

# 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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## The Role of Amateur Radio in the New Century

Remarks by: Dale N. Hatfield (W0IFO), Chief, Office on Engineering and Technology, FCC

### Speech delivered by Dale Hatfield, W0IFO at AMRAD's 25<sup>th</sup> Anniversary Dinner on June 17, 2000 in Falls Church, VA

Dale N. Hatfield is the Chief of the Office of Engineering and Technology at the Federal Communications Commission. Prior to assuming his current position, Hatfield was Chief Technologist at the agency. Before joining the Commission in December 1997, he was Chief Executive Officer of Hatfield Associates, Inc., a Boulder, Colorado based multidisciplinary telecommunications consulting firm. Before founding the consulting firm in 1982, Hatfield was Deputy Assistant Secretary of Commerce for Communications and Information and Deputy Administrator of the National Telecommunications and Information Administration. Before moving to NTIA, Hatfield was Chief of the Office of Plans and Policy at the FCC. Hatfield holds a BS in electrical engineering from Case Institute of Technology and an MS in Industrial Management from Purdue University.

The Amateur Radio Research and Development Corporation (AMRAD) began as an informal group of technically oriented radioamateurs in 1972. It was incorporated in the Commonwealth of Virginia in 1975 as a nonprofit 501(c)(3) tax-exempt scientific and educational organization.

I am very pleased to be able to speak to you this evening on the topic of the role of amateur radio in the new century. I am very pleased to be here for a number of reasons.

First, I am very pleased because it is both your 25<sup>th</sup> anniversary and your first anniversary dinner held in the new century. That seems like a particularly good time to reflect on the future of the amateur radio service and I am flattered that you have asked me to do so.

Second, I am very pleased because I have especially fond thoughts about the service because of the pivotal role that amateur radio – and individual amateur operators -- hams -- played in my own career. As I will explain in more detail in a moment, I would not be in my current position if it had not been for the help of some hams back when I was a teenager about 50 years ago.

Third, I regard it as a particular honor to be asked to address an amateur radio group that emphasizes experimentation and the more technical aspects of amateur radio. Again, as I will indicate in more detail in a few minutes, I believe that experimentation and contributions to the state of the art in the radio field are a major part of the justification for maintaining spectrum allocations for the service in the face of increased demands by commercial and other interests.

I would like to divide the remainder of my remarks into five parts.

*First,* I will briefly -- very briefly -- talk about my personal involvement in amateur radio

*Second,* I will briefly describe the role of the Office on Engineering and Technology at the Federal Communications Commission so that you will have a better idea of the basis for my remarks.

*Third,* speaking from that perspective, I will talk about the growing scarcity -- and hence economic value -- of the radio spectrum and how that growing scarcity will inevitably put pressure on amateur allocations.

*Fourth,* I will talk about the important role that the amateur radio service has played in the past and -- going to the basic topic I have been asked to address -- what the amateur service can do to in the future to justify its spectrum allocations on both a national and international basis.

*Fifth,* and finally, I will talk about a proceeding we recently launched at the Commission -- a proceeding dealing with Software Defined Radios.

Before I continue, I need to add the standard disclaimer that my remarks here this evening represent my own views and they may not necessarily reflect the views of the Commission, any individual Commissioner, or any other staff member.

## Background in Amateur Radio

My own involvement in amateur radio began in my early teens, when my father bought me a used Halli-crafters S-38B shortwave receiver. He and his brother -- my uncle -- had tinkered with crystal sets when they were kids and he somehow sensed that I might find radio interesting as well. I connected that receiver to piece of antenna wire hung out of my bedroom window and soon I heard a ham radio operator in Morocco calling CQ in the 20 meter amateur band. From that moment I was hooked on radio communications.

Two local hams who lived near me -- this was in Dayton, Ohio in the early 1950s -- helped me get my first license (WN8NKG) and helped me build my first transmitter. These two hams were electrical engineers that were employed at Wright-Patterson Air Force Base near Dayton. It was their interest that led me into electrical engineering as a vocation and ultimately to a job at the government's old Central Radio Propagation Laboratory in Boulder, Colorado. I won't bore you with the details, but that first, entry-level job eventually led me to the position I hold today. Accordingly, I will forever be in the debt of those two hams who so unselfishly supported my passion for radio.

## Role of the Office of Engineering and Technology

As most of you may know, the FCC is organized into Bureaus and Offices. Generally speaking, the bureaus -- the Common Carrier Bureau, the Wireless Telecommunications Bureau, the Mass Media Bureau, the Cable Ser-

vices Bureau, and the International Bureau -- have the "line" or operating responsibility in terms of the Commission's regulation of particular segments of the telecommunications industry. For example, the Wireless Telecommunications Bureau -- under the excellent leadership of my colleague, Tom Sugrue -- has the responsibility for the Amateur Radio Service. The offices -- such as the Office of the General Counsel and the Office of Plans and Policy -- provide support and advice to the operating bureaus and to the five member Commission itself.

Reflecting that rough division, the office that I now head, the Office of Engineering and Technology, provides technical advice to other bureaus and offices and to the Chairman and other Commissioners. In addition, however, our office has the responsibility for administering specific parts of the Commission's rules, namely, Parts 2, 5, 15, and 18. Part 2 of the rules contains the Table of Frequency Allocations. That is, while the individual bureaus have primary responsibility for developing and recommending specific service rules, we, in OET, have the responsibility for general allocation matters. We also issue experimental licenses under Part 5 of the Commission's rules. In addition, we administer Part 15 of the Commission's rules dealing with unlicensed devices as well as Part 18, which deals with certain industrial, scientific and medical equipment. Finally, we are responsible for the Commission's equipment authorization program. Much of that work is done at our laboratory facilities in Laurel, Maryland.

