W5YI

America's Oldest Ham Radio Newsletter

REPORT

Up to the minute news from the world of amateur radio, personal computing and emerging electronics. While no guarantee is made, information is from sources we believe to be reliable.

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In This Issue...

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New FCC Rules Encourage Commercial Spread Spectrum Development

The FCC released new rules on May 30 that provide for the introduction of new commercial digital transmission technologies, eliminate unnecessary regulations for spread spectrum systems, and improve spectrum sharing by unlicensed devices operating in the 915 MHz (902 - 928 MHz), 2.4 GHz (2400 - 2483.5 MHz), and 5.7 GHz (5725 - 5850 MHz) bands.

The new Part 15 rules allow new digital transmission technologies and direct sequence spread spectrum systems to operate under the same rules in the 915 MHz, 2.4 GHz, and 5.7 GHz bands. These bands are also shared by the Amateur Radio Service. The changes are not expected to affect amateur operations in those bands since the power level and occupied bandwidth are not changed.

In August 2000, in a *First Report & Order,* the FCC amended its rules to allow frequency hopping spread spectrum systems in the 2.4 GHz band to use wider hopping channels. The purpose of the rule change was to allow wider bandwidths so that Internet devices will operate at higher data speeds, thereby enabling the development of new and improved products such as wireless computer local-area networks and wireless cable modems.

"The rule changes adopted in this *Second Report and Order (ET Docket No. 99-231)* are intended to provide manufacturers with the flexibility to design and market a more diverse set of products which are able to operate efficiently in the unlicensed bands," FCC said. "Manufacturers will have the freedom to design products that fit the various needs of users who may have differing requirements for data speeds and interference resistance. The rule changes will also allow for greater sharing of the spectrum by all devices in the 2.4 GHz band by removing regulatory barriers to the introduction of new non-interfering technologies."

> "I am pleased to join in approving this item, which amends our Part 15 rules to enable the introduction of new technologies and allow for more flexibility in design for systems operating in the unlicensed bands. Among other things, this item allows new digital transmission technologies to operate under the current rules for spread spectrum systems and provides new flexibility for frequency hopping spread spectrum systems in the 2.4 GHz band. These actions will further promote the already impressive development of devices and services in the unlicensed bands."
>
> *(FCC Commissioner, Kevin J. Martin)*

The Commission's spread spectrum rules have been a tremendous success. A wide variety of devices have been introduced under these rules for business and consumer use including cordless telephones and computer local area networks.

Moreover, the past few years have witnessed the development of industry standards, such as IEEE 802.11b, Bluetooth, and Home RF wireless local-area networking schemes that promise to greatly expand the number and variety of devices that will operate in the 2.4 GHz band.

The FCC's Part 15 rules provide for the operation of unlicensed devices. As a general condition

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of operation, Part 15 devices may not cause any harmful interference to authorized services and must accept any interference that may be received.

Spread spectrum rules were first introduced some 15 years ago. Over that time, the FCC has relaxed those rules several times to accommodate technology developments and promote new and innovative use of the 915 MHz, 2.4 GHz, and 5.7 GHz bands. Over the years, the data rates achievable by spread spectrum devices have increased from a few kilobits per second to over 20 megabits-per-second.

These high data rates were not envisioned when the rules were first drafted. Moreover, the original rules were crafted in a manner to highlight the interference immunity characteristics of spread spectrum devices, even at the expense of higher speeds. The FCC said its current Part 15 rules contain provisions that unnecessarily restrict system designs that could otherwise achieve data rates of more than about 20 megabits per second.

Section 15.247 contains rules governing the operation of spread spectrum devices in the 915 MHz, 2.4 GHz, and 5.7 GHz bands. Operation under these rules is limited to frequency hopping and direct sequence spread spectrum systems. Spread spectrum modulation reduces the power density of the transmitted signal at any frequency, thereby reducing the possibility of causing interference to other signals occupying the same spectrum. Similarly, at the receiver end, the power density of interfering signals is minimized, making spread spectrum systems relatively immune to interference from outside sources.

In frequency hopping systems, an information signal, usually a data stream, modulates a radio frequency carrier that quickly moves from frequency-to-frequency in concert with a receiver. In direct sequence systems, the information data stream is combined with a high speed digital spreading code that is used to modulate a radio carrier, producing a radio signal that has a bandwidth covering anywhere from 1 to 100 megahertz. Both frequency hopping and direct sequence systems are permitted to use output powers of up to 1 watt in the above bands, however, most devices use lower power for various design reasons ... such as conserving battery life.

The Commission also removed the requirement that direct sequence spread spectrum systems must demonstrate at least 10 dB of processing gain. Finally, the Order modifies the rules for frequency hopping spread spectrum systems operating in the 2.4 GHz band to reduce the amount of spectrum that must be used with certain types of operation.

The FCC said it was taking these actions "...to facilitate the continued development and deployment of new wireless devices for businesses and consumers." The FCC said it anticipated the introduction of wireless headsets and computer connections for cellular and PCS phones, wireless computer peripherals such as printers and keyboards, and a host of new wireless Internet appliances that will use this band.

The June 7th *New York Times* tells how "two tinkerers" developed a cheap way to provide broadband Internet service. It seems that two hobbyists working in their garage discovered an inexpensive method to bridge the "last mile" between the Internet and the home.

Layne Holt and John Furrier, both software engineers, have started a company called EtherLinx Communications, Inc., on a shoestring budget.

"At the core of their plan is the inexpensive wireless data standard known as Wi-Fi or 802.11b, which is already shaking up the communications industry, threatening to undermine the business plans of cellular phone companies by offering a much cheaper method for mobile access to the Internet."

They used the 802.11b standard "...to build a system that can transmit Internet data up to 20 miles at high speeds - enough to blanket entire urban regions and make cable or DSL. connections obsolete." In just a few years of existence, 16 million people used 802.11 in 2001, according to researcher Allied Business Intelligence. It estimates that number will grow to 60 million by 2006.

