these two programs every year. [Read Radio World's 2017 [article about the program and how it works.](#)]

Poray also mentions the NAB Education Foundation's [Technology Apprenticeship Program](#), which is open to graduating college or technical school seniors who want to work in broadcasting. That six-month program leads to the SBE Certified Broadcast Technologist certification, a paid two-month internship at a station and involvement in producing a webcast.

And Poray sees state broadcast associations playing a more active role.

For instance the New York State Broadcasters Association, under President/Executive Director David Donovan, recently contracted with SBE to buy a large "chunk" of webinar access to help member stations offer their employees entry-level training. Those assets include an eight-part RF basics series plus a webinar on RF safety.

Separately, the Alabama Broadcasters Association offers a five-day ABA Engineering Academy, led by Director of Engineering Services Larry Wilkins (a past recipient of the Radio World Excellence in Engineering Award). And another state's broadcast association is working actively on an education and development program, I've learned, and will announce it this spring.

IT'S ALL TECHNOLOGY

"The good news here is that ownership and general managers have finally realized we have a problem and we've got to work on this," Poray said. "We're seeing more recognition around the country by station owners that they've got to bring in and train people."

He hopes companies will fix the pay scale problem. "Make it more worthwhile to be a broadcast engineer. Most of them love the work they do, but that doesn't put food in the refrigerator." (SBE surveys its members on salary trends; it doesn't release the information to non-members or compare broadcast engineering to other jobs; but Poray says, "Anecdotally we're pretty sure it generally skews under other technical fields.")

Media companies will need fewer people in the future to do these jobs, Poray said. "It's just the way technology is going." Yet there will still be a need for technical expertise.

"It's going to be heavy on the IT side, it's going to be about streaming, about how you get the content out in not only the traditional way but via the internet, and all the ways we're seeing today. It's still all technology. The director of engineering — or whatever that position might be called in 10 years — will still have a role to play."

SBE Certified Schools

The SBE certifies post-secondary schools that have technical broadcast curriculum and wish to have it certified by the SBE. It says graduates from these programs are prospects for stations to consider hiring (in the case of AFRTS, after they have completed their military service obligations). Find more information at https://www.sbe.org/sections/cert_schools.php

Defense Information School

Technical Training Program
Ft. Meade, Md.
<https://www.dinfos.dma.mil>

Bates Technical College

Tacoma, Wash.
<https://www.batestech.edu>

Cayuga Community College

Auburn, N.Y.
www.cayuga-cc.edu

Cuyahoga Community College

Cleveland, Ohio
<http://www.tri-c.edu/programs/engineeringtechnology/Pages/Default.aspx>

Cleveland Institute of Electronics

Cleveland, Ohio
www.cie-wc.edu

Georgia Piedmont Technical College

Clarkston, Ga.
sextonb@gtpc.edu

Loyalist College of Applied Arts and Technology

Belleville, Ontario
www.loyalistcollege.com

Mitchell Technical Institute

Mitchell, S.D.
www.mitchelltech.edu

SAIT Polytechnic

Calgary, Alberta
bxst.info@sait.ca

People Are Functioning in a “Fireman Mode” Instead of a Preventive One

The chair of SBE’s Education Committee is Geary Morrill, regional director of engineering at Alpha Media USA and a former broadcast company president and GM.

“There are some bright spots, but in general I would say the industry has been doing a lot of talking and not a lot of action,” he said. “At the same time the talent pool on the technical side has done nothing but get older.”

He hears broadcast managers cajoling retirees into working contractually, but says such tactics are just a stopgap. “I would say that we’re closer to being in a crisis situation than we’ve been.”

He laments that career training in electronics is not as common as it was. He oversees 26 markets and is able to find candidates. “But the folks that I’m bringing on board are going to need a lot of training.” In some cases he can find interested people in other departments of the company, such as one recent hire who worked in programming, was looking for a change and held an amateur radio Extra Class license.

Morrill describes “hand-wringing” at state associations as members press them to act as clearinghouses or to hire engineers on contract as a shared resource.

“The thing that most people are concerned about is high-power transmitters. People just simply don’t have experience. If you don’t work in the industry, where do you get the experience?”

Morrill is using SBE’s online resources to introduce basic concepts to staff he hires. “While it’s not hands-on, it’s knowledge, and it’s available on demand.”

He also utilizes the SBE entry-level Certified Broadcast Technician content. “I’m using the cert preview, it’s kind of a mock exam. I said, ‘Don’t worry about whether or not you get these questions right. I’m just trying to ascertain what your knowledge is in these areas.’” Once that’s established, he can point a person to specific webinars

and reference material.

He’s a believer in mentorship, and Alpha Media participates in the SBE Mentor Program, which partners a new engineer with a seasoned professional. This becomes all

the more important in the 21st century, when there are fewer technical peers in the workplace. “A lot of it happened by osmosis [in the past]. But now the opportunities are so few and far between because so many people today are functioning in a fireman mode instead of in a preventive mode.”

TOO MANY OPENINGS BUT NOT ENOUGH JOBS

Morrill describes “hand-wringing” at state associations as member stations, particularly smaller ones, press the associations to act as clearinghouses or to hire engineers on contract to create a talent pool that members could then access. The idea is good, Morrill said, but would require money, time and technical screening that associations may not be able to commit. Associations themselves may not have technical staff on their teams.

Morrill has bridged technology and management in his own career. He studied communications at Lansing Community College as well as communication electronics at RETS Electronic Schools. He holds two SBE certifications but also achieved Certified Radio Marketing Consultant status from the Radio Advertising Bureau when he was a president/GM with Midwest Family Broadcasting.

Can SBE locals or the national organization work more aggressively to approach schools and technical institutes about partnerships?

“The first question out of their mouth is, ‘So what are the job prospects?’ While we [in the industry] are in desperate need, there aren’t that many broadcasters anymore. When I came into the industry, I was working for an AM directional and we had six or seven guys on the engineering staff just for an AM and an FM. Today it’s not uncommon, in smaller markets, to have one guy, maybe two, handling multiple markets with multiple stations. So

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GEARY MORRILL



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how many jobs actually exist? We can't look at a school in the eye and tell them that there's going to be 10,000 jobs available in the next decade. It's not an easy sale."

Smaller efforts within the industry thus play an important role.

Like Poray, Morrill highlighted the classes created by the Alabama Broadcasters Association, particularly its outreach to broadcast employees who may work in other station departments.

"Maybe we need to export that into a couple other regions, simply to see if there is a pool out there of people who may be interested and available. Like the chap I hired over in Chicago who was kind of downsized on the programming side but had a technical aptitude.

"Those guys do exist; and I don't think that we're looking that close, because we're wringing our hands looking for that guy that's got 10, 20 years of experience. He's not there."

Train Others on Your Staff to Be Part of the Technical Team

As you can tell, a lot of people are aware of the classes run by the Alabama Broadcasters Association.

Its radio classes this year will be held in February and September. Subjects include an overview of basic electronics; audio concepts, analog and digital; RF, including AM and FM transmitters, and basic antenna theory; FCC rules and regulations, including EAS; and preparation for SBE certification.

The launch of the program is one of the reasons Radio World saluted Larry Wilkins, director of engineering services at the ABA, with our Excellence in Engineering Award not long ago. I found Larry to be more optimistic than others when I asked about an engineering crisis.

"I know there are a lot of people like myself aging out. But based on what we're doing or see in our engineering academy, there's a lot of people still interested in getting into the broadcast business. I haven't really seen a lot of stations with emergencies where they can't find anybody to help them."

What kind of folks take the courses?