## Growing Demand for Spectrum

The management of the radio spectrum resource is an extremely important part of telecommunications policy and regulation. As you all know so well, radio spectrum is an increasingly scarce natural resource. We simply do not have enough spectrum to give everyone all they want. This increasing demand is being propelled by a host of developments:

- the growing shift of our economy towards the service sector,
- the increasing mobility of our workforce,
- the convenience and increased efficiency produced by mobile/portable communications
- the increasing performance and falling cost of wireless devices
- the increasing requirements for public safety and for national defense systems, and
- the dramatically growing interest in accessing the Internet on a wireless basis.

Hence, the allocation of spectrum for particular uses and the development of specific technical and service rules governing those allocations is a crucial determinant of telecommunications industry structure and performance. Even more importantly, it is critical to the perfor-

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mance of our public institutions that are devoted to certain scientific pursuits, such as radio astronomy, to the safety of life and property, and to the national defense.

As the office at the Commission that has primary responsibility for spectrum allocation matters, we, in OET, are in a particularly good spot to judge -- first hand -- the increasing demand for spectrum. Our office is generally the first place people stop when they are seeking new spectrum. Hardly a week goes by without someone stopping in my office or filing a petition asking that spectrum be allocated for some new service or that additional spectrum be allocated to an existing service. While increased efficiency in the use of spectrum -- through the use of digital compression techniques, more efficient modulation and greater frequency reuse, for example -- can offset some of this increased demand, increased scarcity is a very real concern. This scarcity is exemplified by increasingly contentious debates over spectrum sharing arrangements and by the amounts bid in auctions for radio licenses. The \$35 billion bid in the recent Third Generation Cellular auctions in the United Kingdom provides very clear evidence of the increasing value of spectrum.

Our Chairman -- FCC Chairman, Bill Kennard -- has recently called attention to the potential for a "spectrum drought", especially in the valuable range below about 3 GHz. Under the leadership of the Chairman, and with solid support of Commissioner Susan Ness -- who has always been intensely interested in spectrum issues, we have put forth a number of proposals and undertaken a number of initiatives that would allow more uses and users of this national and international resource. One of these initiatives relates to Software Defined Radios -- a topic which I will return to briefly near the end of my remarks. The point that I want to emphasize here, however, is that, in thinking about the role of Amateur Radio in the new century, we must think about it in the context of increasing pressure on the underlying spectrum resource.

## Future of the Amateur Service

Turning now to the future, it seems to me that -- given the increased pressure on the underlying resource from commercial and other non-commercial uses -- the key issue for the amateur service is maintaining access to an adequate amount of spectrum. Let me make it absolutely clear that, in raising the spectrum issue, I am not suggesting that there is any immediate threat to existing amateur allocations. I am simply pointing out the reality of the situation. The rapidly growing demand for spectrum coupled with the increased visibility of its economic value due to auctions makes it almost inevitable that amateurs will be under a certain amount of pressure to justify their "free" use of this precious resource.

In the past, the amateur service has justified its spectrum allocations by, among other ways, (1) engaging in experimentation that has advanced the radio state-of-

the-art, (2) providing emergency communications in times of natural or man-made disasters, (3) providing trained radio operators in times of national emergencies, (4) encouraging international cooperation and goodwill by allowing direct communications between and among people on an international basis and (5) as in my case, providing an important educational outlet for people interested in the more technical aspects of radio communications. While the relative importance of some of these ways has obviously changed because of marketplace, technological and other developments, they remain valid today. The important thing is that they actually be carried out. Or, to use a bit of slang, it seems to me that it will be even more important for all segments of the amateur community to "walk the walk" not just "talk the talk."

Another potentially important area deals with how efficiently one uses the spectrum. We could probably discuss at some length the proper measure of spectrum efficiency but for our purposes here this evening it might be simply the number of simultaneous conversations that can be accommodated in a given amount of spectrum in a particular geographic area. In the commercial sectors, where organizations pay for their use of the spectrum, there is a significant economic incentive to use the resource efficiently -- to spread costs over as many users as possible while maintaining good quality service. That is, there is a strong incentive to develop and adopt more spectrally efficient technology. For example, by adopting various digital techniques, commercial mobile radio service providers (e.g., cellular and PCS) have been able to dramatically increase their capacity compared to the original analog technology. Similarly, when the broadcast industry has completed its transition to digital television, we will be able to reclaim a substantial amount of spectrum for other uses.

I recognize that, in the past, hams have also adopted more spectrally efficient technologies -- for example, by migrating from double-sideband amplitude modulation to single-sideband modulation and, more recently, by shifting to more efficient modulation for text -- TTY -- modes. I would urge you to continue shifting towards more spectrally efficient communications techniques -- especially digital techniques. Such a shift has a number of benefits:

First of all, it demonstrates to policymakers and regulators that you are good stewards of the public's airwaves even without direct economic incentives.

Second, by using what you have efficiently, it strengthens your case when you need to ask for additional spectrum.

Third, by allowing more users to access the available allocations simultaneously, it improves the amateur experience and ultimately increases the attractiveness of the service to new and old users alike.

Fourth, it provides the opportunity or "headroom" for

increases in data rates to more closely match those available on wireline networks and, in the future, on commercial wireless networks as well.

Fifth, as the rest of the telecommunications world makes the transition to digital techniques – and there are very few exceptions to that trend – the amateur service will look antiquated if it is not making progress in that direction as well.

