

## The Society of Broadcast Engineers

Fox Valley Wisconsin SBE Chapter 80 PO Box 1519 Appleton, WI 54912-1519

**June 2012** 

The next meeting of SBE Chapter 80 will be the WBA/SBE Summer Engineering Clinic at the Radisson in La Crosse, WI on Wednesday June 20<sup>th</sup>. For information see inside and at: <a href="http://www.wi-broadcasters.org">http://www.wi-broadcasters.org</a>

## Engineering Opportunities at WBA Summer Conference! by Linda Baun WBA Vice President

Want to know about Spectrum Changes: Future Coexistence in the White Spaces, Protecting Yourself in the White Space or if There An App to That? How about Bandwidth Management, Single Points of Failure, Calm Act Topics? Or your favorite topics: EAS/CAP. 10 Days to the Deadline and Ramifications of Fewer Broadcast Engineers?

If any of the above topics are on your top 10 research then you are in luck. The 2012 WBA Summer Conference Engineering Day will be held on June 20th at the Radisson Hotel in La Crosse.

Also, The WBA Media Technology Institute, headed by Terry Baun, is being offered covering practical, instructional courses for prospective, beginning, and current broadcast/media engineers. This Institute is from Monday-Thursday.

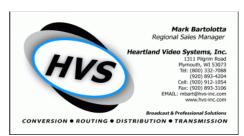
For more information on the WBS Summer Conference, Engineering Day or Media Technology Institute or registration information, visit <a href="www.wi-broadcasters.org">www.wi-broadcasters.org</a>. The Broadcast Clinic Committee and the WBA Conference Committee has planned an outstanding event that you won't want to miss (hotel deadline is May 27).

Reminder: FCC rules require configuration of our EAS equipment to monitor the government CAP server by the end of June. See inside for a FAQ from an EAS webinear held on June 6<sup>th</sup>.

#### Upcoming events:

Wednesday, June 20, 2012 – WBA/SBE Summer Engineering Clinic - Radisson La Crosse, WI. Mark your calendars and plan to attend! Register and make your hotel reservations now. For information: <a href="http://www.wi-broadcasters.org">http://www.wi-broadcasters.org</a>
Tuesday, July 17, 2012 – SBE Chapter 80 Summer Picnic – TBD
Tuesday, August 21, 2012 – SBE Chapter 80 – TBD
Tuesday, September 18, 2012 – SBE Chapter 80 - TBD

Still need to renew your SBE membership? Renew now using our easy automated SBE renewal system.

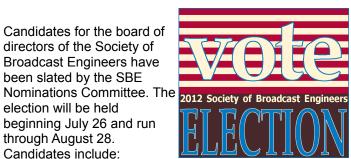






#### **SSBE** national board announces candidates

Candidates for the board of directors of the Society of Broadcast Engineers have been slated by the SBE election will be held beginning July 26 and run through August 28. Candidates include:



#### President

Ralph Hogan, CPBE, DRB, CBNT, Director of Engineering, KJZZ-FM/KBAQ-FM, Tempe, AZ, Chapter 117

#### **Vice President**

Joseph Snelson, CPBE, 8-VSB, Vice President of Engineering, Meredith Corporation, Las Vegas, Nev., Chapter 128

#### **Secretary**

James Leifer. CPBE. Director of Engineering and IT. Clear Channel Communications, Boynton Beach, Fla., Chapter 53

#### **Treasurer**

Jerry Massey, CPBE, 8-VSB, AMD, DRB, CBNT, Corporate Regional Engineer and DoE, Entercom Communications, Greenville, S.C., Chapter 86

#### **Director Candidates**

Tim Anderson, CPBE, DRB, CBNT, Mgr. Radio Market & Product Development, Harris Corp., Covington, Ky.,

Andrea Cummis, CBT, CTO, Technology & Operations Consultant, Roseland, N.J., Chapter 15

Steve Fluker, CBT, Senior Engineer, Cox Media Group Orlando, Orlando, Fla., Chapter 42

Kirk Harnack, CBRE. Vice President- Telos Products. Telos Systems, Nashville, Tenn., Chapter 103 John Heimerl, CPBE, Vice President, WHRO TV/Radio, Norfolk, Va., Chapter 54

