Chapter 24, Inc.
Madison, Wisconsin

Society of Broadcast Engineers *March 1999*

BROADBAND NETWORKS
PART 29 - HEADENDS III

By Neal McLain

This is Part 29 in a series of articles about broadband networks. In this article, we'll continue with our discussion of headends with a look at antenna structures used to receive broadcast television stations off the air.

INTRODUCTION

Broadcast stations represent an important source of programming for cable television operators. In the early years of the cable industry, when broadcast stations were the only source of programming, distant independent stations were the most highly valued signals: they offered unique programming that wasn't duplicated by local stations that potential subscribers could receive with rooftop antennas.

More recently, satellite-delivered programming services have become the primary source of programming for most cable operators. But broadcast signals are still important: many cable systems still carry distant independents. Moreover, under the FCC's must-carry rules, every cable system must carry all "local" stations, and it must place them on the Basic Service Tier. A local station is any station located within the same Nielsen DMA as the cable system.

Last month, we discussed the equipment located at a hypothetical cable television headend. We noted that a cable channel carrying an off-the-air television station must be equipped with an antenna and some sort of electronic equipment. The type of antenna required in any given situation is unrelated to the type of electronic equipment used: as long as the antenna provides an adequate signal, it can be connected to a strip amp, a processor, or a demodulator. Of course, in many cases, the first active electronic device is a preamplifier mounted near the antenna.

(continued on page 4)

Next Meeting:

Tuesday,
March 23, 1999

SBE Executive Director John Poray and EXPO DTV Demo Planning

J.T. Whitney's
674 S. Whitney Way

Dutch Treat Dinner at 5:30pm

Meeting and Program at 7:00pm

In This Issue:

John Poray to Attend Chapter 24 March Meeting

By Fred Sperry

Chapter 24 will be honored with a visit from SBE National Executive Director John Poray at our March 23rd Chapter meeting. John will be visiting Madison to meet that afternoon with Broadcaster's Clinic Chair Don Borchart, the Marriott Hotel and a small contingent from Chapter 24. The purpose of this meeting is to discuss plans for the upcoming SBE National Meeting that will take place in October in conjunction with the Broadcaster's Clinic and Upper Midwest Regional SBE Meeting.

John plans to give us a brief update from the National level at our Chapter meeting. If you have any questions about the SBE at the National level, this will be a great opportunity to talk directly with the person who is probably best able to answer them.

In addition to John's National update, we also plan to spend some time discussing the upcoming SBE DTV demo at the UW-Engineering Expo April 16th – 18th. In addition to covering the logistics of this event, we will also discuss any proposed changes to the 50 DTV questions document Steve Paugh drafted and distributed at our February meeting (if you weren't at this meeting and would like a copy, please contact Steve at WISC-TV). This document will be distributed to the public at the UW-Engineering Expo. For this reason, Steve wants to be sure that the content is as accurate as possible.

I think you will agree that Steve has done an excellent job putting this document together, and it will no doubt serve to answer many questions the general public has regarding DTV. Please help out with this project by taking the time to review this document and bring any changes with you to our March meeting.

Please see the enclosed flyer for details regarding the time and location of the March meeting and plan to join us.

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February Business Meeting Minutes

The February 1999 meeting of the Society of Broadcast Engineers, Chapter 24, Madison Wisconsin, met at WNWC-AM/FM on Medical Circle in Madison, WI. on Tuesday, February 23. Our host was Mark Croom, WNWC Chief Engineer.

There were 19 members and two guests present, 15 were certified. The meeting was called to order at 7:30 PM by Chair Fred Sperry.

The January minutes were approved as published in the February newsletter. Treasurer, Stan Search, reported our checkbook is balanced and in the black.

Fred reported 26 sustaining members.

Certification, Jim Hermanson, reported that local SBE exams were given on February 10th. He also announced the SBE's Millennium Reinstatement of Certification opportunity was now available to any SBE member who had failed to renew.

National Liaison, Leonard Charles, announced that the SBE has filed comments with the FCC regarding reallocation of the 2 GHz band. That the Ennes workshop will be moved to Wednesday, April 21st at the NAB convention. Nominations for National SBE offices are now open, and that the SBE's "Leadership Skills" seminar will be held in June.

Steve Paugh and Craig Bluschke spoke about the upcoming DTV demonstration at the UW Engineering Expo. Set-up will be on April 15th.

It was announced that Leonard Charles has just become the new Chief Engineer of WISC-TV.