"They may be operations managers, board ops or master control operators who have an interest in learning about the technical side; they come to our classes, and that gives them some basic knowledge so that they can work under the chief or on the engineer's staff, and work right into it," he said. "This will create an employee who is a greater asset to the company, especially if you have a contract engineer who is not on site every day.

"Then we have a number in other fields who want to

LARRY WILKINS



Larry Wilkins, third from right, poses with students of an ABA technical class on live mixing.

take a look at broadcasting. And we have seasoned engineers who take classes as a refresher course or to learn about the new technologies — ATSC 3.0, digital audio and HD Radio.

"We can't make chief engineers in five days," he continued. "But we can give them knowledge so they can work under somebody else. I have had calls from people looking for engineers, and I'll refer some of the people who have been to our classes to help them. And we do have a list of people who do contract work and we refer them to those."

KNOW ELECTRONICS

Even though candidates may come from other interest areas, he's firm about the importance of basic electronics training.

"If you don't understand that, everything else you get into will just go right over your head. It's like the basketball coach talking about the training new recruits. He

starts with the basics: There's a right and wrong way to put on your socks. And if you put them on incorrectly, they could bunch up. If you walk or run around, it's going to cause a blister; and a basketball player with a blister on his foot is not going to be very effective.

"The same is true in broadcasting. If you don't understand the basics, Ohm's Law and the basic way electronics work, that's going to be a problem down the road."

But he also urges students to pay attention to developing their communication skills.

"I run into a lot of engineers who get isolated in their own little shop and don't carry on conversation with other people. You're a part of a team, you're not by yourself." He compares it to working in live sound. "You have to get involved with the musicians and let them know you've got their back. The same thing for broadcasting. You've got to learn to work with other departments to make that operation successful."

STILL NEED TECH EXPERTISE

Wilkins reiterated the value of online resources from organizations, not just SBE but also equipment makers.

"As you know, for a number of years, manufacturers have had training seminars, especially for new equipment," he said. "But now, so much of the equipment is designed [so that] companies can log into a transmitter or an automation computer and help the engineer diagnose trouble themselves." But even though there may be fewer seminars, manufacturers post a great deal of useful info online.

Wilkins places great emphasis on certification. When the FCC did away with its earlier technical licensing requirements, "It was like they opened the door and said, 'Well, you know the Domino's pizza guy can be your engineer, if he's got enough knowledge not to blow himself up at the transmitter.'" A benefit of SBE certification is that employers have guidelines to use when looking for prospective hires.

I asked Larry the question several others have asked me: Could the elimination of the main studio rule lead to broadcasters not having local presence and running operations more remotely?

"Yes," he said. "From a business standpoint I'm not sure if that's a good thing or not."

"People will say, 'The way broadcast is now is pushing the engineer out the door.' I say, 'Well no, somebody has got to put the equipment in there; and somebody has got to fix it when it breaks.' You still have to technical people — probably even more so to make sure interconnectivity is working correctly."

ABA Outreach

ABA recently emailed station general managers and operations managers about its free class program. The language gives insight into how it envisions the classes helping stations:

"Training others in your staff to work with the engineer on problems and construction can be a great asset to your operation, especially if you utilize a contract engineer that may not be available all the time," it wrote.

"Look around your operation, we are sure there are those that would be interested in learning about the technical side of broadcasting. We are aware that one week in this class cannot make someone a chief engineer, however this could aid in creating a backup for your engineering staff. Prior technical knowledge is not required.

"With all the new technology arriving almost every day, this class is also a valuable training tool for your staff engineer. We encourage you to take advantage of this great educational opportunity."

He chuckled when I mentioned the convergence of traditional engineering and information technology.

"The IT department was separate from the broadcast engineering department; we always joked about it. We said, 'The people in the engineering department understand what those boxes mounted in the rack do and how to work on them, they just don't know how to make them talk to each other. And on the other side of the hall, the people in the IT department don't know what the boxes do, but they know how to make them talk back and forth to each other over a network!'

"Now your broadcast engineer really has to have a good understanding of IT and how IT works to get their plant to operate properly."

In conclusion, though, he again deflects the idea of a "downhill slide."

"I think engineers are still interested in what they're doing. You've got to have it in your blood. I mean, it's not something you do just for a living. You've got to enjoy being in this business.

"And you have to develop. Develop an attitude of a lifelong learner. This business's technology is changing at such a tremendous rate; almost weekly, there's something new coming out. Engineers should be encouraged to keep up with the new technology in whatever way they can."

Beasley Beefs Up Corporate IT But Day-to-Day Tech Stays Local

Mike Cooney believes our industry is in a transition phase for technical staffing.

"For years we were looking for engineers who had transmitter or studio experience. Now with all the IP audio out there, we're starting to find that IT people deal better with those type of platforms than the typical broadcast engineer like myself who may not have great IT skills."

Cooney is chief technology officer and executive vice president of engineering for Beasley Media Group, which has 64 radio stations. He is aware that the talent pool continues to age, and he has seen other companies get hit by rushes of retirements at the same time. He worries that the industry's quality of chiefs may suffer as a result.

"There's a shortage, so [the industry] is promoting people who may not be chief engineer material because we don't have any choice. Either a company won't support, or the market won't support, the level of pay needed; or there's no one available who wants to move."

"Beasley very much believes in live and local and we not planning any virtualization at this time."

Beasley itself hasn't struggled to retain engineers, he said. "But we have been losing IT people at an alarming rate. We lost four IT directors in the last year, and it's due to the benefits and the pay that good IT guys can make vs. what radio is paying." IT jobs usually don't require an employee to be on call; they might offer the option of working four-day weeks and many are allowed to work from home.

One way Beasley has responded is to expand our corporate IT staff rather than trying to retain higher-skilled people in each market, adding three positions at the corporate level just this month.

"We've realized that we can get by with a lower skill set, more of an IT help desk person, in the market; so

we're going towards that model, which saves us a little money, and we spend that on hiring a higher level of corporate IT staff." This also helps support efforts like Beasley's cybersecurity initiative, which includes more aggressive email filtering and web blocking.

"We're still relying on the local markets for the most part to deal with the day-to-day IT and engineering needs."

VIRTUALIZATION

Cooney understands that some broadcast companies are working toward centralizing technical operations, such as building network operating centers and having a national team for on call. "We have not gone down that road and don't think we will with our size," he said of Beasley.

But as chairman of the NAB Radio Technology Committee, which is researching the implications of virtualization, he knows companies will look at it with interest.

"I think it's great, but I'm worried about it also," he said frankly. "If in the near future we can virtualize all the studio operations and remain legal, I think many small or medium-size markets will end up with no studio staff at all. Beasley very much believes in live and local and we not planning any virtualization at this time. Obviously, if you virtualize everything, you won't need the IT or engineering staff level in those markets."

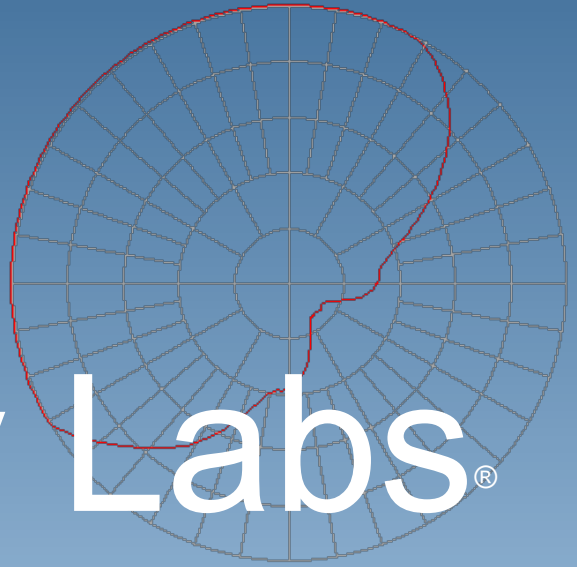
Virtualization, he said, does offer a powerful benefit as backup to operate remotely in emergencies, such as when a hurricane recently hit Fayetteville, NC., and emergency authorities gave Beasley five minutes' notice to vacate its building due to risk of flooding.