EtherLinx uses a 'software-designed radio' which permits them to create an inexpensive repeater antenna that iis attached to the outside of a cunsumer's home. The CPE (customer premises equipment) which can be built in quantity for less than $100 each communicates with a central antenna and then converts the signal into the industry-standard wireless Wi-Fi signal for reception inside the home. They call their SDR device: "Smart Spectrum."

Because of the high wiring cost only 7 percent, or 7.5 million homes, now have high-speed Internet access.

"Without venture capital backing, in a garage just six blocks from the garage where Steven P. Jobs and Stephen Wozniak launched Apple Computer 26 years ago, Mr. Holt is making his clever and inexpensive radio repeater by modifying inexpensive Wi-Fi cards, the circuitry that sends and receives the signals."

"Although he has partially broken with the Wi-Fi standard, he argues he is doing just what the unlicensed radio spectrum was originally set aside to encourage - innovative wireless network designs."

"Holt, replaces the software that supports the Wi-Fi 802.11b standard with his own code, thereby dramatically extending the range of the cheap, mass-produced hardware. Each repeater contains two cards - one that Mr. Holt has enhanced and another that is able to speak the 802.11b standard to a home computer."

A small for-pay trial of the Etherlinx technology has been operating in Oakland, Calif., for about a year. The firm is planning to offer commercial ISP service in Campbell, Calif. which is not currently served with D.S.L. More info at: <www.etherlinx.com>.

CALL FOR TECHNICIAN CLASS EXAM QUESTIONS

On June 1st, the Question Pool Committee of the National Conference of VECa released the following Technician (Element 2) Syllabus into the public domain. This syllabus will be used to develop the new Technician question pool that will be used in examinations starting July 1, 2003.

All amateurs are encouraged to submit candidate questions to the QPC by Sept 15, 2002. These candidate questions should be sent via email to: <qpc@arrl.org>. Please adhere to the following guidelines when drafting candidate questions.

How to Submit Suggested Element 2 Questions.

(1.) All proposed questions must be no longer than 210 characters including spaces and punctuation. (Three lines of 70 characters each.) This requirement exists to facilitate implementation of computer testing and use of software-generated examinations by VE teams. Try to be concise as much as possible.

(2.) Each question must be accompanied by four possible multiple-choice answers only one of which is correct. Be certain that the three incorrect answers are definitely wrong and cannot be construed as correct. Each multiple choice answer is limited to 140 characters. (Two lines of 70 characters.)

(3.) Include any schematic diagrams or symbols that are necessary to answer the question. It is desirable to have more than one question relating to a single diagram. A text-only version of the question also would be helpful for use in examinations to the sight impaired.

(4.) The question comprehension level should be on the Middle or Junior High School reading and math skills level. Remember that many youngsters are administered the beginning Technician Class examination.

(5.) It is very helpful to include a reference from a published source confirming the correct answer. Questions on FCC Rules should reference the appropriate regulation.

(6.) All suggested questions should be on the topics included in the following syllabus (outline). Indicate the "Subelement" and "Topic" number at the top of the question. For example, a question on Ohms Law would list "Subelement: T7, Topic: T7A" above the question.

(7.) Here is an example of a properly submitted question:

Subelement: T7, Topic: T7A
Correct Answer: D
Reference: Part 97.3(b)(6)
What is the term for the average power supplied to an antenna transmission line during one RF cycle at the crest of the modulation envelope?
A. Peak transmitter power
B. Peak output power
C. Average radio-frequency power
D. Peak envelope power

(8.) If you are offering a suggested revision to an existing question, indicate the number of the question your are revising. The current Element 2 question pool may be found at: <www.arrl.org/arrlvec/pools.html>

SUBELEMENT T1 - FCC Rules -- 5 Exam Questions -- 5 Groups]

T1A -- Definition and purpose of Amateur Radio Service, Amateur-Satellite Service in places where the FCC regulates these services and elsewhere; Communications Act, Part 97 and FCC regulation of the amateur services; Penalties for unlicensed operation and for violating FCC rules; Prohibited transmissions.

T1B -- International aspect of Amateur Radio; ITU Regions, International and domestic spectrum allocation; Spectrum sharing; International communications; reciprocal operation.

T1C -- All about license grants; Station and operator license grant structure including responsibilities, basic differences; Privileges of the various operator license classes; General eligibility; License grant term; Modifying and renewing license grant; Grace period.

T1D -- Qualifying for a license; Purpose of examination; Examination elements; Upgrading operator license class; Element credit; Provision for physical disabilities.

T1E -- Amateur station call sign systems including Sequential, Vanity and Special Event; ITU Prefix; Call sign formats.

SUBELEMENT T2 -- Methods of Communication -- [2 Exam Questions, 2 Groups]

T2A -- How Radio Works; Electromagnetic spectrum; Magnetic/ Electric Fields; Nature of Radio Waves; Wavelength; Frequency; Velocity; AC Sine wave/Hertz.

T2B -- Frequency privileges granted to Technician class operators; Amateur service bands; Audio and Radio frequency; Unmodulated RF carrier; Emission types and designators; Modulation principles; AM/FM/Single sideband/ upper-lower, international Morse code (CW), RTTY, packet radio and data emission types; Full quieting.

SUBELEMENT T3 - Radio Phenomena -- [2 Exam Questions - 2 Groups]

T3A -- How a radio signal travels; Atmosphere/ troposphere/ ionosphere and ionized layers; Skip distance; Ground (surface)/sky (space) waves; Single/multihop; Path; Ionospheric absorption; Refraction; Line of sight.

T3B -- HF vs. VHF vs. UHF characteristics; Types of VHF-UHF propagation; Daylight and seasonal variations; Tropospheric ducting; Maximum usable frequency (MUF); Sunspots and sunspot Cycle, Characteristics of different bands.

SUBELEMENT T4 -- Station Licensee Duties -- [3 Questions, 3 Groups]

T4A -- Correct name and mailing address on station license grant; Places from where station is authorized to transmit; Selecting station location; Antenna structure location; Stations installed aboard ship or aircraft.

