CQ *de WA2LQO*

The August General Meeting Will be a Picnic
Details on last page

COMMUNICATIONS SYSTEMS (Continued from July 2011)
By Bob Wexelbaum, W2ILP

Digital computers use binary logic and the terms used are somewhat different than those that are used for information measure. We use the term *bit* as an abbreviation for *binary digit* for computer logic. When there is an uncertainty as to whether the word bit is intended to mean binary digit or as a unit of information measure, it is customary to use the term *binit* rather than bit. If the probabilities of two possible binits are not equally likely, one binit conveys *more* and one contains *less* than 1 *bit* of information. As an example, if the binits 0 and 1 occur with probabilities ¼ and $3/4$, respectively, then binit 0 conveys information in amount: $\log_2 4 = 2$ bits, while binit 1 conveys information in amount $\log_2 4/3 = 0.42$ bit. If there are M equally likely and independent messages and that $M = 2^n$, with n an integer; in this case the information in each message is:

$I = \log_2 M = \log_2 2^n = n$ bits.

If we want to identify each message by binary PCM code words, the number of binary digits for each of the 2^n messages is also n. Thus in this case the information in each message in bits is the same as the number of binits needed to encode the messages. When $p_k = 1$ we have the trivial case, where only one possible message is allowed. In this case since the receiver knows the message there is actually no need to send it! We can find that $I = \log_2 1 = 0$. As p_k decreases from 1 to 0, I_k increases monotonically from 0 to infinity. Thus a greater amount of information is conveyed when the receiver identifies a less likely message. If we pay attention to what has been said so far we can see that it is really conceptually simple to go on further with our understanding of the individual information amounts which are: $I_k = \log_2 1/p_k$ and $I_l = \log_2 1/p_l$ Since the messages are *independent,* the probability of the composite message id $p_k p_l$ with the corresponding information content:

$I_{k,l} = \log_2 1/p_k p_{ln} = \log_2 1/p_k + \log_2 1/p_l = I_k + I_l$

Note that in the above equations the term *information* is applied to the symbol I_k which is aptly chosen because the properties of I_k correspond to the concept of *information* as used in its dictionary meaning. For example, suppose that a ham asks another ham in a distant city about the present weather conditions there. If he receives a response that says, "It is daylight here," he can surely judge that he has received no information about the present weather, because he would have known that it was daylight at the sending ham's time zone location without receiving a message. On the other hand if he receives a message that says, "It is not raining here," he can anticipate that he has received information, since he would not have known that situation with certainty before receiving the message. Further, suppose he receives some weather information from the same ham on two different days. He might then consider that the total information received was the sum of the information received in the individual weather reports.

Suppose for example, an FAA air traffic controller contacts a city located in the desert, where it has not rained in 25 years, before each scheduled airplane flight. These calls are required, even though the controller knows that the weather will most probably be clear. However, one day the call is made and the reply is that a very heavy rainstorm is in progress and a flight to that city must be cancelled. The information received is then very great because it is normally not probable.

We can thus see that the term *information* can take on various qualities or probabilities. Suppose that we have M different messages $m, m_2, ...,$ with probabilities of occurrence $p_1, p_2, ...$ Suppose that during a period of transmission of a sequence of L messages has been generated and L is very large. We can expect that p_1L messages of m_1, p_2L messages of $m_2,$ etc., will have occurred in the sequence. The total information in such a sequence will be

$I_{total} = p_1L \log_2 1/p_1 + p_2 \log_2 1/p_2 + \ldots$

The *average information* per message interval, represented by the symbol H, will then be:

$H = I_{total}/L = p_1 \log_2 1/p_1 + p_2 \log_2 1/p_2 + \ldots = $ Sigma $M_{(as\ k\ =\ 1)}\ p_k \log_2 1/p_k$

This average information is also referred to by the term *entropy*, which is a term that may be familiar to those who have studied mechanics and thermodynamics. When there is a single possible message so that $(p_k = 1)$, the recipient of that message conveys no information At the other extreme as p_k goes to 0, I_k goes to infinity.