"I said, 'What if our employees want to stay?' They said, 'If they want to stay, we need their next of kin, and you are responsible for their lives.' How do you tell an employee we'd like you to stay?" Ultimately two staffers

MIKE COONEY



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volunteered, but Cooney saw this as an instance where virtualization would have helped to be able to run the radio stations remotely.

POOLING RESOURCES

Does Beasley standardize on certain products or systems? Yes, though not necessarily because of a shortage of technical staff; but it's one benefit.

"Because of the support we get from [certain] manufacturers, we do standardize on their product, so we don't have to have an expert in [each] market." For instance Beasley will soon have all markets on Wheatstone IP consoles and WideOrbit automation, converting seven more markets this year, and he expects a handful of staff will become the WO experts for the company.

Cooney believes manufacturers, too, are finding it harder to retain staff in the face of competition — from their own clients as well as outside the industry.

In the future, Cooney believes, radio companies will work together more closely to share technical resources. "Especially on the transmitter side, we may have only one or two transmitter guys in a big city." Some arrangements will be found to retain and pay those experts as a shared resource.

"The other possibility is that the technology of transmitters gets so simple — plug and play, pulling modules — that we can send an IT guy to the transmitter to fix it." Though with legacy tube transmitters still in the field, some stations may not be able to take that risk. "We still need good transmitter engineers."

Cooney believes manufacturers, too, are finding it harder to retain staff in the face of competition — from their own clients as well as outside the industry. Consider this from the manufacturer's point of view, he said. "You finally get a really good installer, and then all of a sudden a broadcaster steals them. That's become a problem for the manufacturers; and that's why we feel we need to have our own expertise in the company."

Look for more suppliers to begin charging broadcasters for technical support as a result.

"Other engineers may cringe at this, but I don't see why [software] suppliers should be able to charge yearly support, whereas we expect to be able to buy a transmitter or a processor, and they need to support us forever on it, for no additional money. I believe you're going to see these manufacturers start charging us for support; and I think that will allow them to pay their staff better and retain them."

"SUCH A SHORTAGE"

His own career began when he studied industrial electronics at a technical institute in South Dakota. After graduation, he learned of an opening at South Dakota Public Television and Radio, which got him hooked on broadcasting. He became a corporate chief for a small radio company for five years, then assistant VP of engineering for VideoMasters Inc., designing and building TV and radio facilities worldwide, and later was VP and project manager for a large audiovisual integrator.

He came back to radio to manage the engineering and IT department at Entercom's Kansas City radio group before joining Beasley in 2007. He is active in SBE as well as on the NAB Automotive Digital Dashboard "DASH" Committee and the Technical Committee of the Broadcast Traffic Consortium; he has participated on the Broadcast Engineering Conference Committee and presented at NAB conferences. He won the Radio World Excellence in Engineering Award in 2016.

Beasley has had some direct contact with educational institutions. For instance it coordinated internships with the University of Nevada Las Vegas; and it has a strong relationship with Appalachian State University, where the broadcasting center is named for its founder, chairman and CEO George G. Beasley, who holds two degrees from there. (In 2013 George Beasley said he hoped Appalachian would become "the premier school of broadcast communications in the Southeast and maybe one of the top five in America.")

And Cooney said the company has had luck in certain markets, finding young people already on staff who show interest in technology and seeking to mentor them.

But the shortfall of technical talent isn't unique to radio, he said, but is true across engineering fields. "There's such a shortage. I have three nephews who are mechanical engineers, and they all started out at \$90,000 to \$100,000 with no experience. Graduates have companies fighting for the top graduates. This is the environment in which radio is competing for technical skills."

We Have to Look at How We Replace the Gap of Skills, Not Necessarily in One Person

As noted above, one commonly mentioned way to help engineering operations be more efficient is to standardize on technology across an enterprise.

For instance, Cox Media Group, with technical staff at several dozen stations in 11 markets, tries to standardize on vendors and product lines.

“Absolutely,” said Senior Director of Engineering Roz Clark. “One of the things we’re taking to another level — in remediating as well — is standardizing *how* technologies are implemented. Configurations and topologies and the settings you go through when you put in a system — if it’s a unique one-off, it may look and smell the same on the surface; but once you get under the covers, you can find that things are dramatically different.”

A lack of standardized methodology would limit a company’s ability to cross-train or have technical staff

“As long as we’re transmitting radio from an antenna, there’s going to be a baseline of support.”

assist in one another’s work. “As we get into areas of security, risk assessments and recovery, you really have to standardize on implementation and topologies.”

Do issues of technical staffing affect infrastructure planning beyond that? Are companies leaning more toward centralized operations or the cloud in part because of challenges finding qualified staff in all their markets?

“The cost savings of centralized or cloud-based operations aren’t really from the technology support department, as I see it,” he replied. “The staffing levels we have at most markets is pretty slim already. You’re still going to have to maintain a lot of local market infrastructure. As long as we’re transmitting radio from an antenna, there’s going to be a baseline of support.”

However, Cox does take into consideration, for instance, the benefit of replacing tube-type transmitters with solid-state transmitters, which bring better manufacturer support as well as a safer environment for staff. An RF plant today “looks more like a RAID for transmitters. You have a whole bunch of amplifiers RAIDed together, if you will, [run via] software,” Clark said.

The RF plant feels like a server system than ever before; and when critical systems offer that kind of design, it does remediate the demand for traditional expert RF skills to a degree. “I’ve had IT folks swap out modules very safely, and log into the GUI to clear faults,” he said.

“That benefit doesn’t fit on a spreadsheet very well, when you go to justify the cap ex expense; but the bottom line is that it directly and clearly impacts the required skill set.”

Similarly, having audio console systems built around IP changes the game. “It’s basically a network of audio appliances on a computer network, so the skill sets are more heavy on the IT side than [requiring] someone who understands all the nuances of traditional audio routing.”

“SIGNIFICANT CHALLENGE”

I asked Roz whether he feels radio faces an engineering crisis.

“‘Crisis’ is overused,” he said, defining a crisis as when a station is off the air with no hope in sight of getting back.

“I don’t know that we’re quite there yet. But what was predicted by many in the industry — that in the next few years there will be a very significant challenge in how we staff the technical support operation of our facilities — that’s certainly true, and we cannot do things the way we’ve always done them.

“It’s becoming more challenging to meet the needs of a broadcast facility from the manpower point of view as technology continues to become more complex and

ROZ CLARK



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increases the demand for other skills from existing staff. We have to train, onboard new talent and replace talent whose retirements take other skills from us.”

Clark held a hiring role for many years; today he oversees local market leaders who hit their own roadblocks in finding qualified candidates.

“There are many skill sets in the [traditional] wheelhouse of engineering. Our company runs engineering as one big technology group, we don’t have a separation between IT and broadcast engineering; it’s all technology. That includes IT, IT security, RF, audio, IP networking, power quality issues, tower and building design, FCC rules, compliance, a huge assortment of things.”

Replacing someone with 25 or 30-plus years of experience at all of that can be a tremendous challenge. “As a person carrying a massive list of skills leaves a market or facility or company, we have to look at how we replace that *gap* of skills, not necessarily a *person* to do all of the same exact things.”