T4B -- Designation of control operator; FCC presumption of control operator; Physical control of station apparatus;

Control point; Immediate station control; Protecting against unauthorized transmissions; Station records; FCC Inspection; Restricted operation.

T4C -- Providing public service; emergency and disaster communications; Distress calling; Emergency drills and communications; Purpose of RACES.

SUBELEMENT T5 - Control Operator Duties -- [3 Questions, 3 Groups]

T5A -- Determining operating privileges, Where control operator must be situated while station is locally or remotely controlled; Operating other amateur stations.

T5B -- Band selection; Selecting a transmitting channel; Transmitter power standards; Interference to stations providing emergency communications; Station identification requirements; Observing frequency boundaries.

T5C -- Authorized transmissions, Prohibited practices; Third party communications; Retransmitting radio signals; Participation in message forwarding system; One way communications.

SUBELEMENT T6 - Good Operating Practices -- [3 Questions, 3 Groups]

T6A -- Calling another station; Calling CQ; Sending messages; Typical amateur service radio contacts; Proper language; Courtesy and respect for others; Conducting Nets; Popular Q-signals; Signal reception reports; Phonetic alphabet for voice operations; Coordinated Universal Time (UTC).

T6B -- Occupied bandwidth for emission types; Mandated and voluntary band plans; Internet linking.

T6C -- TVI and RFI reduction and elimination, Band/Low/High pass filter, Out of band harmonic Signals, Spurious Emissions, Telephone Interference, Shielding, Receiver Overload.

SUBELEMENT T7 Basic Communications Electronics -- [3 Exam, Questions, 3 Groups]

T7A -- Fundamentals of electricity; AC/DC power; units and definitions of current, voltage, resistance, inductance, capacitance and impedance; Rectification; Ohm's Law principle (simple math); Decibel; Metric system and prefixes (e.g, pico, nano, micro, milli, deci, centi, kilo, mega, giga).

T7B -- Basic electric circuits; Analog vs. digital communications; Audio/RF signal; Oscillator; Bandwidth; Amplification.

T7C -- Concepts of Resistance/resistor; Capacitor/ capacitance; Inductor/Inductance; Conductor/Insulator; Diode; Transistor; Semiconductor devices; Step up/step down transformer; Filter; Resistor Color Code system; Electrical functions of and schematic symbols of resistors, switches, fuses, batteries, inductors, capacitors, antennas, grounds and polarity; Construction of variable and fixed inductors and capacitors; Factors affecting inductance and capacitance.

SUBELEMENT T8 - Good Engineering Practice -- [6 Questions, Groups]

T8A -- Basic amateur station apparatus; Choice of apparatus for desired communications; Setting up station; Constructing and modifying amateur station apparatus; Station layout for CW, SSB, FM, Packet and other popular modes

T8B -- How transmitters work; Operation and tuning; VFO; Transceiver; Dummy load; Power supply; Amplifier; Stability; Microphone gain; FM deviation; Block diagrams of typical stations.

T8C -- How receivers work, operation and tuning, including block diagrams; Super-heterodyne including Intermediate frequency; Reception; Demodulation or Detection; Sensitivity; Selectivity; Frequency standards; Squelch and audio gain (volume) control.

T8D -- How antennas work; Radiation principles; Basic construction; Half wave dipole length vs. frequency; Polarization; Directivity; ERP; Directional/non-directional antennas; Multiband antennas; Antenna gain; Resonant frequency; Loading coil; Antenna switch; Electrical vs. physical length; Radiation pattern; Transmatch.

T8E -- How transmission lines work; Standing waves/SWR/-SWR-meter; Impedance matching; Types of transmission lines; Feed point; Coaxial cable; Balun; Waterproofing Connections

T8F -- Voltmeter/ammeter/ohmmeter/multi/S-meter, peak reading and RF watt meter; Building/modifying equipment; Soldering; Minimum tools needed for building kits; Making measurements; Test instruments.

SUBELEMENT T9 - Special Operations -- [2 Exam Questions, 2 Groups]

T9A -- How an FM Repeater Works; Repeater operating procedures; Available frequencies; Input/output frequency separation; Repeater ID requirements; Simplex operation; Coordination; Time out; Open/closed repeater; Responsibility for interference.

T9B -- Auxiliary, beacon, satellite, space, EME communications; Radio control of models; Autopatch; Slow scan television; Telecommand; CTCSS tone access; Duplex/crossband operation.

SUBELEMENT T0 - Electrical, Antenna Structure and RF Safety Practices -- [6 Exam Questions - 6 Groups]

T0A -- Sources of electrical danger in amateur stationslethal voltages, high current sources, fire; avoiding electrical shock; Station wiring; Wiring a three wire electrical plug; Need for main power switch; Safety interlock switch; Open/ short circuit; Fuses; Station grounding.

T0B -- Lightning protection; Antenna structure installation safety; Tower climbing Safety; Safety belt/hard hat/safety glasses; Antenna structure limitations.

T0C -- Definition of RF radiation; Procedures for RF environmental safety; Definitions and guidelines.

T0D -- Radiofrequency exposure standards; Near/far field, Field strength; Compliance distance; Controlled/ Uncontrolled environment.

T0E -- RF Biological effects and potential hazards; Radiation exposure limits; OET Bulletin 65; MPE (Maximum permissible exposure).

T0F -- Routine station evaluation.

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CUTTING EDGE TECHNOLOGY

Here are "The Futurist" magazine's top 10 forecasts: <www.wfs.org>

1. Future farmers could make more money from the air than the land. One study found that landowners could earn as much as $2,000 a year from one turbine on a quarter acre of land by selling the power to electric utilities. By comparison, corn grown on the same plot would fetch just $100.

2. Automated translation systems may one day allow people to communicate freely with others speaking different languages. Such systems would facilitate more international travel—and could mean the end of foreign-language requirements in college.

3. Natural disasters could become more disastrous as the world's wetlands dry up. Half of the world's wetlands disappeared in the twentieth century, and development and other forces could consume another 50% of coastal wetlands by 2080.