However, since $\lim_{(as\ p\ goes\ to\ 0)} p \log 1/p = 0$ the *average information* associated with an extremely unlikely message is zero.

I won't go on to apply calculus in order to plot H as a function of p. [The plot is parabolic.] It is important however to realize the dependence of H on the probabilities of the messages, as has been explained here. When there are M messages, it may be proved that H becomes a maximum when all messages are equally likely. In this case each message has a probability $p = 1/M$ and $H_{max} = $ Sigma $1/M \log_2 M = \log_2 M$, where there are M terms in the summation.

This might be a good place to break, before we define *information rate*, and complete our basic introduction to information theory. Then we can go on to Shannon's theoru m of channel capacity, which, in my opinion, is much easier to grasp without using many mathematic equations.

(to be continued)

PRESIDENT'S NOTE by ED GELLENDER, WB2EAV
August 2011

Of course the big news is the club picnic on Wednesday August 17. Full details are on page 6, but this is the exact same time and place as the last two years; probably even the same yellowjackets buzzing nearby too. (while annoying, they have never been a problem).

There is a recent movie, "Up in the air," starring George Clooney as a businessman who spends his time flying around the country. The movie shows the hollowness of his life; Even his work is hollow - laying off employees for spineless managers who can't do it themselves. Well, over the last month I have found myself in a situation that parallels some aspects of his life. While my travels have had a much more noble purpose, I did share some of the same numbing effects that constant exposure to travel causes. It is disorienting to spend so much time in that mode, divorced from reality.

The worst part is waking up in a hotel room and trying to just figure out where I am today. Then, I sometimes have to stop and think how to do something like turning on headlights; In yesterday's car the control was right there; where is it now? I decide where I want to eat lunch, then realize it's actually hundreds of miles away. Once, as I was literally entering the door of an airplane, my cell phone rang. It was a colleague of mine who said that the guys had conflicting information about where I was going; Where is this plane taking me?

For the last few years, about half the time I rented a car, it had satellite radio included at no additional cost. Over the past few months that has changed over to pay-as-you-go. The reason I liked satellite radio is simply that it solves my two problems with regular AM and FM broadcasts while driving long distances. First, just as you get settled into something it fades out of range. Second, I enjoy a fairly wide range of music, but every station seems to only play the exact same music that I hate. Anyway, with no hope of satellite radio saving me, I find NPR to be my best bet. As a result, I am now quite well informed. Page 2

GRUMMAN AMATEUR RADIO CLUB
MINUTES OF GENERAL MEETING 7/20/2011
By Karen, W2ABK, Secretary

The meeting was called to order by Gordon at 5:30 PM
.
TREASURER'S REPORT – Ed, WB2EAV

Finances continue to be in good shape.

REPEATER REPORT – Gordon, KB2UB

The repeaters are working.

NET REPORT – Karen, W2ABK

Thursday night net at 8:15 PM on 146.745 MHz had one check-in..

Thursday night net at 8;30 PM on 145.330 MHz had a nice turn out.

Sunday morning net at 7:30 AM on 7.289 MHz had poor propagation.

VE REPORT – Bob, W2ILP

Three applicants: 2 passed Technician, 1 passed commercial Element 3 and earned a GROL.

Four VEs were present: W2ABK, WB2EAV, WB2IKT, and W2ILP.

OLD BUSINESS

Our Field Day total score is 1518! Congratulations to all who participated!

NEW BUSINESS

Discussed the picnic which will be on 8/17/2011, starting at 4:30 PM.

PROGRAM

Karen W2ABK brought in a tape of the first Atlantis flight.

The meeting was adjoined at 6:20 PM.

GARC NETS: 40 Meters: 7.289 MHz at 7:30 AM EST Sundays

Net Controller: Eugene, W4JMX

2 Meters (repeaters) Thursdays: 146.745 MHz (-600 kHz) at 8:15 PM 145.330 MHz (-600 kHz) at 8:30 PM.   Tone for both repeaters: 136.5 Hz.

GARC Net Controller Karen, W2ABK

ARES/RACES NETS: Mondays.