Gary Kline, CBT, CBNT, Senior Vice President Corporate Engineering & IT, Cumulus Media, Atlanta, GA, Chapter 5 Scott Mason, CPBE, CBNT, Regional Director of Engineering, CBS Radio, Los Angeles, Calif., Chapter 47 Wayne Pecena, CPBE, 8-VSB, AMD, DRB, CBNT, Asst. Dir. of Educational Broadcast Services, Office of Information Technology, Texas A&M University, College Station, Texas, Chapter 99

Qualified members, nominated by a voting member and endorsed by at least nine additional voting members, may be added to the ballot. Candidates must be voting members, current in their SBE dues and hold certification by the SBE at an engineering level (CBT or higher). If elected, these same requirements apply during the term of office. Voting members include Regular, Senior, Fellow and Life members and the voting representatives of SBE Sustaining Members. Candidate nominations are to be emailed, faxed or mailed to the SBE national office in Indianapolis, attention: National Secretary, James Leifer, CPBE, and be received by no later than 4 p.m., EDT, July 13. 2012.

The election will commence via the Internet on July 26. Voting members who chose to opt out of electronic balloting during this year's dues renewal period will receive their ballots in the mail.

All ballots are to be completed on-line, or if mailed, arrive at the SBE national office, by 4:30 p.m. EDT on August 28. Votes will be tabulated that evening by an authorized board of tellers.

#### **Certification Exam Session Dates**

**Exam Dates** Location **Application Deadline** August 3-13, 2012 Local Chapters June 1, 2012 November 2-16, 2012 Local Chapters Sept 14, 2012 February 8 - 18, 2013 Local Chapters Dec 31, 2012







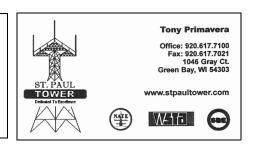




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SONY



#### **CHAPTER 80 ELECTED AND APPOINTED OFFICERS 2011-2012**

Tim Laes	WGEE WIXX WNCY WROE	920-435-3771	tlaes@new.rr.com
Steve Konopka	WPNE TV/FM	920-336-3541	skonopka@ecb.org
Steve Brown	WHBY WAPL WKSZ WZOR	920-733-6639	sbrown@wcinet.com
Keith Kintner	UWO	920-424-7357	kintner@uwosh.edu
John Pfankuch	Heartland Video Systems	920-893-0204	jpfankuch@hvs-inc.com
Bill Hubbard	UW Green Bay	920-465-2510	hubbardw@uwgb.edu
Al Kilgore	WRVM	920-842-2839	akilgore@wrvm.org
Greg Tadyshak		920-438-3258	gtadyshak@new.rr.com
Tim Laes	WGEE WIXX WNCY WROE	920-435-3771	tlaes@new.rr.com
Joe Kamenick	KAMENTECH, LLC	715-359-7088 jckamenick@peoplepc.com	
Bill Tessman	Heartland Video Systems	920-893-4204	btessman@hvs-inc.com
Dave Driessen	WGBA WACY	920-494-2626	ddriessen@nbc26.com
Jim Sams	UWGB	920-465-2572	samsj@uwgb.edu
Jim Jensen	Retired	920-850-2633	jim@jbjensen.net
Steve Konopka	WPNE TV/FM	920-336-3541	skonopka@ecb.org
Keith Kintner	UWO	920-424-7357	kintner@uwosh.edu
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	Steve Konopka Steve Brown Keith Kintner John Pfankuch Bill Hubbard Al Kilgore Greg Tadyshak Tim Laes Joe Kamenick Bill Tessman Dave Driessen Jim Sams Jim Jensen Steve Konopka Keith Kintner	Steve Konopka Steve Brown Keith Kintner John Pfankuch Bill Hubbard Al Kilgore Greg Tadyshak Tim Laes Joe Kamenick Bill Tessman Dave Driessen Jim Sams Jim Jensen Steve Konopka Keith Kintner WHBY WAPL WKSZ WZOR WEGE WIXX WNCY WROE KAMENTECH, LLC Heartland Video Systems WGBA WACY UWGB Retired WPNE TV/FM UWO	Steve Konopka         WPNE TV/FM         920-336-3541           Steve Brown         WHBY WAPL WKSZ WZOR         920-733-6639           Keith Kintner         UWO         920-424-7357           John Pfankuch         Heartland Video Systems         920-893-0204           Bill Hubbard         UW Green Bay         920-465-2510           Al Kilgore         WRVM         920-842-2839           Greg Tadyshak         920-438-3258           Tim Laes         WGEE WIXX WNCY WROE         920-435-3771           Joe Kamenick         KAMENTECH, LLC         715-359-7088 jck           Bill Tessman         Heartland Video Systems         920-893-4204           Dave Driessen         WGBA WACY         920-494-2626           Jim Sams         UWGB         920-465-2572           Jim Jensen         Retired         920-850-2633           Steve Konopka         WPNE TV/FM         920-336-3541           Keith Kintner         UWO         920-424-7357