4. Schools may solve behavior problems with better nutrition: One school eliminated fights, expulsions, and suicides by offering students healthy foods and not allowing them to fill up on junk foods.

5. Get ready for 1 billion elderly people (age 60 and older) by 2020. Three-fourths of them will be in developing countries.

6. Vaccinations will be easier to swallow, as researchers find ways to genetically modify foods such as lettuce and rice with viral proteins to fight diseases.

7. Water shortages will become more frequent and more severe over the next two decades, particularly in the major cities of the developing world.

8. Time-pressed workers will increasingly seek "power leisure"— pursuits packed with intensive experiences that don't take up a lot of time.

9. Goodbye textbooks, hello networked learning: Printed and bound textbooks will disappear as more interactive coursework is developed and distributed over the Internet. Students will receive and return homework assignments, and even take tests, online.

10. Fish farming will overtake cattle ranching as a food source by 2010. Aquaculture has been the fastest-growing sector of the world food economy over the past decade, while beef production has stagnated.

EMERGING COMMUNICATIONS

Both the *New York Times* and the *Wall Street Journal* have run recent feature stories on high definition television. Both point out obstacles encountered in getting the new technology widely implemented.

The June 5th *Times* article pointed out that "Hollywood executives have long maintained that they will not release their most valuable programming in digital format until they can ensure that viewers cannot copy those programs to the Internet. Makers of digital television sets blame the shortage of programming for slow sales of the devices, which are in fewer than a million [less than 1 percent of U.S.] homes."

A standards organization established last fall (the Broadcast Protection Discussion Group,BPDG) was formed to arrive at a proposal that HDTV television and computer manufacturers could include to protect digital broadcasts.

While everyone agrees that digital television should be shielded from unauthorized redistribution, the BPDG was unable to come up with an agreement that satisfied all content providers, equipment makers and consumers.

The studio trade group (the *Motion Picture Association)* wants legislation that requires some sort of "digital flag" to be broadcast along with a movie that scrambles recorded content. "Digital programs that include the flag could be moved electronically between devices in the home, but not transmitted to the Internet."

There are several copyright protection schemes which are championed by various technology companies ...each wanting to be able to license their system to others. It now appears that the government will have to get involved to break the stalemate.

Even if a protection standard is agreed upon, equipment makers say that consumers who use a scrambling device to record a program could not watch it on one of the 30 million DVD players that are in homes today. And DTV and PC makers doubt that any recording device could be made secure against "hacking."

Microsoft objects to the degree of technological control that the studios want. The *Electronic Frontier Foundation,* a civil liberties group, claim that e-mailing a movie clip from a movie is legal under "fair use" copyright law.

The *Wall Street Journal* (June 4th) story contends that the U.S. Government is more concerned with selling the spectrum (for $30 to $70 billion) that would become available once all TV stations migrate to digital channels.

The *Journal* calls HDTV implementation ...a "failed policy" that keeps on failing. Cited is the recent default on the part of TV broadcasters to meet the May 1st transition deadline to DTV broadcasting and the May 28th spectrum auction delay (for the sixth time) in which bidders would be purchasing spectrum vacated by analog television. The Commission has now delayed the auction for six months ...until January 2003.

Theoretically, all TV broadcasts are to be digital by 2006 ...when supposedly HDTV would be received by 85 percent of American households. Industry observers and even the FCC "...privately predict it may take another quarter century to meet that goal."

At issue is the development and implementation of new technologies that need spectrum ...and expansion of existing wireless communications.

The *Wall Street Journal* pointed out that "The telephone took 90 years to penetrate 85 percent of households [and] color television took 22 years."

COMPUTERS & SOFTWARE

High speed computers now available out-of-the-box. Through an arrangement with AT&T Broadband, Time-Warner cable and others, Gateway Computer Corp. is now offering high-speed cable-modem broadband service as a part of a PC bundle. Gateway's stores (and computer cartons) are splotched with black spots because Ted Waitt founded Gateway on an Iowa holstein farm where he was a fourth- generation cattleman. It went public in 1993 and is now a multi-billion dollar business.

Thousands of personal computers are tossed out every day. According to <www.globalfutures.org> the average lifespan of a PC is four years. Most old computers end up in storage rooms,, but a growing volume of computers is ending up in landfills – an estimated 300,000 tons of it in 2000. "E-waste" contains toxic materials such as lead, mercury, and cadmium, posing environmental and health risks. Solutions include requiring an advance-disposal or recycling fee.

GADGETS & GIZMOS

Is there a cell phone being used nearby? ...and why you might want to know. Cell phones are everywhere and no one suspects anything sinister if one is worn ...or just left around in a room. A slightly modified innocent-looking cell phone, however, can make an excellent, high-quality "bug" ...transmitting everything that is happening for up to a week to another location.

An owner can call the phone from anywhere in the world without it ringing and its screen remains blank as if apparently turned off.

Netline Communications Technologies (NCT) of Tel Aviv, Israel, has developed a device for detecting seemingly dormant cell phones that are actually turned on.

Netline's Cellular Activity Analyzer (CAA) works by detecting the signal that cell phones periodically send back to the base station. The CAA emits a visual and audio warning if a secretly-operating cell phone is detected.

NCT was founded June 1998 by former Israeli army intelligence communications and electronic warfare experts. Their first product was a "jammng" device that prevents cell phones from being used at a specific location. More information at: <www.netline.co.il>

INTERNET & WORLD WIDE WEB

Another questionable video-on-demand movie site has popped up on the Internet. <www.film.88.-com> offers streaming video rentals of major U.S. movies for as little as $1 each without having a distribution arrangement with movie studios.

Another movie site - Taiwan-based <www.movie88.com> - was recently shut down when MPA (the international Motion Picture Association) put pressure on the Taiwanese government.

In early June, Film.88 was showing the complete (2 hours and 31 minute) newly released blockbuster "Harry Potter and the Socerer's Stone" as a totally free "sample" movie. You did not need to register to watch the movie.