MEETINGS General Meetings of the GARC are held on the third Wednesday of each month, starting at 5:30 PM, at the Ellsworth Allen Park in Farmingdale. Driving directions and map can be obtained from http://www.mapquest.com. It is suggested that the GARC web site be checked to be certain of meeting location, which may change after this newsletter is distributed. Board meetings are held a week before the General Meeting at the Bethpage Skating Rink.

WEBSITE The GARC web site can be found at http://www.qsl.net/wa2lqo . Webmaster is Pat Masterson, KE2LJ. Pictures of GARC activities, archives of newsletters, roster of members, and other information about the GARC may be found there.

INTERNET LINK OF THE MONTH FOR INTERNERDS

In 1988, when I was the Program Chairman for the GARC, I borrowed a VCR tape from the Corning Glass Company. I had visited the Corning Glass Museum in Corning, NY, while on vacation, where I saw a presentation about fiber optics that I believed would be of great interest to the members of the GARC….so I had requested the tape, which only required the postage cost to return it by mail, and presented it at a GARC meeting. I later obtained another VCR tape from Hewlett Packard which demonstrated fiber optic testing equipment, and I presented it at another meeting. I predicted an obvious conclusion that fiber optics would eventually replace long runs of coax cable for most TV distribution because of its many advantages: no RF radiation, no RF susceptibility, greater bandwidth, freedom from metal oxidation, and not vulnerable to lightning. Some of the GARC members were not as impressed about fiber optics as I was at that time. They thought that the Corning production was an over dramatized sales pitch. Verizon now uses fiber lines right up to our homes. Cablevision uses fiber for main trunk lines. Avionics applications, using fiber lines within commercial aircraft, will eventually become standard. The Navy has a contract now running to use fiber buses on ships but I am surprised to learn that fiber technology has not yet been used on military aircraft to the extent that it could be. Anyway…I guess that I'm now safe in saying…I told you so.

Although Corning was a pioneer in fiber optic glass development, it is no longer a major player in the field of fiber optic cable manufacturing. Great improvements have been made since the original concept that technically proved that light energy can be efficiently retained within a glass fiber, even when the fiber is bent. Laser generated coherent modulated light is now efficiently transmitted and received. Let us go back to an archived AT&T presentation that will be our link for this month. See what they said about light back in 1964, only 3 years after Bell Labs built their first laser. The web address is:

http://techchannel.att.com/play-video.cfm/2011/2/16/AT&T-Archives-Conquest-of-Light

The first laser, the ruby laser, was capable of emitting only pulses of light. The video shows that Bell Labs had made continuous light sources, using inert gas lasers. The big breakthrough came when relatively inexpensive light emitting diodes (LEDs) were made that could work efficiently as coherent continuous wave lasers.

PUZZLE

Here is another puzzle:
1)   Who was the first man to transmit effective audio communication using modulated light? How did he do it? He was not a ham.
2)   Who was the first man to predict the possibility of manufacturing lasers? He did it before there were any lasers, even before lasers were named.

The puzzle for July 2011 asked to identify a man. Here is the solution.
    Question: On 4/15/2011 a famous ham who founded WRL (originally Wholesale Radio Labs, later World Radio Labs) became a silent key at the age of 100. What was his name and call sign?
    Answer: Leo Meyerson, W0GFQ (1911-2011)

GARC Officers

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1 Yr. Board Member: Bob Christen, W2FPF

Newsletter

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Contributing writers: All GARC members (we hope). To submit articles or ham equipment advertisements contact the editor. Articles will only be edited when permission is granted by the author.