One way Cox has responded is to create teams of subject matter experts. For instance it keeps a short list of RF specialists across markets who have experience with new and legacy transmitters and can apply those skills in an installation project or help after a catastrophic failure.

“Another area is IT security for broadcast. That’s very important. To me it’s unreasonable these days to [try to] have one person who knows all the details of the RF system and plant as well as all the nuance of IT security, all in one person.”

I asked Clark if he agreed that in the 1990s, radio companies generally speaking would seek to “hire RF experts who could learn IT,” while now companies need to “hire IT and teach them RF.”

He said that because demand for IT skills is growing while skill sets in RF are leaving the business, by default there will be more IT people, so it makes sense to train the people on staff as much as possible in more specialized needs like RF.

Interestingly, though, Clark has sensed an uptick in interest about technology work from people in other areas of the radio business. “Technology is becoming more friendly as people fool around with software, production systems and so forth. There are competent people who are very good at technology and just have never been exposed to the other parts of the business. Once they are, they do become more interested.”

But employers, he says, do need to think differently. They can’t expect that future candidates will have gone through a four-year program, then an internship and then had real-world experience before applying.

“The younger type of thinkers want to know what they need to know *now*. We [as companies] need to learn with

everyone to find avenues of engagement that might not look like it’s looked in the past. An engineering person handling technology implementation and support in the future may do other things. It may not be such a compartmentalized discipline. People younger than me are more flexible in how they want to work and what they want to do.

“If we are too constrained and too confined on certain skillsets having to look a certain way at a certain time, we may lose people who could be a part of this business.”

BE THE TECH EXPERT

Looking at it from the other side — that of a person contemplating a career in radio tech — what is the career path? In the past, a person seeking an entry-level job could plan around a ladder with several clearly defined rungs: assistant chief, chief engineer, DOE, regional executive and so forth.

One way Cox has responded is to create teams of subject matter experts.

Today, while the industry still offers entry-level technical jobs, Clark sees a “huge gap” of rungs before the ladder resumes at the higher levels, where candidates are expected to know everything that formerly would have been learned on those middle rungs.

His recommendation to any technical person is to put as many tools in your toolbelt as you can. “Don’t expect someone to paint the path for you and promise any certain outcome. You have to become adept at many, many things, whether it seems related or not.”

He recalls that when computers and IT infrastructure were introduced in broadcasting, some engineers felt it wasn’t their job — that computers weren’t relevant to broadcasting or they simply didn’t care to learn them. That kind of mindset won’t carry today. Having interest in technology generally is the key.

“Radio stations now have all sorts of video switching, TriCasters, cameras and lighting. Not too many years ago that wouldn’t be considered radio broadcasting at all. But if you’re interested and if you really dig in, you’re going to find a path into the radio business.

“There may be a heavy side that is technology support, development and implementation; a big facet might be supporting the web department, or app creation, or how

metadata is used and how content is leveraged for sale. Who knows? But it's all technology."

He recommends that employees position themselves as technology experts while working to understand the business context.

"If they can come into the business and be perceived as a technology partner *and* a business partner, they're going to be successful. If you're put into the box where you're 'the guy who's going to fix the transmitter,' that's confining. Don't limit ourselves by how we describe ourselves or how we describe who the future technology experts will be."

Clark also encourages hopefuls to look beyond traditional learning structures.

"Institutional-based training and knowledge is fantastic. However, there are great resources available, electronic or otherwise. People are learning a tremendous amount about anything by searching for it."

That includes YouTube videos; manufacturer websites offering free technical resources; and trade publications — not only within the industry like Radio World, but also in related fields, like EC&M, which explores electrical design, construction, operations and maintenance.

He recommends SBE's MembersPlus program, which I described above and which includes a popular eight-part webinar RF101 series, five-part Fundamentals of IT Networking series and others. Clark calls it a "phenomenal" resource.

The IEEE Broadcast Technology Society has good content too, he said, especially for someone who seeks advanced material. And the American Federation of Com-

munications Consulting Engineers can help technologists understand how FCC regulations affect the business.

TREMENDOUSLY INTERESTING

For himself, Clark loves the diverse nature of the field.

After taking electronics courses in Missouri at Truman University, he worked on video games and installed C-Band satellite dishes before he began his radio career in 1984 at CBS's WYNF/WSUN. He was director of technical operations when those stations were acquired by Cox Radio in 1993.

He is very active in industry technical groups like the SBE; NAB's Broadcast Engineering and IT Conference and its Radio Technology Committee; the IEEE-BTS annual Symposium; the Nielsen Technical Advisory Committee; and the National Radio Systems Committee. He was SBE's Engineer of the Year in 2015.

"I've definitely had to collect a paycheck to survive, but I didn't pursue broadcasting primarily because I thought it was going to make me rich," he said.

"I pursued it because it was tremendously interesting and always evolving and exciting." But he thinks it's important to convey that interest and excitement better.

"Somehow we have to sell that to those who are technically interested. Broadcasting is still one of the most interesting and intriguing businesses out there. If you're interested in technology in general, it is the culmination of most technologies under one roof — pretty much every technology comes together in a broadcast facility.

"There have been no boring days; at least there haven't been any for the past 35 years for me."



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NPR Distribution Now Certifies Engineers With an Eye on the Needs of Public Radio

MICHAEL BEACH



How do these issues look from the world of public radio? I reached out to Michael Beach, vice president of distribution at NPR. He oversees the Public Radio Satellite System, backbone of public radio distribution; the system takes program content from 70 to 100 producers and sends it — live or file-based — out to 400 or so interconnected stations, which in turn retransmit it to 1,200 or so radio broadcast towers to air the content.

The distribution division has about 35 technical employees, people who understand satellite, Cisco networking systems and IP-based audio.

"Here at our building we're network engineers primarily, not so much broadcast engineers; but we're interacting with station engineers all the time and their leadership," Beach said when I asked about the challenges of developing radio technologists. "I can tell you that, speaking with the leadership around public radio stations, there's definitely a concern."

A radio engineer today, he said, needs to be a "tech of all trades."

"The person we traditionally think of as a broadcast engineer has to think about a very high-powered AM or FM transmitter, on a tower of some kind, with an antenna and transmission line — large-scale technology — and the FCC rules that go along with that, and all kinds of safety approaches. Local ordinances.

"They also have to be operationally knowledgeable. Often they also sit a shift on the console. And they are the technology person at a station, so they also need to know all the audio streaming, IP systems around the building itself. 'How do I manage audio consoles, be they digital or analog?' Oh and don't forget all the audio gear that the reporters take out on the road with them. And 'Oh yea we have a plumbing issue,' and 'Let's renovate this part of the building.' They're the only person in the building who might have facilities experience. Oh and they have a satellite downlink; and they have an ISDN line, oh and they have an IT system.

"There's a lot for them to think through and understand."

Beach has heard plenty of stories, in markets big and small, about stations having trouble finding a replacement for a retired engineer. Some stations, he says, are now

working with other stations to develop common resources.

A shortage of such jacks-of-all-trades might not be felt directly at NPR Distribution, yet it matters there too. "If there isn't an engineer handy at the station, they often call our help desk. We routinely get questions that are not network questions, especially if it has something to do with data that's flowing from our transmission networks, over the satellite or the internet, in the form of digitized audio or metadata," Beach said.

"We consult with them for instance on ways to implement their metadata. We have people on staff who were from a broadcast station who will work them through, 'Hey do I have enough bandwidth in my digital STL to get my metadata out by going HD Radio, or if I want to add Artist Experience content to my HD stream?'"