The business meeting was adjourned at 7:55 PM.

A program on Y2K problems and preparations was presented by Madison Gas and Electric.

The Chapter 24 Newsletter is published monthly. Submissions of interest to the broadcast technical community are always welcome. You can e-mail your articles to:

MNorton@ecb.state.wi.us

or send them to:

SBE Chapter 24
Newsletter Editor
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Chapter Elections: Second Call For Nominations!

This is the second call for nominations for interested members to run for a Chapter 24 elected office. In April we will hold elections for Chapter Chair, Vice-Chair, Secretary and Treasurer. If you are interested in running for an office, running for re-election, or know of a worthy candidate, please contact any of the nomination committee members.

Please send us a brief resume if you wish to run for office. The resume will be included with the ballot materials sent to the membership with the April Newsletter. The committee members are Steve Paugh (Chair) 277-5139 (spaugh@wisctv.com), Jim Hermanson 836-8340 (jmh@execpc.com) and Denise Maney 277-8001 (sloop26@aol.com).

Candidates must be current with their SBE membership and be available for the monthly meetings. A modest time commitment and a desire to serve the chapter are the only qualifications required!

SBE CHAPTER OF THE AIR:

HamNet meets the second Sunday of each month at 0000 GMT on 14.205 MHz. Hal Hostetler WA7BGX is the Control Station.

AMATEUR RADIO NEWS

By Tom Weeden, WJ9H

The FCC has issued an Experimental Radio Service license to the American Radio Relay League (ARRL) to permit two-way tests in the vicinity of 5 MHz, the most likely site of the next amateur HF band. The experimental license callsign of WA2XSY was issued January 8. It will be shared among 15 amateurs in various parts of the US and the Caribbean to conduct experimental two-way radioteletype and single-sideband transmissions from 5.100 to 5.450 MHz. Even though two studies by the US National Telecommunications and Information Administration (NTIA) include an allocation at 5 MHz among future spectrum needs for the Amateur Radio Service, the subject is not likely to win an allocation at a World Radiocommunication Conference for several years.

The FCC's newest amateur radio enforcer, Riley Hollingsworth (a ham himself, K4ZDH), is making himself highly visible lately. On January 13, he showed up on the air on the 75 meter band to break into an on-air argument, then stayed on the frequency to discuss FCC enforcement issues. Hollingsworth has recently stepped up FCC enforcement, fining and sending warning letters to several hams who were in violation of the rules.

April 22 will be Amateur Radio Operator Recognition Day in Wisconsin. A proclamation has been approved, and there will be a ceremony in March for Governor Tommy Thompson to officially sign the proclamation. The ceremony, recognizing Amateur Radio's role in emergency preparedness and response, will be in conjunction with the April Tornado Awareness Week proclamation.

(Excerpts from March 1999 "QST" Magazine and "The ARRL Letter")

Thank you to WKOW-TV for providing copying and folding facilities for the Chapter 24 newsletter!

Thank you to WISC-TV for maintaining the web server for the Chapter 24 Web page!

Broadband Networks Part Twenty-Nine (continued)

Over the years, cable television operators have devised an enormous variety of antenna structures to receive television broadcast stations. Some structures are quite simple: a nearby station can be picked up with a Radio Shack rooftop antenna. More distant stations require more elaborate antenna structures.

The remainder of this article is a picture gallery of antenna structures, from the simplest to the most complicated.

CLOSE TO THE TRANSMITTER: SIMPLE STRUCTURES

Cable systems located near metropolitan areas have a fairly easy job: a simple antenna aimed at the nearest antenna farm is all it needs.

Figures 1 and 2 illustrate two examples. Both of these structures are located in Dane County, within 15 miles of Madison, although both were built before the Madison Community Tower was erected. The antennas illustrated here don't have preamps: the antenna downleads run directly to the headend equipment.

The Belleville tower was originally constructed to receive signals from Madison (15 miles north) and Rockford (41 miles south). Since it was constructed, the Rockford signals have been dropped, but the old Rockford antennas are still visible in this picture.

GETTING FARTHER AWAY: TALLER TOWERS

Cable systems located at greater distances from metropolitan areas need more elaborate structures. Figures 3-5 illustrate three examples.

Figure 3 illustrates two 200-foot towers located in Vero Beach, Florida. The tower on the right supports cable TV receiving antennas. Note the cluster of antennas at the top, some aimed north (left) toward Orlando and some aimed south (right) toward West Palm Beach.