Film88's "video store" rented movies for three days after a credit card payment of $1 to $1.50. Viewers watched the movies (they can't be downloaded or saved) on their PC using RealNetworks' RealOne free media player.

A check of domain registrar's "Who-Is" utility at <www.netsol.com> shows that the site was registered on April 18th to a Hali Hami in Tehran, Iran. The U.S. does not have diplomatic arrangements with Iran, a country which also does not recognize or protect foreign copyrights.

Hami reportedly said his company is working out a reasonable percentage (he mentioned 30 percent) to pay the copyright owners. The firm said it is also in the process of adding French, German, Spanish and Japanese movie versions to its site. Film88 also provided links to Amazon.com in the event you wanted to purchase a movie. (Film88 got a commission.)

The MPA said it was aware of Film-88.com and was pursuing several legal options to prevent the site from distributing films without authorization. Verisign said they would pull the registration and deactivate the address if legally ordered to do so.

Late bulletin! A few days after we wrote the above, Film88 was shut down. While operated from Iran, its servers were actually based in the Netherlands. The MPA asked the Internet service provider in the Netherlands - a country which recognizes international intellectual-property laws - to turn the site off which it did.

Visitors to Film88 are now being advised that the site is down due to technical problems encountered during their "trial run." It used a Netherlands ISP because the Internet infrastructure and connectivity is not good in Middle Eastern countries.

WASHINGTON WHISPERS

The transition from analog to digital television (DTV) broadcasting is not been gong well at all! The Telcom Act of 1996 Act laid the ground work for America's transition to digital TV broadcasting. To get it going, Congress agreed to award an additional 6 MHz channel to all full-power broadcast licensees at no cost in exchange for meeting a transition schedule spaced over several years ...a multi-billion dollar spectrum give-away.

The Act did not specify a construction schedule. In the absence of specific guidance from Congress, the FCC established a series of deadlines for DTV station completion which the *National Association of Broadcasters* agreed to.

ABC, NBC, CBS, and Fox affiliates in the Top-10 television markets had to construct their facilities by May 1, 1999. Affiiates in TV markets 11-30 had until November 1, 1999.

All other commercial TV stations had until May 1, 2002 to broadcast a digital signal. (Non-commercial stations until May 1, 2003.) Most did not make it and the FCC is now taking a hard line approach against them.

The FCC has now issued a *Notice of Proposed Rulemaking* regarding the failures of several "Top 30" market television broadcast stations to meet the deadline to complete construction of their digital stations. The build-out of major market stations was supposed to have been completed more than two-and-a-half years ago. Each of these stations has been granted another six month extension to get their DTV stations up and running.

The FCC then proposes a three step approach to dealing with lagging licensees should they continue not to complete construction.

1. Denial of an additional extension request to meet its DTV build-out deadline.
2. If a station has not completed construction within 6 months, a *Notice of Apparent Liability (NAL)* for forfeiture (a fine) would be issued. The station would be required to report every 30 days regarding its progress.
3. Under the final step, one year after the first step, if a station has still not completed construction, absent unusual circumstances, the construction permit would be considered to have expired.

The Commission also asks whether the vacated DTV spectrum assignment should be auctioned, so that others may put it into use. The Commission seeks comment on these sanctions by July 8.

In a separate action, the FCC has denied requests from another fifty commercial TV stations' outside the Top 100 markets for an extra six months to construct their digital-television facilities. They were issued warning letters for missing the May 1, 2002 construction deadline.

Requests from another 191 stations are still pending, and some of those are

expected to be cautioned, as well. Stations can be fined or lose their licenses if they cannot justify failure to complete their digital-TV facilities.

The FCC can grant up to two six-month waivers if operators have a good reason to miss the deadline. So far, 602 of 843 waiver requests have been granted.

AMATEUR RADIO NEWS

Venezuela Withdraws Invitation for WRC-03, Conference Location Uncertain - World Radiocommunication Conference (WRC) 2003 is looking for a new location. Citing economic concerns, theO *Venezuelan National Commission of Telecommunications* (CONATEL) has advised International Telecommunication Union (ITU) Secretary-General Yoshio Utsumi that it will be unable to host WRC-03.

The conference had been scheduled to be held in Caracas next June and July. Whether it can be held on the scheduled dates in some other location is not yet known.

"Planning for a conference of this size and scope generally takes two or three years," said ARRL Chief Executive Officer David Sumner, K1ZZ. Sumner serves as administrative officer for the delegation that will represent the International Amateur Radio Union at the conference. "It is a formidable challenge for the ITU staff to work with potential host administrations to find a suitable facility for a conference that is supposed to open less than one year from now."

Several issues of importance to radio amateurs are on the conference agenda, including harmonization of the 7-MHz amateur and broadcasting allocations. Other Amateur Radio-related issues include the revision of Article 25 of the international Radio Regulations -- the basic rules for the Amateur and Amateur-Satellite services. Among other issues, this includes the issue of whether to retain the treaty requirement to demonstrate Morse code proficiency for access to amateur bands below 30 MHz.

"Amateurs may rest assured that wherever and whenever the conference is held, the IARU team will be there for them," Sumner said. *(ARRL Bulletin)*

FCC Amateur Radio Enforcement

Michael E. Priest KB0KMJ (Diluth, MN) has been warned by the FCC that "Close-proximity direction finding evidence indicates that on numerous occasions between January 2 and April 4, 2002, you deliberately interfered with the operation of the 146.94 MHz repeater of the Arrowhead Amateur Radio Club of Diluth, Minnesota.

The interference included sound effects, 'kerchunking,' lengthy keying on top of existing signals, music and voice. Direction finding bearings located these signals to your residence....."

Such interference subjects him to criminal prosecution and a monetary fine of up to $10,000. His license renewal is being held up this matter is resolved.

The Reliant Energy Company (Houston, TX) has been advised that their electric may be causing harmful radio interference to Amateur Radio operator, Edward J. Gerber, W5GCX.