So looking to the future of the amateur radio service in the new century, I would urge you to continue your traditional role in public service by being prepared for and providing communications in times of emergencies, conducting experiments, providing training in radio communications, and encouraging international comity. But I would also urge you to focus particular attention -- for the reasons I just mentioned -- on experimentation with digital techniques that are capable of squeezing more "bits per second per Hertz of bandwidth" out of the increasingly valuable radio spectrum resource.

### Software Defined Radios

I am rapidly running out of time but before I close I would like to talk about one additional topic that, as it turns out, may help enable some of the experimentation with digital techniques that I just advocated. The topic, as I mentioned at the outset of my remarks, is Software Defined Radios. Software defined radios -- or software radios or software programmable radios as they are sometimes called -- can be described as radios that are implemented in digital signal processors with functions defined in software. In other words the signals are generated in -- or converted to -- the digital format and the necessary processing -- for example, modulation and demodulation -- is done in software on a common platform.

From what I have been told, such radios could have a host of advantages:

- One, they would allow a common radio to accommodate a host of different standards and thereby help alleviate some of the problems that we have had with the creation of different standards in the wireless field.
- Two, they would facilitate interoperability among different types of radio systems, when for example, a large number of different emergency groups arrive at the scene of a major disaster.
- Three, they would allow a manufacturer to develop different radios but on a common hardware platform. In other words, rather than manufacture and carry in inventory several different radios, the manufacturer could achieve economies of scale in the production of a common hardware platform, but wait until the product is about to be shipped before loading the software to create a specific type of device.

Four, they would allow the end user to update his or her radio simply by getting a software update -- just like an end user gets updated software for a Personal Computer today. In fact, one could even envision a situation where one could get software updates right off of the Internet or over-the-air.

Five, it is possible that a manufacturer could sell a bare-bones hardware platform to which third party providers or end users -- including hams -- could supply software to create custom radio systems. Certainly we have seen similar developments in the computer field and in other sectors of the telecommunications industry.

Six, it is even possible to imagine a radio that could adapt its characteristics to fit the interference environment and user needs on a more-or-less real time basis. For example, the radio could maximize its use of bandwidth in areas where the spectrum is not congested while conserving bandwidth or going to more robust modulation in areas where interference is heavy and/or propagation conditions are particularly difficult.

Indeed, if we can solve some of the difficult regulatory issues involved, it is even possible to envision Software Defined Radios as a means of facilitating a new era of amateur experimentation. One intriguing possibility is that it could enable hams without skills and/or interest in hardware construction to build and experiment with new systems by writing new code. It might also allow the rapid sharing of new modulation techniques and receiver designs through electronic publication of the implementing software. This could stimulate a whole new generation of amateur innovation that not only includes the more spectrally efficient systems I mentioned earlier, but also radios that could adapt to their environment as well.

In many ways, Software Defined Radios represent a final merger of the radio communications and computer fields. Viewed from that perspective, this technological development even has the potential of attracting back to the hobby some of the people who have shifted their interest to computer technology. Because of this potential to advance the service in fundamental ways, I would urge amateur groups to participate actively in our proceeding.

### Concluding Thoughts

Let me conclude by saying that I believe that the future of the amateur service is a bright one. It is one where technological advances such as Software Defined Radios can enable the ham community to continue its proud tradition of innovation while demonstrating its commitment to the efficient use of the spectrum resource. Certainly your organization -- AMRAD -- is in a particular good position to encourage the experimentation that will lead to such innovations and I strongly commend you for your leadership efforts in that direction in the past.

## CUTTING EDGE TECHNOLOGY

■ Scientists at the Massachusetts Institute of Technology (MIT), Lucent Technologies' Bell Labs in New Jersey and the Institute of Neuroinformatics in Zurich **have created an electronic circuit similar to the brain's neural system.** It contains artificial neurons that communicate with each other. The technology could ultimately be used to create computers that think more like humans and even perform perceptual tasks such as sight recognition.

■ **"Let's see an analog 'scope do THAT!"** Many digital storage oscilloscopes can store reference waveforms in their internal memories or onto diskette. This makes it easier to compare a known-good circuit against another, even if they are physically separated by inches or hundreds of miles. Engineering support for a manufacturing firm can keep such waveforms on file and make them available for download to field technicians. Reference files and sample images can be then transferred into a word processor, and the waveforms can be published on paper or on a Web page.

■ **"Invisible Light Pipes" direct infra-red light from source to target.** Many products use transparent plastic tubes or rods to deliver visible light from LEDs mounted deep inside the box to the outside world, without the expense of wiring. Now Epner Technology is doing the same with invisible infra-red light. The plastic light pipes are specially coated with a thin layer of gold on the inside wall, providing up to 98% efficiency.

■ **If your photographs or scientific measurements aren't turning out the way you'd hoped, perhaps it's your light meter.** Temperature affects their performance, just like every other electronic component. With summer bearing down, it's important to remember that most light sensors can fail permanently if left in a brutally hot environment. To keep their accuracy, take light meters and sensors out of their boxes and let them get used to the light for a few minutes. Don't let light far brighter than what you want to measure hit it for very long, or the sensor will take too long to re-adjust. And keep in mind that most meters are more accurate in the middle of a scale, rather than at either end, so adjust the scale accordingly.

■ **At least one manufacturer offers**

**fiber-optic ribbon cables.** Since these are immune to RFI, they can provide faster data transfer. Perhaps future transmission standards will dictate parallel optical cables over wire-based ones.

■ **Still interested in building electronic kits?** They're not dead yet. Synthesis Technology offers kits for analog music synthesizer modules. You can build voltage-controlled amplifiers, ring modulators, power supplies, sample-and-hold modules, and more. They provide the bare PC board, the parts, the wire and the solder. They also offer pre-assembled modules, for those who aren't quite ready for do-it-yourself. They're also a gold mine of information for techs who like to troubleshoot and restore old analog music synthesizers. Check them out at <http://www.synthtech.com> or phone them at 1-888-818-6686.