NEW CERTIFICATION PROGRAM

NPR Distribution last year took a step to help address the loss of technical expertise in the industry.

"We had noticed over the years that engineering staff out at some of our stations were losing knowledge about how to manage the receivers or the antennas or maintain the electronics around them. We also heard from the stations about the lack of engineers, and trouble replacing retiring engineers."

So it introduced the Public Radio Engineering Training Program, described as "an effort to preserve and update technical skills that are crucial to maintaining public radio station operations," specifically including VSAT satellite technology.

The program aims to offer station personnel interested in pursuing a career in radio engineering a pathway to skills accreditation. It's modeled on the certification program of the Society of Broadcast Engineers and incorporates SBE training and membership, as well as attendance at the NAB Show and Public Radio Engineering Conference.

Its goal is not only to certify people already working in the system but to help nurture more as well.

The program leads to three certification levels. The Public Radio Operator certificate is evidence of an individual's qualifications to serve as an operator at a radio broadcast station. According to the website, "This entry-level certificate indicates that the holder has acquired the basic knowledge to operate a radio station and comply with FCC rules and regulations."

The mid-level Public Radio Technologist certificate indicates qualifications to set up, operate and maintain radio station equipment such as transmitters, terrestrial and satellite antenna systems, studio consoles, microphones, audio codecs and test equipment; it also indicates working knowledge of FCC rules and regulations. The advanced Public Radio Engineer certificate requires further levels of specialized expertise and experience. (Find info at prss.org/certification.)

"If you're going to be an engineer, you've got to like puzzle-solving."

"General managers we've talked to don't know where to point their people," Beach said. This new certification program "gives them a specific curriculum, a path to follow and check off, that'll get them the information they need. If I'm a GM and I've got a younger network engineer who is doing great on my LAN and my web page and my internet, and who shows interest, I can say, 'Let's train you up and you can step into this bigger role.'"

Another consideration for public radio is that close to half of the licensees are held by universities. Beach said several general managers have expressed interest in linking an internship to the PRSS certification program.

For instance, an EE major might "spend their summer working for the radio station, and get some insight into actual application of technology; and as part of the internship requirement, the university requires them to knock out this base certification level." This idea hasn't gone past the discussion phase but Beach finds it exciting.

Like other executives with whom I spoke, Beach thinks a part of radio's problem in developing technologists is one of awareness. Technically minded students know about Google and Microsoft, Beach said, but "I don't think they think, 'Whoa wait, there's a radio world out there with engineers in it that I could learn?' A lot of this might be about helping college kids and trade school folks realize there's a whole industry here."

COMPLEXITY REQUIRES EXPERTISE

I asked Beach whether the growing use of the cloud in radio technology might change the calculus for engi-

neering staffing; he said it's not an either/or question.

"We helped author a paper for the North American Broadcasters Association last year called 'The Value Proposition of Radio in a Connected World,'" he said.

"We're encouraging radio stations to consider multiple paths, as opposed to just thinking broadcast-only or internet-only. Your listeners are in lots of different places. Some of those are traditional broadcast radio in the dashboard. Some of those are apps on a dashboard. Some of those are streams sitting at your desktop. Some of those are streams coming through a smart speaker. Some of those are podcasts coming through their cellphone."

Listeners use all of these platforms, Beach said, and not all have the same listeners; different crowds use one, both or all of the above.

"So I'd argue the opposite: As more of these approaches and technologies come into being, and as long as the FCC requires a licensee to have a tower and a transmitter — which I don't see going away anytime soon — then all of these other options are simply additive. It's more stuff that a savvy engineer needs to know how to do. It puts more of a requirement to have a good engineer on your staff, not less."

Could recent elimination of the main studio rule by the FCC dramatically affect the landscape of industry infrastructure and thus engineering careers? Beach downplayed its impact.

"For how many years have we had a studio downtown and a broadcast facility on a mountaintop?" he asked rhetorically. "I don't think it's that big a deal where you're creating your content versus where it goes over the air; that's been remote forever. The idea of consolidation to regional or national networks has also been happening for a long time."

"Plenty of people argue whether that's a good or a bad thing, localism vs. regionalism; that's not a topic for me to argue about," he continued. "But from a technology perspective, the more complex or the more options or the more directions somebody takes, the more dependent they are on engineers who know how to deal with it."

"I've participated in lots of automation projects over the years," he added. "They really haven't, in my book, changed the number of people you need. All they've done is changed the skill sets that's required, changed the nature of the jobs people are doing. It hasn't really changed the need for those people to do that work."

WANTED: PUZZLE-SOLVERS

Beach has had an interesting career, in and around media and tech. He earned a bachelor's in mass communications/media studies as well as a master's of science in project management. As a Navy lieutenant he was a communications officer on ship. He held technical and security roles for NSN Network Services, then was assistant general manager and chief technology officer for

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Nebraska Educational Telecommunications, the statewide PBS and NPR broadcast network, for eight years. He went to satellite operator Intelsat, S.A., before coming to NPR.

He acknowledges that the pay and hours of radio technology jobs might dissuade some people from pursuing a career in it, but says the nature of the work is enticing for the right kind of problem-solving personality.

"People going as an engineer into any technology-focused business, if their number one focus is money they're going to end up being unhappy. If you're going to be an engineer, you've got to like puzzle-solving, dealing with technology that breaks, people who don't understand it, software that needs to be babied, last-minute changes because something breaks and it's the middle of the night or because a customer is demanding a piece of software be upgraded quickly."

Beach hopes employers will encourage experienced engi-

neers to mentor others. Oh, and veteran engineers shouldn't be intimidated by skill sets of the new generation, either.

"Maybe they worry that 'the younger guys know the internet better than me,' but that doesn't matter, every engineer has a strength. These more seasoned engineers definitely understand broadcast better than the newer folks who are coming in. Whatever we can do to encourage those still actively working to mentor, so much the better; and glean from the next generation the stuff that they don't know, the networking stuff."

"There's a lot of strength in the direct interconnection between engineers whose focus is about learning and puzzle-solving, making things more efficient or smarter or faster. Those are common goals that engineers hold, whether they've been around forever or are new to the system. That's the mentality that makes a good engineer, so they need to share with each other."

Use Co-op Programs and Paid Apprenticeships to Build Your Bench of Tech Talent

I wanted to learn how the situation looks from the perspective of a school that teaches tech.

At Cayuga Community College in Auburn, N.Y., "telecommunications technology" is an associate of applied science degree. When a student graduates, they're eligible to be certified as an SBE Broadcast Technologist without taking the SBE exam. Currently there are about 10 students in the program.

Professor Steven Keeler is an award-winning technology educator who directs the college's School of Media and the Arts, which he helped create. He is also director of the college's programs in Media Communications and Telecommunications, and the general manager of the college's station WDWN(FM).

Though his background was in TV production not engineering, he's a longtime member of SBE Chapter 22 and has twice received the SBE Educator of the Year award, so he straddles the worlds we're talking about here.

I told Keeler I wished there were more programs like Cayuga's around.

"I know ours is unique in New York state," he replied. "There are 30 community colleges in New York state, and we have the only SBE-certified program. We got our cer-

tification when I came to the college; we've been a certified program for 30 years now."

So how would someone go about launching something like this? They'd have to start by researching the rules and regulations set out by a state's education department for creating a new program, Keeler said. The good news, he said, is that most colleges probably have in place 70 to 80 percent of the courses they would need, so specialized courses can be added on top of those.

At Cayuga, "We've pulled from different departments to create a program that prepares students to be entry-level engineers. They're getting electronics, they're getting computer science technology, they're getting networking education, they're learning how to work in a television or radio facility." The program's advisors include professional broadcast engineers to make sure the material is relevant.