Under FCC rules, power-line equipment is classified as an "incidental radiator." This term is used to describe equipment that does not intentionally generate any radio-frequency energy, but that may create such energy as an incidental part of its intended operation.

The FCC rules specify that "Operation of an intentional, unintentional, or incidental radiator is subject to the conditions that no harmful interference is caused.... [and] operators of Part 15 devices are required to cease operation should harmful interference occur to authorized users of the radio frequency spectrum."

Mr. Gerber attempted unsuccessfully to work through the firm's complaint resolution process. The electric company is to advise the complainant within 30 days of the steps being taken to correct the interference problem.

Sam Jacobs K3SAM (Latrobe, PA) has had his upgrade to Extra Class license granted for only a two year term "due to previous enforcement issues" related to the filing of an application for a club license in July, 2000 in which there were discrepancies in the listing of officers. If there are no valid complaints of rule violations, Jacobs may renew his license for a full ten year term effective April 9, 2004.

Peter M. Figueroa N6IWH (Berkeley, CA) was previously warned that he had been found operating on two-meters with an expired license. Figueroa said that his failure to renew his license was "due to an illness of a family member located out of state...." The FCC accepted his explanation but granted the renewal for only a two year period. If there are no rules violations during that period, his license will be routinely renewed for a full ten years.

Michael E. Guernsey ND8V (Parchment, MI) had been forwarded copies of various complaints lodged against him last fall. He responded with an unsigned letter which was returned to him on March 6, 2002 for signature. The FCC also reminded him to sign his letter on April 22, 2002.

The signed letter has still not been received and the FCC gave Guernsey one final warning. Failure to sign and return the letter will result in enforcement action which "...will range from a monetary forfeiture to station license revocation and operator license suspension."

No growth in ham radio continues. There are just about the same number of Amateur Radio operators as two years ago when the Amateur Service was restructured. Here is a comparison between April 2000 and June 2002.

License Class	Apr. 2000	June 2002	Increase
Novice	50077	39930	-10147
Tech.	206440	232974	+26534
Tech.+	131430	84880	-46550
General	111337	138374	+27037
Advan.	101725	86372	-15353
Extra	77530	97612	+20282
Total	**678539**	**680342**	**+1803**

The (June 2002) number of Technician and Technician Plus operators is rather skewed since no Tech Plus operator licenses have been issued since April 15, 2000 ...and a Tech Plus operator gets his license renewed as a Technician.

The ham census figures should be good news for ham radio equipment makers. Thanks to the reduction of the code requirement to 5 wpm there are nearly 32,000 more HF (General Class and higher) operators now than two years ago.

On the next page you will find a current census of licensed ham operators sorted by state and license class. Also included is the ham operator density (number of ham stations per one-thousand population.) Alaska has the most operators per 1000 residents: 5.11 - the District of Columbia has the least: less than one. Overall, about one-quarter percent of all Americans hold a ham ticket.

Amateur Radio Operator Census by State - (June 1, 2002) - Number of Stations per 1,000 Population

State and Postal Code	Population 2001 Estim.	Stns. Per 1,000	Extra Class	Advanced Class	General Class	Tech Plus Class	Technician Class	Novice Class	Grand Total
AK - Alaska	634,892	5.11	450	382	646	347	1,277	140	3242
AL - Alabama	4,464,356	2.35	1,596	1,289	2,068	1,180	3,980	379	10492
AR - Arkansas	2,692,090	2.61	1,037	816	1,268	777	2,858	276	7032
AZ - Arizona	5,307,331	2.95	2,267	2,074	3,043	1,838	5,855	586	15663
CA - California	34,501,130	2.92	11,417	11,374	16,958	12,679	41,905	6,459	100792
CO - Colorado	4,417,714	2.76	1,880	1,618	2,425	1,489	4,271	529	12212
CT - Connecticut	3,425,074	2.40	1,339	1,112	1,892	1,042	2,137	683	8205
DC - Dist. of Columbia	571,822	0.72	72	74	102	40	94	28	410
DE - Delaware	796,165	1.73	240	178	330	186	372	74	1380
FL - Florida	16,396,515	2.42	5,796	6,220	9,831	4,835	10,285	2,768	39735
GA - Georgia	8,383,915	1.75	2,183	2,022	3,013	1,839	4,951	631	14639
GU - Guam	157,557	3.21	65	37	64	78	245	17	506
HI - Hawaii	1,224,398	2.68	499	381	575	431	1,209	190	3285
IA - Iowa	2,923,179	2.21	1,006	1,061	1,507	705	1,796	386	6461
ID - Idaho	1,321,006	3.36	589	438	846	528	1,888	146	4435
IL - Illinois	12,482,301	1.82	3,422	2,969	5,003	2,796	7,004	1,510	22704
IN - Indiana	6,114,745	2.45	2,044	1,822	3,187	1,978	5,103	871	15005
KS - Kansas	2,694,641	2.69	977	841	1,607	885	2,471	461	7242
KY - Kentucy	4,065,556	2.18	1,254	949	1,694	1,101	3,357	519	8874
LA - Louisiana	4,465,430	1.50	1,030	1,008	1,392	796	2,118	342	6686
MA - Massachusetts	6,379,304	2.25	2,476	1,957	3,196	1,922	3,799	995	14345
MD - Maryland	5,375,156	2.06	1,940	1,618	2,327	1,398	3,102	668	11053
ME - Maine	1,286,670	3.42	687	538	1,043	528	1,360	249	4405
MI - Michigan	9,990,817	2.12	3,153	2,631	4,583	2,596	7,111	1,123	21197
MN - Minnesota	4,972,294	2.16	1,679	1,466	2,425	1,242	3,385	550	10747
MO - Missouri	5,629,707	2.26	1,931	1,654	2,747	1,452	4,297	657	12738
MS - Mississippi	2,858,029	1.62	697	643	952	494	1,650	200	4636
MT - Montana	904,333	3.40	454	357	647	319	1,140	158	3075
NC - North Carolina	8,186,268	2.28	2,803	2,351	3,700	2,252	6,424	1,107	18637
ND - North Dakota	634,448	2.46	214	167	368	212	520	78	1559
NE - Nebraska	1,713,235	2.28	554	552	996	475	1,119	206	3902
NH - New Hampshire	1,259,181	3.96	880	583	1,056	634	1,554	273	4980
NJ - New Jersey	8,484,431	1.83	2,583	2,281	3,406	2,180	3,888	1,221	15559
NM - New Mexico	1,829,146	2.96	818	698	1,005	535	2,208	151	5415
NV - Nevada	2,106,074	2.28	680	594	1,067	529	1,744	184	4798
NY - New York	19,011,378	1.68	4,618	4,101	6,795	4,214	9,514	2,780	32022
OH - Ohio	11,373,541	2.65	4,319	3,548	6,234	4,302	9,937	1,803	30143
OK - Oklahoma	3,460,097	2.66	1,301	1,100	1,605	1,062	3,741	388	9197
OR - Oregon	3,472,867	3.81	1,802	1,649	2,999	1,580	4,523	674	13227
PA - Pennsylvania	12,287,150	1.97	3,979	3,349	5,461	3,195	6,742	1,539	24265
PR - Puerto Rico	3,937,316	1.56	367	484	841	1,483	1,331	1,619	6125
RI - Rhode Island	1,058,920	2.19	394	264	547	372	563	181	2321
SC - South Carolina	4,063,011	1.70	1,093	877	1,581	804	2,249	306	6910
SD - South Dakota	756,600	2.08	258	239	374	154	450	101	1576
TN - Tennessee	5,740,021	2.44	2,146	1,827	2,782	1,784	4,852	605	13996
TX - Texas	21,325,018	1.97	6,617	5,808	8,346	4,871	14,616	1,738	41996
UT - Utah	2,269,789	3.89	800	624	1,043	1,072	5,041	256	8836
VA - Virginia	7,187,734	2.36	2,888	2,329	3,458	2,051	5,307	900	16933
VI - U.S. Virgin Islands	122,211	2.41	48	28	84	29	87	19	295
VT - Vermont	613,090	3.64	358	241	451	265	820	96	2231
WA - Washington	5,987,983	4.07	3,280	2,887	4,903	3,140	8,977	1,171	24358
WI - Wisconsin	5,401,906	1.98	1,599	1,401	2,337	1,154	3,653	529	10673
WV - West Virginia	1,801,916	3.58	805	585	1,096	736	2,935	294	6451
WY- Wyoming	494,423	3.28	241	197	322	187	601	73	1621
Other - (See Note)	141,696	7.90	187	79	146	107	558	43	1120
	289,155,577	**2.35**	**97812**	**86372**	**138374**	**84880**	**232974**	**39930**	**680342**
Difference between April 1, 2000 & June 1, 2002			**+20,282**	**- 15,353**	**+27,037**	**- 46,550**	**+26,534**	**- 10,147**	**+1,803**