■ **The National Football League is experimenting with tiny video cameras for players and officials to wear on their headgear.** The cameras, about the size of your thumb, are undergoing tryouts in the European league and might be used in America during the 2000 pre-season.

■ **An electronic protractor is available from Fred V. Fowler Co., Inc.** Featuring a liquid-crystal display, it can provide resolution down to one minute or arc, or 0.01 degrees. Press a button and you can convert instantly from degrees-minutes-seconds to decimal degrees. You can also download readings to a PC.

■ **"In Search of the Lost Chord"** - A handheld electronic device lets musicians access the precise fretwork of over 500 guitar chords. The Chord Computer, from Banana Guitar, displays on its LCD 48 scales, major chords, minor chords, and many more.

■ **Did you use wind power during Field Day?** Windmills and wind turbines keep turning up in creative applications. Though long used to pump water, they're also charging batteries for remote repeater locations, powering RV's and mobile homes, and turning on navigation lights on boats and oil platforms.

■ **The most accurate clock in the world is now in place in Boulder, Colorado.** The NIST F-1 is a new cesium atomic clock at the National Institute of Standards and Technology (which, coincidentally, is 100 years old this year). It boasts one-second accuracy for every 20 million years! Linked to UTC (Coordi-

nated Universal Time) and time-keeping station WWV, it is three times more accurate than NIST-7, the atomic clock it's replacing. The clock works by striking cesium atoms with infrared lasers and measuring how long it takes them to complete a circuit in a vacuum chamber.

■ **You can measure how far away a storm is with the handheld Spectrum ThunderBolt.** The electronic device, which looks like a cross between a digital multimeter and a transistor radio, listens for the RF signature of distant lightning activity. Spectrum Electronics, the device's manufacturer, claims the device can track storms as much as 60 miles away. A two-line alphanumeric LCD tells the user how far away a storm is, where it's headed, how fast it's moving, and -- if the storm comes within eight miles -- when to take shelter. The ThunderBolt initially "locks out" normal RF sources to prevent false triggering. It displays probability of lightning striking nearby. An external alarm can be connected if the internal beeper isn't enough, and up to 200 hours of storm-tracking data can be downloaded to a computer. It weighs less than a pound and runs off of a 9-volt battery.

■ **Every piece of technology has its pros and cons.** One problem with charge-coupled device (CCD) digital cameras is that the individual light sensors, arranged in an array behind the lens, often create a "smearing" effect on the TV screen. This is particularly noticeable in a scene showing a sharp contrast between a dark area and a bright area. It's caused by the charges on individual light sensors "bleeding over" each other on the substrate.

■ **NASA Brings Satellite Back to Earth.** On June 4, 2000, NASA purposely programmed the Compton Gamma Ray Observatory satellite to fire its thrusters to lower its orbit and burn up in re-entry over a remote section of the Pacific Ocean. It was the first time that NASA has deliberately destroyed a satellite in this manner, but they had good reason. The huge satellite had suffered a major hardware failure, and NASA engineers decided to de-orbit the craft while they could still control it - rather than let it fall on its own and possibly injure someone.

Launched on April 5, 1991, from the Space Shuttle *Atlantis*, the 33,000-pound satellite was about the size of a garage. Its objective was to monitor the sky for gamma rays, the most powerful section of the electromagnetic spectrum. Designed to last at least two years, it lasted for

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almost nine and provided reams of data for scientists to study – it discovered 10 times more gamma-ray sources than we've detected from the ground.

A bearing in one of the three main gyroscopes caused it to fail, which made it difficult for ground controllers to keep the GRO positioned properly. Other hardware failures were likely to follow, given the length of its mission. Repair in orbit during another Shuttle mission was not an option, because the gyroscopes were not meant to be replaced and the risk to astronauts was judged to be too great.

The GRO was designed for eventual re-entry, anyway. So, after more than 51,000 orbits, one of the scientists at NASA pushed the final button and Compton disintegrated over the Pacific Ocean, scattering tons of material for hundreds of miles. Titanium and aluminum rained down from the sky for over 20 minutes, but no one was hurt. The craft depended on solar cells and contained no radioactive power sources. It came down between Hawaii and Mexico. Other, more sensitive satellites are already in the works to replace the Gamma Ray Observatory.

■ **Batteries may be replaced by fuel cells.** Motorola is trying to shrink fuel cells, which convert chemicals into electricity, to the point where they can be small enough and inexpensive enough to operate toys, cell phones, laptop computers and other appliances more efficiently than today's batteries can. Motorola's fuel cells convert a mixture of alcohol, water and gaseous oxygen. The by-product from the electricity produced would be just water vapor, which can be released back into the air.

■ **Some cars in Europe are available with an RF "lock" built inside the car key.** The passive radio-frequency device inside the key contains erasable data memory, which is interrogated by the car's computer if a key-like object is inserted into the lock. If the data matches what is expected, the computer allows the engine to start. Otherwise, all electronics are disabled -- radio, engine control, navigation, etc. Philips Semiconductors designed the devices, which operate on a very low frequency: about 125 kHz. Keys can be re-written instantly with millions of new codes, so a thief can't get a master set and hope to steal cars with them.

■ **How do you protect furniture against static charge buildup?** Roll-around chairs in semiconductor clean rooms can collect static charge, unless they're grounded. Nailed-down chairs are

neither convenient nor practical. That's why you sometimes see metal drag chains near the wheels. They bleed electrical charges to ground at all times, just like drag chains on gasoline trucks. Casters and glides on chairs can be made of conductive materials, as well, to increase protection.