## Webinars by SBE presents 'IPv6 for Broadcasters' live webinar

Wayne Pecena, CPBE, 8-VSB, AMD, DRB, CBNT, presents "IPv6 for Broadcasters", a live SBE webinar on July 11 from 2 to 3:30 p.m. ET. This webinar will help broadcast engineers learn more about IPv6 and make informed decisions about implementing IPv6 in their organizations.



The Internet is rapidly expanding. One of the reasons is that consumers are turning to the Internet in their consumption of broadcaster-produced content. Much of this expansion is occurring in an IPv6-only environment due to the shortage of conventional IPv4 address space.

Participate in this webinar to gain an understanding of the background of IPv6, terminology and migration approaches to enable broadcasters, as content providers, to evaluate and develop an IPv6 implementation plan. Participants will also learn about the current state of the industry in terms of technology fundamentals and principles, and get suggestions on where to obtain further knowledge.

Wayne Pecena is the Assistant Director of Educational Broadcast Services in the Office of Information Technology at Texas A&M University. He is a member of the SBE Education Committee, and regularly presents on networking technology.

The registration fee for members of the SBE is \$49 and \$69 for non-members. Register Now on line at the SBE website and to get more information.

For more perspective on IPv6, read this <u>article</u> Pecena wrote for Radio World magazine earlier this year.

The SBE Chapter 80 Newsletter is published monthly. Members are welcome to contribute articles or ideas. Please have your submissions in by the 4<sup>th</sup> of the month to Dave Driessen or Bill Tessman







## WISCONSIN PUBLIC RADIO'S 2012 EAS SCHEDULE

DAY/DATE TIME
COMMENT......
W 4 Apr 2350 Routine Monthly Test initiated

R 12 Apr 1059 M 16 Apr 1459 T 24 Apr 1259

by ECB

W 2 May 0850 Routine Monthly Test initiated by NOAA

R 10 May 1059 M 14 May 1259 T 22 May 1459

W 30 May 1059

W 6 Jun 2350 Routine Monthly Test initiated by WEM

R 14 Jun 1459 M 18 Jun 1259

T 26 Jun 1059

#### **▲ Current Wisconsin EAS Plan**

http://www.wpr.org/eas/

### QUESTIONS From June 6, 2012 EAS "Getting Ready for CAP" Webinar

A few questions were answered during the webinar. The remaining questions were circulated to FEMA and FCC for responses. FEMA responses are below, along with responses during and after the webinar from Suzanne Goucher, Maine Association of Broadcasters. Answers from FEMA:

Q: When we go to the CAP system end of June will we still use our old EAS system?

Al Kenyon, FEMA - 3:44 PM

A: Yes, CAP is an overlay with extended capability.

Q: I understand the security signatures need to be fixed. Are present CAP messages through IPAWS adequately secure?

Al Kenyon, FEMA

A: Vendor observations helped FEMA track down a problem where some CAP messages with valid signatures signed through a particular process had their digital signatures damaged during subsequent processing prior to these messages being posted to the CAP EAS Atom feed. This has been resolved. At no time were incoming messages without valid digital signatures posted to the CAP EAS Atom feed.

Q: We don't have a config that allows us to check for validating signatures (Trilithic)

Al Kenyon, FEMA

A: That may be due to the vendor reading of Part 11.56(a)(2) of the FCC Rules. The Commission makes

specific reference to the OASIS Common Alerting Protocol Version 1.2. In the standard Implementation Note 3.3.4.1 states "Processors MUST NOT reject a CAP Alert Message containing such a signature simply because they are not capable of verifying it; they MUST continue processing and SHOULD inform the user of their failure to validate the signature." FEMA will work with the FCC, the vendor community and ECIG to resolve this issue. This group will issue guidance to broadcasters to only process EAS messages with valid signatures.

Q: Digital signatures on CAP messages are optional, correct? Why not mandatory?

A: IPAWS OPEN requires a valid digital signature on messages processed for dissemination via EAS and CMAS. Digital signatures are optional for other CAP messages processed through IPAWS OPEN such as agency to agency messaging.