Other = Includes APO (AA, AE, AP), American Samoa, N. Mariana Island addresses. Year-2001(Population) U.S. Census Bureau

'HDTV HERE AND NOW - It's Bigger Than You Think'

That's the subject of a speech presented by Dr. J. A. Flaherty, Senior Vice President-Technology at CBS Television before a group of journalists at the New York Hilton in New York City last month.

Flaherty also is the chairman of an ITU technical group working on establishing an international standard for a digital motion picture delivery system called "D-cinema." The following is a two-page capsule version of his remarks.

Seventy years ago in the fall 1931 edition of the important trade magazine of the day, *Radio Design,* a fellow journalist, Mr. Robert Hertzberg, asked about the emergence of television. He concluded "The over-enthusiastic televisionists are making their big mistake in thinking that television will repeat the glamorous history of radio broadcasting, when every sign indicates that it will not and indeed cannot. Conditions are now altogether different from what they were ten years ago. Today we have a Federal Radio Commission, an aggravating patent situation, an over crowded ether, an overabundance of radio factories, a lot of politicians with radio axes to grind, and worst of all, a sophisticated buying element that has been spoiled by high quality broadcasting and high quality talking motion pictures."

"If not for the talkies, the present crude televisors might stand a slight chance, as the mere novelty of a sight-and-sound combination would be enough to sell a lot of radio apparatus. However, the talkies have entirely erased this possibility."

Even before Mr. Hertzberg, the engineer and inventor, Lee DeForest, in 1926 said in the *New York Times,* While theoretically and technically television may be feasible, commercially and financially I consider it an impossibility, a development of which we need waste little time dreaming." Sound familiar? Of course, all new technology arrives to an doubtful audience.

High definition television has now crossed the final barrier. The reaction is now irreversible, and HDTV is here and here to stay! When TV emerged after WW II, we called it television. When color came along in the early fifties, we called it color TV. Now we just call it TV. Today we call HDTV, High Definition TV. As it becomes part of everyday American life, well just call it TV again.

In the beginning, on May 7, 1935, in a report on the emergence of television, David Sarnoff, then President of RCA said: "Public interest in television continues unabated since RCA stated that it was diligently exploring the development of television. Our laboratory efforts have been guided by the principle that the commercial application of such a service could be achieved only through a system of high-definition television."

"Our technical progress may be judged by the fact that we have produced a 343-line picture, as against the crude 30-line television picture of several years ago."

Thus, in 1935 high definition was 343 lines, in pre-war England it became 405 lines, and by the 1939 New York World's Fair, it was 441 lines. 525 line NTSC color was introduced as a "high definition color TV system", and in latter day Europe, HDTV became 625 lines. Today it is 1080 lines by 1920 pixels-per-line, at an aspect ratio of 16:9 with 60 pictures-per-second and 24 for film. Nothing less is HDTV.

The digital HDTV era began on June 1, 1990 when General Instrument proposed an all-digital terrestrial high definition television system to the FCC *Advisory Committee on Advanced Television Service* (ACATS), and television was forever changed. The digital era had begun and analog standard definition TV was doomed worldwide! Today, the 1080 line digital, wide screen, high definition TV system has escalated television picture and sound quality to a plateau never before imagined.