It helps too that Cayuga has a radio station on campus; it serves as a living laboratory for engineering students. "An institution without a radio station might be at a little

STEVEN KEELER



bit of a disadvantage, but certainly they could partner with area radio stations to give students some engineering experience. We require internships, so all of our students have to intern at a facility that's related to what they're studying."

Graduates may go into radio engineering jobs or seek work as cable installers. Many however go into television.

"Generally speaking they'll start out as master control operators and then try to move up into the engineering ranks. As the industry changed, we see more and more distribution centers, I would call them — broadcast operations centers that serve a multitude of stations; we see our technology graduates moving into those types of positions as well. Our local PBS station provides broadcast operations for all of the PBS television stations in upstate New York; we find those types of operations are rich job sources."

MAKE ME A STAR

Is it possible that young people find radio or TV less sexy today?

"I'm getting a lot more students who are interested in the film industry," Keeler said. "I think it's a result of streaming services like Netflix and Hulu and Amazon Prime. Students want to get involved in that side of the business."

"The other thing that's very attractive is social media like YouTube. We see an increase in students who say, you know, 'I want career as a YouTube star,'" he said with a laugh.

In general, awareness about technical careers in radio, TV, cable and streaming is pretty low among arriving freshmen. "It's part of our job, and the industry's job, to make them aware." But the biggest problem he sees is that there is not a clear career path laid out, one that he can present to students.

"I strongly urge employers, if they really want to replace the engineers who are retiring, to create co-op programs, create apprenticeship programs. I realize those are an added expense; but if the radio industry really wants to replace engineers with qualified people, they're going to have to invest in human resources. And they have to invest at that entry level, which means partnering with colleges like us and others that are SBE-certified."

How does that work?

"A co-op program essentially is when an employer says, 'I'm going to pay some students to be interns here.' Broadcasters have generally not used the co-op model," Keeler said.

"If somebody is a member of the SBE and is working as an engineer, they need to go to their employer and say, 'Look, we need to start a co-op program here. There's a local college or a local high school that has an SBE certified program; they can send us good students that we can train, as long as we pay them, to come in a couple of days a week, or five days a week, for a semester. When they're

Course Work

Students in the Cayuga Community College Telecommunications Technology AAS degree program "learn to operate, install, maintain and repair audio, video, RF and specialized communications equipment used in the media and telecommunications industries. Students work in engineering, operations and production projects in a professional environment. Cayuga's facilities include video studio diagnostic stations, electronics labs and a fully operational radio lab used for technical instruction."

This list is the minimum coursework:

First Semester (17 credit hours)

Freshman English I
Intermediate Algebra
Electrical Circuits
Introduction to Digital Computers
Audio Video Production Techniques I

Second Semester (15 credit hours)

Freshman English II
Basic Electronics
Introduction to Telecommunications
Exploring Computer Technology
Health
Physical Education

Third Semester (14 credit hours)

Analysis of Broadcast Equipment Systems
Advanced Audio Production
Television Production I
Intermediate Electronics

Fourth Semester (17 credit hours)

Broadcast Systems Maintenance
Internship Radio/TV
RF Communications
Principles of Data Communications
Introduction to Networks
Physical Education

done, we'll have somebody who is trained to work here, and we'll know whether they're a good job candidate."

Broadcasters love internship programs if they're free, he said, but: "Consider employers in computer technology or other engineering fields; they have huge co-op programs, with sometimes dozens of students, getting *paid* to train there. [Companies] see it as having a cheap way to find job candidates."

This, he thinks, would get more students excited — and get them trained for the specific work that the media industries needs done.

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"We can provide [students] with the basics. We can give them the electronics, the networking, the broadcast technology; but every employer is different. Every employer has specific needs. The way an entry-level engineer learns those specific needs is through things like co-op programs and apprenticeships."

INVEST IN YOUR PEOPLE

I know of an engineer on the board of a state broadcast association who also serves on the electronics program advisory committee of a local vo-tech school.

This engineer has been trying to convince the school that its program needs to be a combined IT, networking and electronics program to train today's technician. While the school prepares students for the NOCTI electronics exam, and also offers Cisco networking and other IT classes, it can't practically combine them, and students may come out of the program not knowing, say, about networking and serial ports, whereas today's broadcast engineer needs to master electronics, IT, networking *and* audio and video.

When I shared that story with him, Keeler acknowledged the problem. "We see that here in New York state as well. If you're a student, you can take an electronics program at the local BOCES, or a networking program at the local BOCES, but there really aren't programs that combine that."

(BOCES stands for Board of Cooperative Educational Services. In New York state, a BOCES is a regional organization comprising a group of local K-12 school districts; the BOCES offers career and technical education programs for its constituent school districts, usually on its own campus.)

Keeler said state regulations may limit what that local



Among graduates of the program are Jim Gadsby, who handles IT and engineering for Finger Lakes Radio Group, and Lee Mitchell, a radio technical specialist at WRVO(FM) in Oswego, N.Y.

program can do.

"It's a little different at a college than it would be at a BOCES; a college has more flexibility in creating a degree, as long as it meets the requirements of the state's education department. That's how we're able to make a degree that has some electronics, some networking, some broadcast technology; as a college we have way more flexibility than they have at the K through 12 level."

Another obstacle to developing good technology people, of course, is that many students consider math and electronics courses to be hard and aren't interested in taking them. It's not a problem unique to this industry.

But Keeler is emphatic that money does matter. "The media and broadcast companies need to make a more substantial investment in their human resources on the engineering side. They really have to look at what they're paying and at ways they can make those jobs more financially attractive. There's a lot of competition out there right now for the kind of students and graduates who can do that kind of work, and other tech employers have much higher entry-level salaries."



SO WHAT?

For further insights, be sure to read the three shorter articles that follow this one, by Wayne Pecena, Larry Wilkins and Gary Kline.

My interviews for this ebook leave me feeling certain that the radio industry hasn't done nearly enough to get ahead of this problem in an organized, coordinated

way. I hope we'll hear more discussion and see more coordination among organizations like NAB and the state associations; technical leadership groups; broadcast owners and managers; and trade media like RW. All of us have a stake in it.

I was struck by a recent paragraph in a New York Times article by tech writer Kara Swisher. She was writing generally about the "job-killing potential of tech" like automation, robotics and artificial intelligence.

"Many jobs will, in fact, be replaced by tech, especially ones that are rote and also many that are high paying in medicine, law and more," she wrote.

"But this is also an opportunity to rethink the entire way we imagine employment and education. The smartest minds in tech should be thinking about reformulating and recalibrating the workplace and the structure of businesses. And rather than accept that poor pay and poor protections for gig workers are inevitable and that the pressures of a global work force are too hard to push back, tech companies should figure out how to creatively and humanely deploy talent across the world to show that they are interested in dealing with the consequences of their inventions."

Not all of that applies to radio, but I particularly like her call for the "smartest minds" to rethink the workplace and the structure of their businesses.

For radio, though, when it comes to a shortage of tech talent, we can't say we didn't see it coming. ■

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SBE Has Rich Offerings for Your Career



by **Wayne M. Pecena**

The author is president of the SBE.

The Society of Broadcast Engineers has been well aware of the changing landscape in the broadcast

industry for several years, and the growing shortage of qualified broadcast engineers.

Our efforts have focused upon continuing education programs for those in the industry, education for those coming into the industry, certification as a demonstrated standard of competence and programs for the younger entry-level individuals.

Today's successful broadcast engineer must process a wide range of knowledge and technology skills ranging from information technology (IT) to high-power radiofrequency (RF) transmission systems, in addition to the basic understanding of electronic systems.