■ **Can the packaging of a semiconductor affect its performance?** It sure can. At very high frequencies, the TO-3 transistor package contains enough internal inductance in the leads to slow down MOSFET switching times -- which goes against what MOSFETs are designed to do. TO-220 packages reduce inductance and switching times, but using a socket for MOSFETs can just put inductance back into the circuit path.

■ **Robot vacuum cleaner needs no assistance.** You may have seen TV commercials for robotic lawn mowers, and now the technology can clean the house on the inside, too. Dyson's 20-pound DCO6 vacuum contains sensors to "learn" its way around the room, avoiding obstacles, and remembering where they are. It works its way around hindrances and won't harm pets or children. No pre-programming is needed. Its battery lasts for about half an hour, and takes just an hour to recharge.

■ **Watch out if you're using white LEDs in your next project.** Light-emitting diodes of other colors have been around for so long that we've gotten used to their generic forward voltage: about 2 volts. White LEDs, for the most part, have a forward voltage of twice that value. That can greatly affect their brightness if the right amount of current isn't flowing through them.

■ **Over 8,000 pieces of space junk currently orbit our planet.** Some are as large as booster rockets, others are only 10 centimeters across. There are countless numbers of pieces smaller than this, which cannot be tracked from the ground. Even the people who sent the objects up there have lost track of some them. Solar panels, nuts and bolts, old satellites and other man-made debris eventually fall from low Earth orbit, but they pose increasing risk to manned space missions. Less debris exists thousands of miles up, in the geosynchronous Clarke belt, where the biggest communications and meteorological satellites reside.

■ **Plumbers and sewer workers are using tiny, flexible video cameras to find leaks and blockages in pipes.** At-

tached to the end of a "snake," the cameras contain their own light sources and can be fed deeply into plumbing systems that would be difficult or impossible to reach manually. Workers look at the video display to pinpoint exact locations of leaks and what objects may be clogging pipes.

## EMERGING COMMUNICATIONS

■ **Controversial media tycoon Rupert Murdoch plans to launch a satellite TV network** to reach nearly two-thirds of the world's population. Although a naturalized U.S. citizen, Murdoch's global media holding company News Corp., is headquartered in his native Australia. He plans an initial public offering (IPO) to raise money to consolidate and expand all of his far-flung satellite holdings into a new company, **Sky Global Networks, Inc.** The amount raised could be as high as \$5 billion ...more than double that he raised to get his FOX TV network off the ground. According to the IPO, Sky Global will serve as a satellite-based platform to distribute pay TV, video entertainment and Internet-based services.

■ **Why break the window when you don't have to?** A new method of connecting outside satellite antennas to home TVs without having to cut glass, drill holes or scrunch cables is now available from *Multiplex Technology*. It passes RF and dish-control signals directly through the glass itself, similar to some cellular-telephone antennas. You attach the links to each surface of the glass, and it takes care of the rest. It's meant to be used with popular DSS equipment.

■ **Phone rates are set to dive even more as Internet telephoning comes to the masses!** The Internet now has its own phone company, called **Net2Phone**.

Next month, Panasonic will begin shipping their 1800 series 900MHz digital Spread Spectrum cordless phones with a feature that automatically routes telephone calls over the Internet. After you push a button, you get a connection and then you just dial normally. The service will be provided by Net2Phone, Inc., of Hackensack, NJ.

Many long distance carriers are already routinely routing long distance calls over the Internet. But these are the first telephones that can transmit both public switched and IP phone calls, allowing consumers a choice on the same phone

between regular long distance phone service or low-cost Internet-based long distance service, simply by pressing a button on their phone.

You get one hour of free Internet calls after setting up your telephone for Internet calling. If you decide to keep the feature, you get another 2 free hours of net calling and pay only 3.9¢ per minute to Net2Phone. You do not have to subscribe to an Internet Service Provider to use the service.

■ **Priceline.com's "name your own price" long distance service also uses Net2Phone.** Customers simply set the price they would be willing to pay per-minute for a block of calling time.

You tell Priceline your home or small business phone numbers and select the market (U.S. domestic, international or a specific country) you want to call. Then select the amount of time you want to buy and the price you want to pay.

In 60 seconds or less, you'll find out whether your price was accepted. You'll get a special PIN number to use when you make your call. When your block of time runs out, you go back to Priceline Long Distance and set another price. Customers never have to switch from their current long distance providers.

### COMPUTER INFO

■ **Computer retailers, CompUSA Inc. and Micro Centers have begun selling Net2Phone's new line of YAP (Your Alternative Phone) Internet telephones.** YAP phones permit long distance calling over the Internet with or without a PC. Their product line:

- The **YAP Headset** plugs into the back of a computer.
- The **YAP Phone** works after you install Net2Phone software and plug the handset into your PC's multimedia soundcard.
- **YAP Ports** allow use of a regular phone which is plugged into an external interface or slot on your PC.
- Plug an ordinary telephone into the **YAP Jack** to phone over the Internet. Users do not need a PC to make calls. Instead, Net2Phone places the call using an Internet Service Provider and then routes the call over the Internet.
- **YAP Multimax** allows corporate users to extend the capacity of an Internet line into the equivalent of up to 6 lines.

■ **AT&T has agreed to lead a coalition that is investing \$1.4 billion** (a 40 percent ownership stake) in Net2Phone, Inc. AT&T's interest? Getting its cable modem PC subscribers to convert to low cost local and long distance Internet telephone service. Watch for the upcoming battle royal as traditional telephone companies begin competing with Internet calling. AT&T's current basic plan charges 26 cents a minute on weekdays, 16 cents per minute on week nights and 11.5 cents a minute on weekends. See: <<http://www.net2phone.com>> for more information.