This tower is typical of cable towers located in the 40- to 70-mile range. The UHF antennas are solid parabolic reflectors and the VHF antennas are

(continued on next page)

Figure 1. Rooftop antenna on headend building. Communication Technologies CATV, Middleton Township, Wisconsin, 1990.

Figure 2. Short antenna tower. Belleville CATV, Belleville, Wisconsin, 1991.

Figure 3. Guyed antenna tower (the tower on the right). Florida Cablevision, Vero Beach, Florida, 1986.

Broadband Networks Part Twenty-Nine (continued)

high-gain yagis, often in multiple phased arrays.

Note the large VHF quad array on the right side of the tower. This array receives WPTV, Channel 5, West Palm Beach, at a distance of about 65 miles. The individual yagis are arranged in a diamond:

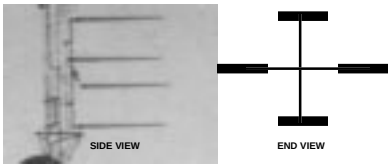
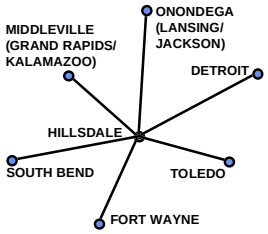


Figure 4 is another example of a tall tower, this one in Hillsdale, Michigan. This tower supports antennas aimed in six different directions (although many of them had been abandoned by 1982 when this picture was taken):



Here again, note the large VHF quad array in the lower left corner, and several UHF parabolics above it.

The large yagi at the top of this tower deserves special mention. This is a so-called "search" antenna, a high-gain broadband yagi mounted on an antenna rotor. Search antennas existed for several reasons, the most obvious being standby: if a dedicated antenna was not working properly, the search antenna could be substituted temporarily.

Back in the good old days (before satellites), search antennas served another important function: network restoration. If a local commercial station did not clear a network program, the cable operator was authorized (under the FCC signal carriage rules) to carry that program from any station it could receive. Many cable operators took advantage of this rule by rigging up automatic switching equipment. Some even used manual switching: many high school students spent their weekends sitting in remote headends watching television.

Figure 5 is — or was, at the time this picture was taken — the cable tower in Decorah, Iowa, owned by Teleview Systems Corporation. This particular tower is interesting mostly because of its history: it's an old AM radio tower. When this picture was taken (1990), it was still sitting on the large porcelain insulators typical of AM towers, although heavy bypass wires had been installed to ground it. This tower has since been destroyed by a tornado, perhaps because it wasn't designed to support all those extra antennas.

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Figure 4. Antennas at top of the of a 1000-foot guyed tower. Comcast Cablevision, Hillsdale, Michigan, 1982.

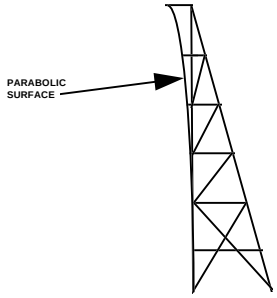
Figure 5. Old AM radio tower supporting cable TV antennas. Teleview Systems Corporation, Decorah, Iowa.

Broadband Networks Part Twenty-Nine (conclusion)

EVEN FARTHER AWAY: THE CRESSEY "BIRDCATCHER"

Figure 6 is one of the most elaborate cable television antennas every constructed: a torus reflector measuring 90 feet by 360 feet.

There are several antennas in this picture, but the antenna we're interested in isn't immediately evident. Note the ten shorter towers spread across this picture. Note the shape of these towers:



The torus reflector consists of steel wires stretched along the parabolic inner surface of these towers. If this were a solid reflector, it would cover the entire lower half of the picture.

This antenna was constructed in 1965 by General Electric Cablevision, in Cressey, California, about 15 miles north of Merced. It was originally built to receive television signals from San Francisco, just over 100 miles westnorthwest.

Frank Baxter was Vice President of Engineering for GE Cablevision for several years. He kindly provided me with the following description of this antenna:

"It is an antenna that it parabolic in the vertical plane and circular in the orthogonal plane. There is a locus of feed positions that exist at one half the distance of the radius of the circle. Using this characteristic permits wide angle scanning by just moving the feed point.