GROWING LIBRARY

In 2011, the need for broadcast engineers to be skilled in IT and IP networking technology skills became apparent. The SBE responded with professional development courses focused on providing continuing education in these areas. IP networking webinar series offered ranged from introductory level to advanced levels and specialty areas such as network troubleshooting and cybersecurity.

In recent years, IT professionals from related industries and the military were found to be entering the broadcast engineering field, but lacked knowledge in areas specific to broadcast engineering, especially RF. The SBE responded with introductory and advanced webinar series in RF technology, also ranging from introductory to advanced level topics, with specialty areas in safety and Federal Communications Commission regulations.

Today, over 80 webinars are available on-demand, and additional content is added throughout the year. With the SBE MemberPlus membership option, all webinar

content is available for free.

Professional development programs are a cornerstone of services offered by the SBE and go beyond on-demand webinars. Additional programs available include online SBE University classes, customized instructor-led tutorials often offered at state broadcast association events, and presentations held at regional Ennes Workshops throughout the country.

The Ennes Workshop held at the National Association of Broadcasters annual NAB Show is one of the premier professional development offerings of the SBE in cooperation with NAB. SBE programs range from the beginner in the field to programs focused on furthering the knowledge of the seasoned broadcast engineer. The annual SBE Leadership Program is a unique professional development program focused upon preparing the broadcast engineer for leadership and management roles in the industry.

EXPANDING CERTIFICATION

The SBE Certification Program is one of the most visible programs offered by the society.

Prior to the early 1980s, an FCC First Class Operators License was the benchmark for substantiating the knowledge and skill level of the broadcast engineer. When the FCC eliminated the requirement for a broadcast engineer to hold a First Class License, the evaluation of an engineer's skill and competence fell on the shoulders of the station license.

The SBE Certification Program was developed and has become the premier technology certification program in the broadcast industry. Annual salary surveys conducted by the SBE have shown that those holding SBE certifications receive higher annual median pay than those non-certified. Holding a certification demonstrates an individual's commitment to his or her own professional advancement, but also provides an employer a baseline competence qualification evaluation when seeking potential candidates.

Fifteen SBE Certifications covers the beginner Operator Level to the Professional Engineering level with focus in both radio and TV fields.



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The Certified Radio Operator (CRO), the Certified Broadcast Technologist (CBT), the Certified Audio Engineer (CEA), the Certified Senior Radio Engineer (CSRE) and the Certified Professional Broadcast Engineer (CPBE) are such certification levels offered by the SBE. In addition, specialty endorsements are available in field such as AM Directional Specialist (AMD) and Digital Radio Broadcast Specialist (DRB). The Certified Broadcast Network Engineer (CBNE) certification is the latest certification offering and recognizes the importance and growth of information technology in the industry.

Certifications are reviewed and updated, with new certifications being developed such as the ATSC-3 endorsement. Demonstration of technical knowledge through a structured testing program is the foundation of all levels of certification. The more advanced certification levels also have experience requirements.

MENTOR & PARTNER

The annual SBE Salary Survey clearly has indicated the workforce is aging. In 2016, the SBE Mentor program was created to attract and assist younger individuals to succeed in the broadcast and multimedia technology fields. Webinar content is created that is specifically oriented towards entry-level individuals. The program partners a new engineer with a seasoned professional. This allows the more-experienced person to share his or her gained knowledge, both empirical and practical, with someone new to the field.

The SBE Mentor Program provides a means for SBE members to share knowledge and experience that can sometimes take years to accumulate.

SBE professional development content and certification have also become a component in other organizations' education effort. The Alabama Broadcast Association Engineering Academy utilizes the SBE certifications in their career development program. The National Public Radio (NPR) Public Radio Engineering Training Program (PRETP) is another program offering utilizing SBE educational and certification resources to develop a new generation of technical leaders and innovators for public radio.

The SBE was organized in 1964 and is the only member organization solely devoted to furthering and representing the interests of broadcast engineering and related media technology fields. The society offers a wide range of services and programs to the radio broadcast, TV broadcast, and media technology community whether a beginner or an experienced professional.

Today, the SBE serves approximately 5,000 members in a range of technology fields ranging from the production operator to the chief engineer in the radio, TV, cable and post-production related fields. As the SBE approaches 60 years of service to the broadcast technology field, it is well positioned with services and programs focused upon serving the broadcast technology community for the future. The SBE website www.sbe.org provides a wealth of information regarding SBE programs and services. ■

Seven Traits of a Good Engineer

This list is provided to students of training classes held by the Alabama Broadcasters Association. It was provided by Larry Wilkins, ABA's director of engineering services.



1 Have Excellent Organization

Establish effective routines for everything you do and to use the simplest tools to get the job done. That is a good way to stay mentally organized.

2 Are Continuously Learning

Equipment is constantly changing and getting more complex and sophisticated. But even without chasing the latest software or hardware solution, we need to be on a path of continual learning in our craft ... where art and science meet to create new experiences.

What does it take to be great at what we do? We have to know the science of sound, the art of creating the product for the listener, how to have a servant's heart, and how to work with other people. If you are in a leadership role, then there's even more to it.

Finally, think about learning with a VERY open mind.

3 Have a Good Attitude

Without a good attitude, you will make enemies and stunt your growth as an engineer. But with a good attitude, you'll be more able and willing to learn, take direction and properly support the rest of the team, sales, programming and management.

If you love your work then you'll have a good attitude about it. That means being positive, being helpful, and doing your best.

Maybe you don't feel like your work is respected? Why is that? Is it based on a comment someone once said or a lack of regular appreciation? When you have a good attitude, people want to be around you, help you when you have problems, and are more likely to compliment you. And, as I mentioned, the better attitude you have, the more likely you are to do your best work ... and that's something that definitely gets noticed.

4

Serve as Mentors

Nothing fosters your growth or that of the team faster than sharing the ideas and working to support the best ones. When we get to a certain skill level, it's time we spent some of our time teaching what we know.

5

Have Good People Skills

The people skills will almost always win out over the technical skills. No one wants to work for the "genius" that treats others poorly.

A successful engineer is one who knows how to talk to people, work through problems, accept responsibility for mistakes, and keep others updated on important pieces of information.

6

Have Good Technical Skills

- Do you know how to use a volt meter?
- Do you know how to solder jacks to a cable?
- Do you know the different properties of a microphone and why they are important?

7

Listening

This pairs well with having good people skills. If someone complains the way the station sounds, ask questions to find out what did they hear that didn't sound right. Don't assume they are wrong just because you are the engineer, LISTEN to what they say and you'll find out if it was a problem with your setup or where they were listening.

Likewise, be slow to defend yourself or your work. If there is a complaint or a problem, listen to what's said, and once the person has nothing left to say, then you can either explain your side of things or explain the reason for the problem.

I know this sounds cliché but you'll learn far more from listening than you will by talking.

While we are talking about listening.... listen to your station! We have to have a critical ear so we learn to listen to the specifics of sound. We must train our brains how to listen critically and [know] what to do with that knowledge. Get your ears used to what real music sounds like, without any system and the associated distortion involved.

Tips for Interviewing the Candidate



By Gary Kline

Here are some of the things any manager (engineering or general) should be thinking about when trying to hire a prospective candidate. Having hired numerous people for technical roles for more than 20 years, I've met many candidates from all walks of life and geographic regions.

