CQ *de WA2LQO*

The official voice of the Grumman Amateur Radio Club

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The September 21st General Meeting will be a Picnic at Marjorie Post Park, Massapequa.
See president's note.

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

If the source of the messages generates messages at the rate r messages per second, then the *information rate* is defined to be: $R = rH$ = average number of bits/second. H is the average information per message, as defined last month. For example: An analog signal is bandlimited by B Hz. When it is sampled at the Nyquist rate, suppose that we quantize it into 4 levels. Let us call them: Q_1 Q_2 Q_3 and Q_4 (messages) that are assumed independent and occur at the probabilities $p_{1 = } p_{4 =} 1/8$ and $p_{2 =} p_{3 =} 3/8$. We then can find the information rate by computing as follows. First we find the average information H, which is:

$$H = p_1 \log_2 1/p_1 + p_2 \log_2 1/p_2 + p_3 \log_2 1/p_3 + p_4 \log_2 1/p_4$$
$$= 1/8 \log_2 8 + 3/8 \log_2 8/3 + 3/8 \log_2 8/3 + 1/8 \log_2 8$$
$$= 1.8 \text{ bits/message}$$

The information rate $R = rH = 2B (1.8) = 3.6$ bits/sec

If we transmit this message by binary PCM we can identify each message by a binary code, as in the following table: *Message   Probability   Binary code*

Message	Probability	Binary code
Q_1	1/8	00
Q_2	3/8	01
Q_3	3/8	10
Q_4	1/8	11

When we transmit 2B messages per second each message will require 2 binits and we shall be transmitting at 4B binits per second. We had said that a binit is capable of conveying 1 bit of information. With 4B binits of information we should be able to transmit 4B bits of information per second. In this example however we are only transmitting 3.6 bits of information per second. Thus we are not taking full advantage of the ability of binary PCM to convey information. If we do that we can find that the average information per second is: $H = 4 (1/4 \log_2 4) = 2$ bits/message   and

$$H = rH = 2B (2) = 4B \text{ bits/sec}$$

Suppose however it is not convenient to change the messages. An alternate method might be to use a *coding* scheme other than binary encoding in which, on the average the number of bits per second is fewer than 2 [ideally 1.8 as was determined in the example].

Why did we need to formally define information rate? Why is it important? The importance of information rate is that without its concept we cannot go on to explaining Shannon's famous theorem, which is concerned with the rate of transmission of information over a communications channel.   The term *communications channel* is used on many occasions, but here we must understand that that abstract term is meant to include all the component parts of a system which introduce noise or limit bandwidth.   Shannon's famous theorem says that it is possible in principle to devise a method that can transmit information with an arbitrarily small probability of error, provided that there is a communications system where the information rate R is less than or equal to a rate C called the *channel capacity*. To approach this capacity we use a technique involving *coding*. Describing Shannon's theorem more formally we have the following;
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Theorem Given a source of M equally likely messages, with $M >> 1$, which is generating information at a rate $R,$ and given a channel with capacity $C.$ Then, if $R <$ or $= C$ there exists a *coding* technique such that the output of the source may be transmitted over the channel with a probability of error of receiving the message that may be arbitrarily small. The surprise is that for $R <$ or $= C$ the transmission may be accomplished without error in the presence of noise! The probability density of Gaussian noise extends to *infinity.* To be technically accurate we must concede that there may be infrequent times when noise must override the signal, thereby resulting in errors, but Shannon said that this need not be the case. There is a negative statement that can be derived from Shannon's theorem. It states the following:

Theorem Given a source of M equally likely messages, with $M >> 1$, which is generating information at a rate $R;$ then if $R > C$ the probability of error is close to unity for every possible set of M transmitted messages. This *negative* theorem shows that if the information rate R exceeds a specified value $C,$ the error probability will increase, and thus increasing the complexity if coding will result in an increase in the probability of error.

What is more surprising is that Shannon's theorem has held true no matter how hardware capabilities have been improved, sampling rates have been increased, etc. since he originally stated it. We can note that the theorem itself contains no actual numbers, but holds true for any numbers that may be substituted for $R, C,$ or M.