"[This] antenna was erected in about 1965 [near] Merced, California, a CATV system owned and operated by General Electric Cablevision until 1986. The screen was about 90 feet high and 360 feet long. The radius of the torus was about 100 feet. The screen was centered on San Francisco and several antennas were placed along the locus of feed positions to cover all the Bay Area signals. The support structure consisted of steel towers with the appropriate curvature and the screen was constructed using horizontal, stretched steel wire. The screen was difficult to see and soon became dubbed 'the bird catcher.' It also had a tendency to 'sing' during high winds.

"The torus was the main source of Bay Area signals for a number of years, and later served as back-up to the CARS microwave system that replaced it."

This reflector still stands to this day, although the San Francisco stations are now imported into Merced by microwave, and the torus serves only as a backup. The feed point is still oriented toward Mt. San Bruno, site of the KTVU (Fox, Channel 2) and KQED-TV (PBS, Channel 9) transmitters.

There are several other antennas in this picture as well. The UHF reflector on one of ten torus towers receives a station from Fresno, about 70 miles south. The 200-foot tower near the center of the picture supports the microwave antenna now used to import the San Francisco stations.

The original design of the torus reflector came from an unknown Canadian firm. According to Frank Baxter, several similar reflectors were built in Canada during the 60s. But the torus in Cressey, California is the only one still standing today.

This series will resume in May, with the discussion of the FCC rules governing cable television signal quality. Among other things, we'll discuss the meaning of an "adequate" off-air signal.

Figure 6. Tower-supported wire torus antenna. General Electric Cablevision, Cressey, California, 1975. Picture courtesy of Bryan Wade, Plant Manager, MediaOne, the current owner.

SBE Short Circuits - March 1999

By John Poray, CAE
SBE Executive Director

MEMBERS GET DISCOUNTED NAB REGISTRATION

Once again, SBE members get a great discount on registration for the NAB Convention in Las Vegas. SBE members will get the NAB Member rate off the full conference fee. This is a savings of $330, six times the cost of one-year of SBE membership!

If you haven't received registration material direct from NAB, call them at (800) 424-8806 and request that one is sent to you.

MILLENNIUM PROJECT OFFERS OPPORTUNITY TO GET LAPSED CERTIFICATION BACK

SBE is now offering a limited time opportunity to those who have let their SBE Certification drop. The "Millennium Certification Project" will continue from now through December 31, 1999. This opportunity offers anyone who has allowed his or her SBE Certification to drop, to apply for certification reinstatement without taking another exam.

Applicants are required to complete a two-page application and submit it to the National Certification Committee explaining how they have maintained their knowledge and enhanced their experience in broadcast technology over the past several years. Applications will be reviewed by members of the National Certification Committee, who will apply essentially the same recertification criteria that would be applied to non-lapsed certification holders.

Past holders of Certified Broadcast Technologist, Certified Broadcast Engineer and Certified Senior Broadcast Engineer certifications are eligible. Past holders of Certified Professional Broadcast Engineer may also apply but will recertify at the Senior level. Following recertification at the Senior level, former CPBE's may apply for certification at the CPBE level.

A flat $99 fee is required with the application. It does not include membership in SBE, which is optional, though very much encouraged. Non-members wishing to become a member of SBE should include an additional $55 (one year's membership dues) with their application.

To get a Millennium Certification Project application, see your Chapter Certification Chairman or contact Linda Godby-Emerick, Certification Director at the SBE National Office, at (317) 253-1640 or lgodby@sbe.org.

CHAPTER 24 SUSTAINING MEMBERS

RECENT RENEWALS:

Clark Wire and Cable
maney-logic

THANKS TO ALL OUR SUSTAINING MEMBERS:

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WMTV-TV 15

Chapter 24
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Steve Paugh is the editor for the HTML Version of this Newsletter, available monthly on the SBE Chapter 24 web page.

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FIRST CLASS MAIL

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Thanks to Leonard Charles for his work on the Chapter 24 WWW page.

MARCH MEETING and PROGRAM

Society of Broadcast Engineers
CHAPTER 24 MADISON, WISCONSIN
Tuesday, March 23, 1999

SBE Executive Director
and
SBE DTV Demo at UW EXPO

This month's program will include information from SBE Executive Director John Poray, who will update the chapter on some information from a national level. Also, we will spend some time discussing the upcoming SBE DTV demonstration at the UW-Engineering Expo

Dutch Treat Dinner
at 5:30pm

at J.T. Whitney's
674 S. Whitney Way

Meeting and Program
at 7:00pm

Visitors and guests are welcome at all of our SBE meetings!

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