■ **Why optical computing? Because it's faster.** An integrated circuit processing photons of light within glass pathways can work a thousand times faster than a chip based on silicon and electronics. Prototypes are already being built.

■ **How are software publishers protecting their products against piracy these days?** It's much more difficult to produce on CD-ROMs the anti-copying tricks that worked on old floppy disks. Each company has its own special way of doing things. Here's just a sample:

- Phone the software publisher, and they'll require you to "register" your copy by speaking a string of gobbledygook characters from the manual over the phone. They'll read back another confusing string of gibberish, which you type in. The program then enables all the features. (If the product isn't registered within anywhere from a couple of days to several weeks after initial installation, some important features such as printing and file-saving may be disabled.)
- Keep the original CD-ROM handy. The program will load and run just fine without it, but periodically it will stop and demand that you put the disc into the computer for a moment. It then double-checks whatever serial numbers may be embedded in the data to make sure you're using a pristine copy.
- Use the Internet to e-mail the company a password request. This involves typing in whatever unique serial numbers are printed in the manual. After a while, the manufacturer e-mails back the full password information to unlock the software. (This means that for some users, the Internet is no longer a luxury, it's a necessity.)
- "Nag box." Rather than lock out users, the software is fully enabled without any registration whatsoever. But without proper authentication, a window will "pop up" on the screen periodically, reminding you about it. It won't affect operation, but it's just aggravating enough to most people to convince them to "do the right thing."

■ **PalmPilot users can now use Chinese handwriting recognition.** The DragonPen software (from Synergy Technology) can recognize and display over 5,400 traditional Chinese characters and over 500 Hong Kong characters. Since the language requires so many different ideograms, it is much easier to enter characters by writing them out by hand.

■ **Remember your first Hewlett-Packard calculator?** An excellent website called the Museum of HP Calculators at [www.hpmuseum.com](http://www.hpmuseum.com) lets you look at old manuals, find software for the programmable models, and even look up "bugs" or mathematical errors that were accidentally built into some models. You can share your favorite HP calculator stories with other users from all over the world. CD-ROM collections of the entire series of HP calculators (and there are a lot of them) are available, containing user manuals, tutorials, programs and tips. Thousands of engineers and technicians cut their educational teeth on these devices that made slide rules obsolete.

■ **Intel, Delta Airlines, American Airlines, and Ford Motor Co. are among large businesses that are offering their employees huge discounts on personal computers, printers, laptops and Internet connections -- for their personal use.** Not only is the hardware free in some cases, but some companies promise to continue hardware and software upgrades in the future to keep the machines from becoming obsolete. Why are the companies doing this? Money. They figure that if they keep their employees and their families interested in the technology, they will become more familiar and comfortable with it. Workers can do extra work at home this way, sharpening their skills and becoming even more useful to their employers.

■ **The largest-capacity hard drive commercially available can store 75 gigabytes of data.** Produced by IBM Storage Technology, the Deskstar 75GXP offers 7,500 times more storage space than the first hard drive on the IBM XT computer. (And that isn't all -- IBM's researchers have successfully stored data in the lab at 400 gigabytes per square inch.) Ultra-brief pulses of laser light -- one picosecond or less (one millionth of one millionth of a second) -- are being used to

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clean delicate objects. When controlled properly, bursts of laser light lasting so short a time can blast away contaminants from the surface of a delicate object without damaging it. This is because the light energy doesn't last long enough to generate heat in the object itself.

■ **If you need to print a computer document but don't have a color printer, and a friend of yours some distance away does, you can use the Internet.** Nadio's InternetPrint is downloadable software that lets you use anyone else's printer, anywhere in the world. If both parties are using the software, one point and click is all it takes. This allows graphic artists to submit commissions and art assignments directly to their editors immediately, rather than risk time and damage in the mail. It works with color printers (which fax machines can't do), and contains password protection.

■ **Better not trust your valuable documents to ink-jet printers.** The ink may vanish in a few years. It's happened more often than you might think, faster than one might imagine. The problem stems from the dyes used in ink-jet inks, which tend to fade faster than the pigments in permanent inks. Laser-printer inks tend to last much longer, because their mixture of carbon toner and plastic gets melted and fused onto the page. (Although toner likes to stick to some surfaces, such as the insides of notebook binders, and even other sheets of paper if enough pressure is applied.)

■ **Wall art that changes itself automatically can be yours.** The Ceiva, made by Ceiva Logic, is a wall-mounted frame about 10" by 8" that contains a 6" by 4" color display. Its internal memory contains up to 10 images, which can be set to change at different times. Pictures (saved as JPEG image files) can be downloaded by a direct telephone modem connection to Ceiva's Web site, and you can upload whatever pictures you want to show. You must subscribe to Ceiva's monthly service to activate it.

## INTERNET NEWS

■ **Look for Internet Service Providers around the world to begin offering an easy-to-use web appliance to non-subscribers as part of an overall service package.** Intel Corp., has developed and begun shipping "Intel Dot.Stations" to ISPs which will provide them with a new

hardware revenue stream.

The customizable telephone-like device is being built by an off shore manufacturer and runs the Linux operating system, Microsoft's fast rising competitor. Targeted at non-PC owning families, Intel's kitchen counter-top "Dot.Station" marries the telephone to e-mail and Internet access. It also has note-posting, calendar and address book capability. The "Dot.Station" comes with a high-resolution full color screen and a silver keyboard.

It will not be sold at retail and most ISPs will probably offer the device for free in exchange for long term web access agreements.

Both Microsoft and Intel are moving away from their core software and chip business into other opportunities. Intel plans for their Web appliance family to be a multi-billion dollar business.