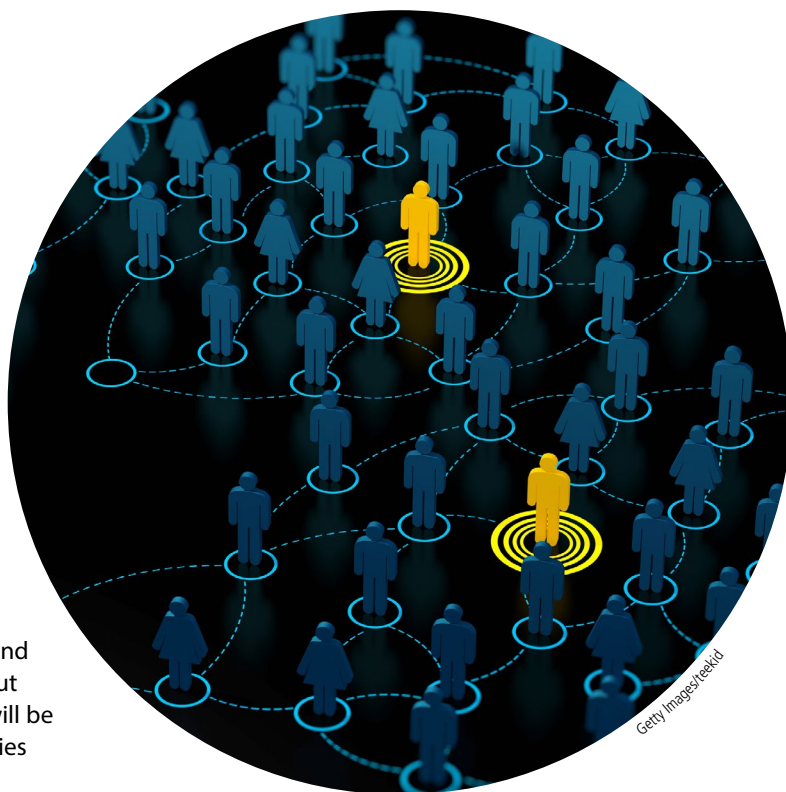
Their needs and wants (not always the same thing) may vary a bit; but most want to know about one or more of these things:

Salary — Most candidates do expect to be paid fairly and commensurate with their experience and based upon the requirements of the new job. Title and market size may factor into their mindset. Usually, but not always, they do have an expectation that they will be paid more than their last position. Engineering salaries are climbing as the supply of experienced and trustworthy candidates dwindles.

Be very careful about convincing someone to take the job for less than they are truly worth. It is my experience that they will be plucked away by another station or station group. Again, that's not a given but it does raise the chances this will happen.

This applies to newer less-experienced candidates too. You could end up training them for a year or two only to have an offer made to them for significantly more than your paying them if you do not pay competitively. And, yes, you might have an opportunity to offer an increase to keep them when the time comes, but you'll likely end up paying more to do this in the end.

Reporting structure — Many candidates you interview will be very interested to understand who they will be reporting to directly. That may be the director of engineering if they are applying for an assistant or staff level position. It may be the OM/PD if that's how the station cluster was configured in the past; some GMs thought it



best to do this since the DOE/CE ends up working most closely with the OM/PD on a day-to-day basis anyway. And in many cases, the CE/DOE reports directly to the station manager (GM/MM).

It is my experience that in most situations it is best to have the CE/DOE report to the GM/MM and that the position be defined as a department head. They can work day to day with the OM/PD and anyone else that makes sense, but structurally they should be accountable to the station manager. And most engineering candidates going after a top-level position do want that. They should be included in weekly department head meetings in addition to a minimum once-a-week one on one with their direct supervisor.

Job Description — This sounds like a no-brainer. It is important to have a job description that is well thought out so that there are no questions about expectations and responsibilities. Along with accountability comes

responsibilities. There's a very good chance you have this in some form already because you needed it for the recruiting process. You can't simply think of or list everything an engineer or IT candidate should do as part of their job, but you can properly describe the role such that everyone understands the overall expectations. Any candidate who has experience as a broadcast engineer should come to the table with a decent understanding of what is required of them.

This process ensures that you have something to refer to in the future should there be a need. Broadcast engineers work very hard but do want to make sure that the hours and on-call expectations are reasonable among other unique requirements that come along with the territory. You know, like playing with high voltage. Whether they articulate this or not during the interview, it matters to them.

Growth — Not everyone you interview will be looking to grow. Some technical candidates are content to settle into a nice working environment at a good location, and do their job well. But there are others who are interested in growing.

They may want to know about opportunities to grow within the cluster, regionally if a larger company, or even to a corporate position one day. If you are asked, be prepared to discuss this with them. You may need to talk to regional or corporate engineering management in advance of the interview or telephone discussion. Every company has a plan for growth for those who desire it, the main takeaway here is to be prepared to discuss it. If they are interviewing with different companies at the same time this could be a deal breaker.

Condition of the physical facilities — Good, qualified candidates will ask to see the studios and transmitter sites before they take the job. They should unless your facility is one that's been published or reviewed in the past few years or has photos online. In most instances, people are looking for a more modern plant that is not a rats' nest of wiring, has transmitter sites that use newer transmitters and have redundancy, and a general sense that the facility will not consume a majority of their time "putting out fires." There are exceptions of course. Some engineers do want something to sink their teeth into and clean up, but only if management can convince them that there will be the funds and support to do that. Sometimes, there is a capital budget already approved to build a new site or new studio(s) or purchase new transmitters — it's just that the cluster needs someone to implement it. Those are also good attractors of top talent.

Station vehicle (honorable mention) — If your market doesn't have a decent, working, dedicated and properly sized engineering department vehicle, you might consider obtaining one. Especially if any of your transmitter sites are distant and/or hard to get to because of bad roads, snow, etc. Most experienced and qualified candidates do consider having an engineering vehicle an important tool towards performing their duties. This is not always the case, but I have seen it in a majority of the hires I have been involved with.

The author is owner of [Kline Consulting](#) and former corporate director of engineering and broadcast IT for several radio companies. ■

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CONTENT

Managing Director, Content Paul J. McLane,
paul.mclane@futurenet.com, 845-414-6105

Senior Content Producer — Technology Brett Moss, brett.moss@futurenet.com

Content Manager Emily M. Reigart, emily.reigart@futurenet.com

Technical Advisors Thomas R. McGinley, Doug Irwin

Technical Editor, RWEE W.C. "Cris" Alexander

Content Director — International Marguerite Clark

Contributors: Susan Ashworth, Dave Beasing, John Bisset, James Careless, Ken Deutsch, Mark Durenberger, Charles Fitch, Travis Gilmour, Donna Halper, Craig Johnston, Alan Jurison, Paul Kaminski, John Kean, Peter King, Larry Langford, Mark Lapidus, Jim Peck, Mark Persons, Stephen M. Poole, James O'Neal, Rich Rarey, Jeremy Ruck, John Schneider, Randy Stine, Tom Vernon, Jennifer Waits, Chris Wygal

Production Managers Nicole Schilling

Managing Design Director Nicole Cobban

Senior Design Director Karen Lee

ADVERTISING SALES

Senior Business Director & Publisher, Radio World
 John Casey, john.casey@futurenet.com, +1-845-678-3839

Publisher, Radio World International

Raffaella Calabrese, raffaella.calabrese@futurenet.com, +39-320-891-1938

LICENSING/REPRINTS/PERMISSIONS

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Head of Print Licensing Rachel Shaw licensing@futurenet.com

MANAGEMENT

Senior Vice President, Content Chris Convey

Group Publisher Carmel King

Vice President, Sales John Bubello

Head of Production US & UK Mark Constantine

Head of Design Rodney Dive

FUTURE US, INC.

11 West 42nd Street, 15th Floor, New York, NY 10036



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Tel +44 (0)1225 442 244