Q: Is latency of the internet provider an issue for proper reception of CAP messages?

Mark Lucero, FEMA

Al Kenyon, FEMA

A: Internet latency (up to several seconds) is not an issue for reception of CAP, though it does affect the promptness of alert delivery to the public.

Q: RWTs should be firing off now; each Monday? Suzanne Goucher, MAB/NASBA - 3:22 PM

A: FEMA has been sending RWTs every Monday for the past several months, at 11:05 a.m Daylight local time, 10:05 a.m..Standard local time, by time zone. The chart of RWT time zones may be found at the following URL: http://eas.radiolists.net/wp-content/uploads/FEMA-RMT-ZONES-FIPS.jpg

Q: So starting July should we Monitor IPAWS CAP Server and expect RWT every Monday? Suzanne Goucher, MAB/NASBA - 3:47 PM

A: Yes but you can start monitoring now, they have been sending the RWTs for the past several months.

Q: could we have a few extra RWTs sent during June to help stations that are still installing gear to check ... more than once a week?

Al Kenyon, FEMA

A: FEMA will issue RMTs daily Monday through Friday beginning June 11th until Friday June 29th.

Q: We receive RWTs from all time zones. Is that a box configuration issue?

Al Kenyon, FEMA

A: Most likely your CAP EAS device has not been configured to ignore RWTs targeted beyond your operational area.

Q: We have been receiving tests but multiple state tests are coming down and not specific to our area. Is this a FIPS code misconfiguration possibly? *Al Kenyon, FEMA* 

A: The FEMA RWTs are directed to states roughly grouped by time zone. If you are receiving tests that are not directed to your state it is likely your CAP EAS device has not been configured to ignore RWTs targeted beyond your operational area.

Q: What is the URL for the North and South Carolina CAP servers?

Suzanne Goucher, MAB/NASBA - 3:25 PM A: For those specific CAP feeds, check with your state emergency management agency as to whether they are CAP capable. The list of states that have been approved, or applied, for access to the FEMA IPAWs server is at

http://www.fema.gov/emergency/ipaws/authorized\_localities.shtm

Q: Where do I find New York state's CAP server and information?

Suzanne Goucher - 3:50 PM

A: Check with your state emergency management agency or state emergency communications committee Q: Does anyone know if any agency in Mississippi has applied for CAP compliance. I have already looked on the IPAWS site. I was wondering if anyone has any updated info on this. Thanks

Suzanne Goucher - 3:57 PM

A: the list of states is at

www.fema.gov/emergency/ipaws/authorized\_localities.s htm

Q: Are we going to do a national test anytime soon, and if we do are we going to have the same problems as we did before

Suzanne Goucher - 3:26 PM

A: Neither the FCC nor FEMA has announced a date for another national EAS test.

Q: Has there been any problem solving about the issues that we had during the national test

Al Kenyon, FEMA

Yes, a number of solutions have been implemented at different levels.

Q: what is the URL that we need to monitor for CAP alerts?

A: Contact your EAS device manufacturer for specifics on how to connect to the FEMA CAP server. The base URL is: apps.fema.gov

Q: @suzanne Do you have an address for the ATOM feed?

Suzanne Goucher - 3:41 PM

A: Here's what FEMA says: We are directing EAS Participants to check with their device manufacturers because methods of entry and pin numbers for various devices are different. The base URL is: apps.fema.gov

Q: We haven't been able to poll FEMA. We've tried to 'ping' the apps.fema.gov site. Should we get any response back from that 'ping' or is it blocked? Al Kenyon, FEMA

A: By design the server at the apps.fema.gov web address will not respond to ping requests.

Q: We've installed & configured our manf CAP equip. We haven't been able to poll successfully yet. Do we need to do anything else? I.E. -contact FEMA for authorization or does the manf equip onboard CAP software has everything?

Q: Outside of installing & configuring the manufacturer's CAP equipment is there anything else we need to do to poll & get IPAWS feeds? Do we need to contact FEMA for authorization or does the manufacturer's equipment onboard software do all the rest for polling? Al Kenyon, FEMA

A: If you follow the manufacturer's instructions and have established a good internet connection it should work. Understand that there most likely will not be a message waiting to be retrieved. Most CAP EAS

devices will indicate through display or logs if they have successfully polled. The device manufacturer can provide you with all the information you need to set up and poll the IPAWS feed.