■ **Need a gentle reminder? Let Mr. WakeUp do it for you.** The website [www.mrwakeup.com](http://www.mrwakeup.com) is a free service you subscribe to, which notifies you later of whatever events you desire. If you need a wakeup call, birthday notification, reminder to take medicine, news or weather, it will contact you at the pre-arranged time. It works with ordinary telephones, cell phones, pagers and e-mail. The downside is having to listen to advertising at the beginning of each message. You can use your own voice or pick someone else's. Passwords are included to thwart pranksters.

■ **Online grocery business is consolidating** -- Year old Webvan has agreed to buy HomeGrocer.com in a stock swap valued at \$1.2 billion. The company will be known as the Webvan Group and will reach 13 metropolitan areas by the end of the year. Internet pioneer, Jim Barksdale (of Netscape fame) will join the board. (Webvan says 78% its business is repeat customers and the average order is \$90.)

■ **Film photo processing heads to the web.** Eastman Kodak Co. is entering into *PrintAtKodak* service agreements with various brick-and-mortar retailers that allows customers to have their film-based photos processed and posted to the Internet. The idea is to help retailers retain their film development business. The website of large pharmacy retailer CVS Corp. <[www.cvs.com](http://www.cvs.com)> is the latest to offer digital processing and photo-sharing. Additional photo prints can be ordered online. Kodak also offers web processing and display at Snapfish <[www.snapfish.com](http://www.snapfish.com)> and Shutterfly <[www.shutterfly.com](http://www.shutterfly.com)>

■ **Yahoo has replaced its Inktomi**

**based default search engine with privately held Google of Mountain View, CA.** And with good reason. It is definitely bigger and better - with more relevant results at faster speeds. (We tested several sample, highly selective searches.) No other search engine came close to the performance! Inktomi's stock plunged more than 20 percent on the Yahoo switch.

Google <[www.google.com](http://www.google.com)> claims to have the world's largest search engine with more than a billion pages indexed which can be accessed in less than half a second! Google can handle 30 million searches a day and in ten different languages. It only returns web pages that contain all the words in your query. To narrow a search all you need to do is add more words to the end of your query.

Google is based on a variety of new innovative technologies, including sophisticated text matching and its advanced, patent-pending "vote interpretation" technology called PageRank™, which ensures that the most important results come up first. Google is so selective, it is the only search engine that lets you obtain only one result. Cached (saved) pages insure a search result - even if the site you requested is down which is frequently the case.

Its effectiveness has not gone unnoticed. Google won the 2000 Webby Award for Best Technical Achievement; *TIME* magazine's Top Ten Best Cybertech of 1999, a Technical Excellence Award from *PC Magazine*; and *The Net's* Best Search Engine designation. Check it out!

## WASHINGTON WHISPERS

■ **Online trading can be hazardous to your financial health.** That's the bottom line of a new report from the *General Accounting Office*, the investigative arm of Congress. GAO's mission is to help the Congress oversee federal programs and operations to assure accountability to the American people.

Their report number GGD-00-43, "**On-Line Trading: Better Investor Protection Information Needed on Brokers' Web Sites**" focused on the growth in on-line trading. There are now nearly 200 firms providing online trading to more than 10 million trading accounts.

This growth is accompanied by outages and delays which has caused many investors to suffer losses or miss investment opportunities. GAO estimates another 8 million new on-line trading

accounts could be opened within a year.

ETrade, one of the biggest online brokerage firms, was recently fined \$20,000 by the brokerage industry's self-policing division for allegedly failing to respond promptly to requests for information related to customers' complaints. The firm was also hit with two class-action lawsuits filed by investors last year after its computers shut down on three separate occasions.

According to the GAO, most brokers don't seem to worry if delays hurt customers.

■ **One-stop shopping for government services coming this fall!** - President Clinton made his first *Saturday Webcast* on June 24<sup>th</sup>. Clinton used the occasion to announce the formation of a new website that permits rapid access to government information and public services. The new site basically lashes the government's 20 thousand different websites together.

Citizens will be able to search any of the half a billion documents offered by the federal government in less than one-quarter of a second from a single free web site called "Firstgov, Your First Click to Digital Government" - a slogan the administration has trademarked.

"I'm pleased to announce several major steps in our efforts to go forward in creating a high-speed, high-tech, user-friendly government," Clinton said.

"When it's complete, Firstgov will serve as a single point of entry to one of the largest, perhaps the most useful collection of web pages in the entire world. Whether you want crucial information in starting a small business, or you want to track your Social Security benefits, you can do it all in one place, 24 hours a day, 7 days a week." <[www.firstgov.gov](http://www.firstgov.gov)> will start operation in 90 days or less.

Clinton said the website will be interactive, permitting the public to send and receive information and to conduct sophisticated transactions on-line. It will be able to handle at least 100 million searches a day. The site will not collect any personal information from citizens.

In addition the White House announced "...a major competition to spur new innovative ideas for how government can serve and connect with our citizens electronically." Awards of up to \$50,000 are being made available to citizens who present the most creative suggestions for advancing e-government.

### AMATEUR RADIO

■ **We received a phone call from a "No code" Technician licensee who obtained his ticket a year ago.** It turns out that back in the fifties, he held a Novice license which had expired "decades" ago. He still had a copy of his old license in his possession. His question to us was, is he now authorized to operate on ten meters and what does he have to do to update his license.

The answer is that he is immediately eligible to operate on the HF portion of the Novice/Technician Class bands and he does not have to do anything. The FCC no longer issues Tech Plus licenses. Section 97.505(a)(5) of the Rules provide permanent Element 1 (5-wpm) credit if a person has ever held a Novice license ...even if it has been expired for decades. Furthermore, he can upgrade to General or Extra without taking another code test.