The constant search for higher quality television has been endless, and there has never been a significant quality improvement in television technology that has not become a part of everyday American life. HDTV is just the latest such must have technology. Today's generation of young 'screen-agers' will settle for nothing less than the best. They are the HDTV generation.

HDTV is alive, healthy, and growing in America, and the conditions for its rapid expansion are all in place. Expansion requires an ample supply of HD programs, HD distribution systems, including terrestrial broadcasting, cable, direct-to-home (DTH) satellite, and HD packaged video systems.

As to programming, HDTV programs are readily available in quantity, and have been for many years. Indeed, up to 90 percent of all commercial primetime programs in the U.S. are regularly produced in high definition ... namely 35-mm film.

For nearly 50 years network prime time programming has been produced in HD, but not one frame of it could be delivered to a single home until now. Thus, an initial HDTV program service will be shot in the wide screen format, on the same film, using the same film cameras used today to shoot normal television programs, and a large proportion of primetime programming could be broadcast in HDTV.

The four major television networks are already ramping up the number of programs produced in HDTV for network broadcast. Sports is an HDTV natural, and some believe that HD was invented for sports. In short, over 450 high definition programs are available to the home viewer each week, and the near term promise of the HD-DVD will add a new dimension to HD program availability.

Moving these programs to the home in HD via terrestrial broadcasting requires TV stations to complete their conversion to digital operation in accordance with the FCC-mandated transition from analog NTSC to all-digital

transmission. In 1998 the FCC required that the conversion proceed on an aggressive schedule. Stations in the largest markets were required to complete the transition by the first of May, 1999. The next largest group of markets was to complete the transition by November 1999, while all commercial stations were to complete the process by May 1 of this year. This last requirement proved to be a real challenge for some, but today I can report that a total of 410 TV stations, or 25 percent of the total of 1625 U.S. stations, have made the conversion, enabling 86 percent of all television households to receive a digital and HDTV signal.

DTH satellite services already provide digital and HDTV program transmission to virtually all television households that subscribe to their services.

Unfortunately, many cable systems have not been updated to carry the additional load of the new digital SDTV and HDTV broadcasts in addition to the analog channels and cable networks they now carry. Except for a few forward thinking cable systems, cable is behind schedule and sneaking "snail-like" into the 21st century and HDTV.

After a slow start, set manufacturers have made great strides in manufacturing a comprehensive line of HDTV equipment for the consumer. Initial prices were too high to develop a mass market, but now some 20 integrated HD sets are ready to choose from, and over 300 different digital monitors. The average price of a set has fallen 38 percent in the last two years, and is expected to fall 25 percent in the present year. Total DTV sales to date in 2002 are $2.6 billion and are continuing to rise. More than half of all TV displays sold are now in the digital wide screen 16:9 format, an important part of the Home Theater.

The digital revolution is even beginning to impact the movie industry. Following on the heels of DTV, HDTV, the DVD, and the HD-DVD, the large electronic digital screen in the motion picture theater is revolutionizing movie exhibition, and it will turn the theater into an enhanced D-cinema multi-media center. Television technology is coming to the movies! The D-cinema is a sweet form of television, and it begins with HDTV!

But what is the D-cinema, and why has it burst on the scene just now? In nearly a hundred years of cinema and fifty years of television the two media operated with different, and totally incompatible, delivery and exhibition systems. 35-mm film exhibition was a photo-mechanical system, and only film could be shown to a cinema audience. The new digital cinema will change all that!

The unique technological breakthrough that launched the D-cinema was the development of a large, theater-sized, bright high definition digital projector. That single breakthrough, coupled with existing high definition support systems for distribution, storage, and playback, gave birth to the D-cinema. While this was a major breakthrough, today's projectors hardly qualify as HDTV and, like consumer displays, cannot yet display the full quality of 1080/1920/24P -- the only worldwide high definition standard.

Fortunately, as in consumer products, improvements in theater displays are being made at a rapid pace, and full high definition quality will be achieved in the not-too-distant future. This is, of course, vital as HDTV quality and beyond is the very foundation of the D-cinema, and all future programming in D-cinema theaters will be at least high definition quality.

Real time and non real time HDTV programs, stage productions, concerts, documentaries, cultural, industrial and sporting events, will play at the local movie theater side-by-side with digital feature movies. Exhibitors will have a full bouquet of digital program choices to support and enhance their classic feature film business, increase audience size and contribute to profits.

The *Broadway Television Network* is an example of emerging cinema programming that is aimed at D-cinema theaters. Bruce Brandwen, CEO of BTN is producing Broadway musicals in HDTV for the D-cinema, with four presently in release, and successful Broadway musicals will command a significant theater audience.

The D-cinema's modern, high definition, electronic screens will deliver a quality to large cinema-size screens essentially equivalent to, or better than, 35-mm release print quality, and future improvements will enhance the cinema experience beyond 35-mm film quality and assure continued audience interest in a night out at the movies. Today is only the beginning of the beginning.

Thus, consumers will see and appreciate high definition quality in the cinema and expect it in their home theater as well. The present DVD has been a market success, and is replacing the analog VCR. Now, building on the HDTV technology the High Definition DVD, or HD-DVD, is coming to market. When this HD-DVD is played back on a HD Home Theater system, the D-cinema will have come into the living room, with potentially the same performance and quality.

Those who have not yet moved to HDTV are now one generation behind. As the D-cinema rolls out, they will be two generations behind, and slipping. One only need to read the theater critics on the superb technical quality of the new George Lucas' *Star Wars - The attack of the Clones,* a production shot wholly in HDTV without a foot of film, to see the future of the cinema and the challenge to the home theater.

The D-cinema is here to stay. When this Star Wars Episode 2 was released recently it played in normal film movie theaters, but its digital version played in 52 D-cinemas in the U.S., 4 in Canada, and 31 around the world.

As analog NTSC rumbles on into oblivion and HDTV becomes 21st century television, I think you will agree, HDTV is Coming Around the Corner at Last.