(To be continued)

PRESIDENT'S NOTE by ED GELLENDER, WB2EAV
September 2011

We were supposed to hold our annual picnic on Wednesday, August 17th, but on the previous Sunday we had an unusual all day soaking rain with some ridiculous figure like eight inches of rain. Jack, WA2PYK checked out our picnic site and determined that with its below grade location, it would be quite good for mud wrestling, but not for a picnic.

We are now going to hold the picnic in place of our scheduled September meeting night, on September 21st. The usual meeting time is 5:30 to 7 but if you can make it earlier, several guys will start setting up at around 4 or so. As usual we will have hot dogs and hamburgers cooked by our professional staff (not professional cooks, but professionals nonetheless). If you didn't do so in August, give Jack a heads-up call to expect you at 516-249-0979.

After two years in Syosset, this time we are back where we were a couple of years ago, Marjorie Post Park in Massapequa. Directions are: Take NY 135 (Seaford Oyster Bay Expressway) south to the very last exit, Merrick Road East. After about 3 miles you will see the park on the left. Go past the park, then at the end turn left onto Unqua Road. Make a quick left into the park and head towards the far left corner…bypass the first lot, drive through the second, and then walk about 200 feet further west to the picnic pavilion where we will be.

Things from Hurricane Irene took about a week to get completely back to normal. Pretty bad for a storm that wasn't even technically a hurricane anymore once it made landfall in Brooklyn. In 1985, Hurricane Gloria hit the middle of Long Island as a category 2 (some say 3), and it didn't take much longer to clean things up and restore power. Can't figure that one out. Anybody have any thoughts?
Ed, WB2EAV

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GRUMMAN AMATEUR RADIO CLUB
MINUTES OF GENERAL MEETING 8/17/2011
By Karen, W2ABK, Secretary

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The meeting was called to order by Gordon at 5:35 PM

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TREASURER'S REPORT – Ed, WB2EAV

Finances continue to be in good shape.

REPEATER REPORT – Gordon, KB2UB

Bill, N2NFI, reported to Gordon that the repeaters are fine. If it is windy, 330 might have some noise. He can't find a site for the IRLP.

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 was quiet.

VE REPORT – Bob, W2ILP

There was no August VE session because there were no applicants.

OLD BUSINESS

Our Field Day score got signed.

NEW BUSINESS

Our August picnic is rescheduled for Sept. 21 at Marjorie Post Park in Massapequa.

PROGRAM

Gordon talked about Coast Guard radios. He explained that Sea-town acquired a new radio system that is all automated.

Karen made a report about the YLRL Hamvention in Quincy, Mass. She saw the Nantucket Lightship in Boston Harbor.

The meeting was adjoined at 6:00 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

Most of us have digital cameras now….Yours probably has about 12 Megapixels…Right? What could you do with a 111 Gigapixel setup? I learned from a QRZ poster that such a camera exists and it has been used to create a 180 degree panoramic landscape picture of Seville, Spain. The camera itself is a Canon 5D Mark II with a 400 mm lens mounted in an impressive frame.   An entire sequence of photos were computer-merged to create the final image.

When I first read about the picture I asked myself what good would it be? My monitor's limited resolution could never display a picture with such fine resolution. Once I downloaded the picture I realized how truly amazing it is, and how I could take advantage of its 111 Gigapixels. You can click on details shown in the little pictures at the bottom, and let your computer automatically find them and zoom in on them….or you can click on the arrows to slew to any part of the picture that interests you and zoom in on it. This picture is now said to be the largest digital picture in the world!   See it at: http://www.sevilla111.com/default_en.htm