Q: So at this point if you have a FEMA COG, and are sending EAS messages to IPAWS will they be relayed over NOAA Weather Radio?

Al Kenyon, FEMA - 3:43 PM

A: If your COG (Collaborative Operating Group) is authorized for HAZCOLLECT, messages will be routed to NOAA for further dissemination. (More on COGs at http://www.fema.gov/emergency/ipaws/alerting\_authorities.shtm)

Q: States EAS plans that utilize EMnet to disseminate State EAS alerts will not have a CAP capable server correct??? We cannot point to an EMnet URL for that additional overlay correct???

Suzanne Goucher - 3:55 PM

A: I think EM NET ought to be able to answer this question for you. Suggest you contact them

Q: Will the NPR Squawk box send Cap messages Al Kenyon - 3:50 PM

A: No, the agreement with NPR just covers distribution of national level EAN messages in audio format.

Q: Will NPR be doing weekly tests?

Al Kenyon, FEMA

A: The PEP NPR feed is limited to national level EAN feed.

Q: What do we do if our state does not have a CAP server on June 30th?

Al Kenyon, FEMA

A: Some states may not choose to implement their own CAP server. All states and approved local jurisdictions are welcome to use the FEMA OPEN CAP message aggregator free of charge.

Q: Is each state going to have their own CAP system? If they don't do we follow a National feed?

Suzanne Goucher - 3:49 PM

A: There is nothing in law or the FCC rules that requires a state to be CAP compliant. If your state isn't getting on board, you may want to bring some pressure to bear on them

Al Kenyon, FEMA

A: Some states may not choose to implement their own CAP server. All states and approved local jurisdictions are welcome to use the FEMA OPEN CAP message aggregator free of charge.

Q: Where do we submit updated State Plans? Suzanne Goucher – According to the audio portion of the webinar, Greg Cooke of FCC stated that SECCs and LECCs do not need to undertake full-blown rewrites of their state plans. Instead, they can submit amendments to Bonnie Gay at FCC

(bonnie.gay@fcc.gov) showing how your state or locality will integrate

the CAP requirements. If your state has a state CAP system, the plan should incorporate a description of the state CAP relay. FCC wants to see a description of the monitoring specifications for state or local CAP feeds.

[Note from Suzanne Goucher: The Nov. 2011 national EAS test pointed up, among other things, that

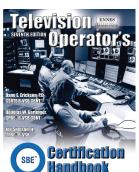
some state EAS plans, including Maine's (which I wrote), were approved by the FCC in the mid-'90s despite

the fact that they included NO mention of how a Presidential EAN message would be received and relayed.

Given the problems some states had with even figuring out a relay for the national test, and the fact that some state plans (including Maine's!) have not been substantively updated since the mid-1990s, it is my opinion – and my opinion only – that the CAP transition provides an impetus for every SECC and LECC to do a top-to-bottom review of its EAS Plan. In Maine, for instance, due to the sheer number of alerts and resulting boy-cried-wolf tune-out, we have decided to make severe thunderstorm warnings an OPTIONAL code. We are also doing away with our alternate State Primary relay network, since internet dissemination obviates the need for that redundant pathway. Long and short, I anticipate that Maine will submit a whole new EAS plan to FCC. What worked in 1995 might not make sense in 2012. If your relay network is in good shape, you might be able to get away with submitting "amendments" to FCC - but at least take this opportunity to give your state or local plan a good combthrough to see if there are other elements that need revision.1

# SBE television and radio operator handbooks now available in digital format

The Society of Broadcast Engineers has published handbooks for radio and television operators for more than 15 years and now, they are available in digital



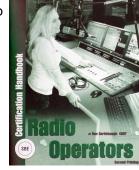
format. The SBE Television
Operators Handbook and the
SBE Handbook for Radio
Operators can now be
purchased through Amazon.com
and BarnesAndNoble.com.
Search for them using the
titles. They can be read using
those companies' popular Kindle
and Nook capable devices and
apps.

Purchase of the digital version of either book does not include the corresponding SBE operator certification exam. The exam can be purchased separately through the SBE website. The combined cost of the digital book and the separate exam is the same as the cost for the traditional paper book that includes the exam.

"These two handbooks represent the first of many digital books and other educational material the SBE plans to publish going forward," said SBE President, Ralph Hogan, CPBE, DRB, CBNT. Hogan also said, "Publishing in digital form helps to meet the needs of our members who want educational material available in

traditional and digital versions. Providing both will offer options to the broadcast engineer who routinely uses electronic devices in their daily jobs."