GARC Webmaster

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GARC VE Exams

We normally proctor exams for all classes of ham licenses on the second Tuesday of each month, starting at 5:00 PM. The exams are given at Briarcliffe College, 1055 Stewart Avenue, Bethpage, NY in room: Long Beach #5. Ham Exams are: Element 2 – Technician, Element 3 - General, Element 4 – Amateur Extra Class. All applicants must pre-register by contacting W2ILP. Time and location of exams are subject to change. If there are no applicants VE sessions will be cancelled. The fee for 2011 is $14 for all exams taken at one sitting. New first time applicants should be aware that their Social Security Number will be required on the application form unless they register with the FCC for an FRN. Applicants for an upgrade should bring their present license and a photocopy of it. All applicants should bring picture ID such as a driver's license. Study material may be bought from the ARRL-VEC or W5YI-VEC http://www.arrl.org or http://www.w5yi.org All VECs use the same Q & A pools. **NOTE: As of July 1, 2011 the General Class Exam Q & A will be changed.**

Commercial FCC Radio Operator Exams

We are certified by the National Radio Examiners to administer exams for all classes of FCC commercial radio operator and maintainer exams. All Commercial Operator License Examiner Managers (COLEMS) use the same commercial license pools. Administrating fees vary. For information or to register contact W2ILP.

Editorial

I recently wrote about the Fukushima disaster in Japan and described an e-mail that I received from an American teacher who lives in Tokyo. Although you might say that this has little to directly do with Ham Radio, I want to follow up by partially quoting from another e-mail, dated July 31, 2011, that I received from the same teacher:

"The nuclear situation I think is still far from under control. They say now they will not have the plants stabilized until Dec. or Jan. but as you know there is still contamination in the air and we are trying to buy things which are not from the Fukushima area. Bad government decision making and lack of communication have caused a lot of panic and stress for people. Did you know that the back-up generators were placed in front of the reactors on the shore, when they could have just as easily been placed on higher ground by nearby mountainsides? Incredible! There was another strong earthquake in the Fukushima area this morning at about 6:40 AM. It was reported to be magnitude 4 in Tokyo where we live. Woke me up!"

Grumman Amateur Radio Club
Sixty Seven Years 1944-2011
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PICNIC REMINDER
By Jack Cottrell, WA2PYK

The Annual Radio Club Picnic details are: Wednesday, August 17, 2011 at Syosset Woodbury Park from 4:30 to 7:00 PM (come a little early to help set up).

It is on the south side of Jericho Turnpike (NY 25) a half mile east of the NY135 Expressway; opposite the Fox Hollow Inn. (once in the park, go right at the fork). You may want to bring a bug spray just in case.

Please contact me, if you haven't already done so, and tell me 'YES we're coming" or 'No I can't make it', so that I can order the food. My land line is: 516-249-0979 and my new e-mail address is: jjcottrel@optimum.net

THE FCC, THE FAA, and US
By Bob Wexelbaum, W2ILP

Amateur Radio volunteer examiners (VEs) and volunteer examiner coordinators (VECs, such as ARRL-VEC and W5YI-VEC) have been responsible for administrating FCC amateur license exams since 1982. The GARC has participated in this VE program since the beginning and has tested several thousand applicants during that time. Formerly the exams were given at FCC Field Offices, first by FCC Radio Engineers and later by FCC clerks. The FCC personnel were GS rated civil servants, who were full time employees of the US government, eligible for all benefits that such people are entitled to. The VEs and the VECs, however, are not employed by the government and they work as volunteers, at no cost to the government. The administration of a similar program that tests applicants for FCC Commercial Radio Operator's Licenses also operates at no direct cost to the US government. However, FAA programs for aircraft pilot licensing are operated at government expense. The cost of FAA operations is shared between the Federal government, the municipalities where airports are built and maintained, the airlines, and the airline customers (in the form of taxes added to ticket prices). Who pays for what is a complicated mess, as are the costs for security policing and safety inspections. All of this came to a head recently when the Senate failed to fully fund FAA programs that were already in the works and caused some FAA employees to temporarily work without paychecks or be unemployed. I won't get into the recent politics about extending our national debt and the specific cuts in the bill that was recently signed. As for the FAA there is quite a debate as to what is absolutely necessary and what is seen to be earmarks for politicians who want improvements made at their own local airports, even when they are hardly used…like bridges to nowhere. It is a good thing that ham radio licensing is not costing our government anything…because I am sure that if it was, funding would probably be cut now.   page 6