PUZZLE

The August puzzles asked the following questions. Now I'll supply the solutions.
1)   Who was the first man to transmit effective audio communication using modulated light? How did he do it? He was not a ham.
Answer: Alexander Graham Bell (1847-1922). In 1880, Bell, together with his assistant Charles Summer Tanner (not Mr. Watson this time), built what he called the "Photophone". Bell considered it his greatest invention although it had no practical use. That is because it could transmit speech without wires as radio ultimately did. It depended on sunlight, which was reflected by a parabolic mirror to form a narrow beam of light. The light beam was modulated by a mirror that vibrated at voice frequencies. The resulting modulated light beam was received by a selenium crystal many yards away, which converted it to an electrical telephone signal. Bell had no idea that modulated light could be transmitted on glass fibers.
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.
Answer: In 1917 Albert Einstein first theorized about the process which makes lasers possible, called "Simulated Emission". Einstein's early work was concerned with photoelectric effect, for which he earned a Nobel Prize. His Special Relativity Theory came later and it was not universally accepted at first.

This months' puzzle again asks you to identify two men. Answers next issue.
1)   Who was the cartoonist who first drew Mickey Mouse? It wasn't Walt Disney. Disney was a promoter   not an artist.
2)   Who is credited for having invented the first teletype printer (teleprinter)?

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Treasurer: Ed Gellender, WB2EAV (see above)
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2 Yr. Board Member: Jack Cottrell, WA2PYK Retiree 516-249-0979
1 Yr. Board Member: Dave Ledo, AB2EF
1 Yr. Board Member: Bob Christen, W2FPF

Newsletter
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Editor: W2ILP 631-499-2214 W2ILP.RADIO@gmail.com (new E-mail address).
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.

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. Administration fees vary. For information or to register contact W2ILP.

Editorial
The ARRL has reported that a new method of administrating ham exams is now considered legal by the FCC. This method requires that the exams be taken on a computer or via internet and that there need be only one VE present, since the exams are graded by computer. This method is impractical for us now, although the software that I use to print out the exams always has been capable of also grading the exams. Obviously there would be a PC required for each applicant, so just providing one laptop at a VE session would not be adequate. Commercial exams have long allowed computers to present and grade the exam, with only one proctor present. Many commercial exams are given in technical schools that have rooms full of computers for just that purpose. Most of the commercial applicants that we get are people who have studied independently and have not gone to a school that prepared them for the tests. Once any applicant makes final official multiple choice selections with a mouse and submits them, they cannot be changed, nor can the results of grading be changed. This proves that a computer can be more accurate and honest than a person can be. I don't know why this isn't so on Wall Street!

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Do Not Delay

TROPICAL STORM IRENE
By W2ILP

As a result of the storm I lost electrical power for more than two days. I also lost telephone service for most of that time because I now use Verizon FiOS. The fiber optic line does not provide the 40 VDC that a wired line provides; Instead, a power supply installed by Verizon serves that purpose. The supply charges a battery that can last (as Verizon claims) for "up to 8 hours". I bought a generator years ago when I was working for Grumman, but after many years of disuse it is now rusted and may be beyond repair. I don't own a cell phone so I decided that I better check my battery operated Ham HT just in case I needed to call 911 in a medical emergency. The GARC 5.33 repeater was in active use with KB2RZM operating as net control for a bunch of stations that checked in. Some were at emergency shelters and lookout sites; others were at home. I just listened but certainly would have checked in if I had an emergency. I won't use a net frequency unless I can offer assistance or am in need of help. I learned long ago as an ARES/RACES and MARS operator during the cold war that unlike drills, real emergencies require tight discipline, with a clear channel maintained for true emergencies. The ARRL section has sent out a thank you to all on record in NYLI who participated during the Irene emergency. I'd like to thank the unheard hams who just stood by and listened in case they were needed.
Many people have complained about the slowness of LILCO or National Grid to restore power, and especially to communicate to their customers. First, I do not believe that enough tree trimming was done as preventive maintenance. Then, when I reported my power outage I was promised by a machine that I would be called back with an estimate of when I could expect power to be restored. Not until the day after power was restored did I get a phone call from a machine telling me to be patient and that my power would be restored at some unknown future time. This shows a widespread failure in communication. Maybe they need some of our "professional" amateur communication nets.