The digital versions of the operator handbooks provide the added value of convenience and mobility. The digital editions have exactly the same content as the



current paper editions and include practice questions at the end.

## Live Code Test Recap & EAS/CAP Update By Gary Timm, Wisconsin SECC Chair

Wisconsin's first live code EAS Tornado Warning Test went fairly well on April 19th. There were no major issues, and most stations reported receiving and relaying the test at 1:45PM that day. With no significant opposition expressed this time around, we will likely repeat this live code test again next year. Please forward any suggestions or concerns you have regarding future tests to WBA. Thanks again to the many broadcasters that ran the PSAs, did special weathercast segments and conducted interviews with Wisconsin Emergency Management on the test.

Since our last EAS update we had a slight panic regarding EAS-CAP equipment which was subsequently averted by swift FCC action. The Commission's new CAP rules had prohibited the use of text-to-speech (TTS) technology in EAS-CAP equipment, but only days before that ruling was set to take effect the FCC reversed itself to allow TTS use. So the end result is now that stations can indeed allow their EAS-CAP equipment to use TTS when there is no audio file furnished with the CAP alert. Stations are encouraged to check that the TTS feature is enabled in their EAS-CAP unit.

Just a quick reminder that at last count, only 60% of stations nationwide had reported their FCC-required results of the November 2011 Nationwide EAS Test. At NAB, the FCC stated that "enforcement action is very possible" against stations that have not reported their test results. The check if the FCC has received your test results, contact: Timothy.May@fcc.gov.

And lastly, the June 30 deadline grows ever closer when broadcasters will be required to have equipment installed to receive EAS alerts in the Common Alerting Protocol (CAP) format. Also by that date, these EAS-CAP units must be connected to the Internet and monitoring the FEMA CAP feed. Contact the manufacturer of your EAS-CAP unit for instructions on configuring your unit for that required monitoring.



## **WBA Media Technology Institute**

June 18 - 21, 2012 Radisson, La Crosse, WI

Underwritten by the Wisconsin Broadcasters Association and Midwest Communications

Practical, instructional courses for prospective, beginning, and current broadcast/media engineers

3 days of instructional content, 1 day of technical seminars/equipment exhibition as part of the WBA Summer Engineering Conference. Handouts are provided for most sessions.

**Day 1** is designed as a general introduction to the profession and is most suitable for prospective and beginning engineers. The first half of the day discusses the business model of broadcasting, how engineering/technical support fits in to the station structure, explains the skill set required for success in the field, and how "traditional" engineering is now only a part of the skill set required. A typical day in the career of a broadcast/media engineer is discussed, along with the interactions among various departments in the traditional radio/TV station structure.

Following a break for lunch, the afternoon sessions are dedicated to a general description of radio and television studio design, and well as program distribution and delivery. Engineering roles in development, construction, and modification of these facilities will be emphasized.

The final Day 1 session will discuss in detail the changes in workflow, responsibilities, and job functionality that follow from the increasing digitization of both radio and television facilities.

**Day 2** is completely devoted to an in-depth survey of RF fundamentals for radio and television. The instruction begins with basic atomic/electrical theory, and proceeds to detailed discussion of the development of the art and science of RF generation, including telegraphy, AM and AM Directional, FM, and Television VHF and UHF. Antenna theory is also included, as is a demonstration of typical test and measurement equipment used in diagnosis and repair of RF systems. The session concludes with a discussion of the IBOC digital radio platform and the 8VSB digital television transmission standard.

**Day 3** is spent in attendance at the annual WBA Summer Engineering Conference. This day-long event begins with multiple technical presentations by vendors and clients, features an afternoon engineering luncheon, and then concludes with more technical presentations. Following the final presentation, there is an Engineering reception, with technical exhibits and discussions with equipment vendors, followed by an informal dinner.

**\Day 4** features a morning presentation dedicated exclusively to IT/Network fundamentals for radio and television, progressing from a demonstration of IT networking through more advanced areas of IP management and network design as typically seen in radio/TV facilities. Following lunch, the afternoon session includes three modules: FCC Rules/chief Operator Duties for radio/TV;

Safety/Security for Engineers and the general public; and concludes with a general Q&A session about the broadcast/media engineering profession. WBA OFFICE: 1-800-236-1922