■ **It looks like computer hacker Kevin Mitnick's career as a "expert analysis" writer is over before it starts!** Mitnick, N6NHG was to write a monthly column for the "Contentville Web" - a new Internet-based magazine scheduled to launch next month. He was to be advanced \$5,000 and paid \$750 per column. Mitnick would also receive 50 percent of the profits from a planned e-book that would include some of his columns.

Mitnick's probation officer said "No!" adding he was enforcing a ban restricting the hacker from consulting or advising on computers or Internet-related activities. Mitnick also can not use modems, software, computers, cellular phones or anything that might give him Internet access.

To avoid using high tech devices, N6NHG planned to write his column on a mechanical typewriter and dictate it over a telephone to his New York editors. Mitnick's probation is over in January. He spent nearly five years in jail for his hacking activities.

■ **It now looks like AMSAT's next-generation Phase 3D amateur radio satellite will not launch until this fall at the earliest.** The actual launch date is still unknown but it is now definite that we will be on Arianespace Ariane 507 (Flight v132) aboard an Ariane 5 heavy-lift launcher. It is manifested as one of two secondary payloads. Liftoff is expected between mid-September and end of October.

PanAmSat Corp., whose PAS-1R Atlantic Ocean geostationary satellite is the primary payload says only that the second quarter launch has been rescheduled for the fourth quarter of 2000.

Phase 3D was previously scheduled to go up in late July. The amateur spacecraft is still sitting in a clean room at the Kourou Spaceport in French Guiana (South America) in its packing case waiting for the launch campaign to start. It cost \$25 thousand to ship the Phase 3D satellite from Orlando, Florida to the launch site.

■ **Amateur radio in China may get a boost in interest.** The IARU is planning to operate a promotional booth at the TELECOM ASIA 2000 exhibition to be hosted by the Government of China in Hong Kong between December 4 and 9. It will be manned by Hong Kong VR2 hams. Asia 2000 is the first such telecommunications event ever hosted by the Peoples Republic of China. Five hundred companies from more than 100 countries are expected to exhibit. The 49 countries of the Asia-Pacific region constitute the world's largest single market for telecommunications products and services. The regional average telephone density is just 6.6 per hundred people ...less than half the world average.

■ **It looks like Europe will support a top manual code speed of 5 words-per-minute.** The EUROCOM Working Group of radio societies across Europe is supporting 5-wpm Morse code amateur license exams as the qualification for full HF band access. Previously, the speed was 12 wpm. We understand that following the EUROCOM vote, the European Conference of Postal and Telecommunications Administrations (CEPT) will adopt 5-wpm as the top speed.

The Deutscher Amateur-Radio Club (DARC) at EUROCOM WG held in Germany successfully proposed a modification to the regulation CEPT TR 61-02, to lower the Morse code examination speed from 12-wpm to 5-wpm. EUROCOM WG delegates supported 5wpm as an interim measure in recognition that the Morse code requirement is likely to be removed at the ITU World Radiocommunication Conference in 2003.

Only the Hungarian Society (Magyar Radioamator Szovetseg MRASZ) remained in support of 12-wpm for CEPT licensing. A modification to the CEPT regulations to implement 5-wpm will result in a virtual worldwide adoption of the lower speed. (Thanks to Jim Linton VK3PC, President, Wireless Institute of Australia, Victoria)

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## UPDATE ON THE STATUS OF LOW POWER FM RADIO

"In creating a low power FM radio service, the FCC has thrown open the doors of opportunity to the smaller, community-oriented broadcaster, and will give hundreds - if not thousands - of new voices access to the nation's airwaves." ...FCC Chairman William E. Kennard.

On January 20, 2000, the FCC adopted rules creating a new, noncommercial low power FM radio (LPFM) service. The new broadcast service will consist of stations with maximum power levels of 10 watts (LP-10) - reaching an area with a radius of between 1 and 2 miles - and 100 watts (LP-100) - reaching an area with a radius of approximately 3½ miles. The 100-watt stations will be authorized first. Once applicants from all states have had the opportunity to apply for 100 watt LPFM licenses, the FCC will open filing windows for 10 watt stations. The FCC decided against licensing 1000 watt (LP-1000) LPFM stations.

Low power FM radio was first requested in petitions filed by two Extra Class ham operators, Nickolaus Leggett N3NL of Reston, Virginia and Rodger Skinner W4FM of Pompano Beach, Florida. Currently, the smallest class of commercial FM radio stations run 6000 watts.

The new LPFM stations would operate throughout the FM broadcast band. The stations will be geographically separated from existing stations on the same (co-channel) channel, the next (first adjacent channel) channel, and the channel two channels away (second adjacent channel). The new stations will not, however, be geographically spaced from stations three channels away (third adjacent channel).

The new LPFM service will be exclusively non-commercial. Only government or non-profit organizations are eligible to apply for an LPFM license and applicants must be based in the community in which they intend to broadcast. In addition, current broadcast licensees or parties with interests in other media - cable or newspapers - will not be eligible for LPFM stations. LPFM stations will be licensed exclusively to local entities for the first two years of license availability. Individuals are also not be eligible to apply for LPFM stations. LPFM licenses will be awarded for eight year, renewable license terms.

A point system is being used to rank applicants that request the same frequency in the same community. Points are awarded for (1.) showing two years prior community presence, (2.) pledging to operate at least 12 hours daily, and for (3.) locally originating at least eight hours of programming daily.

Previously unlicensed (pirate) broadcasters will be disqualified from holding LPFM station licenses unless they certify that they ceased operations when notified of their violation of FCC rules or by February 26, 1999. Unauthorized FM stations that continued illegal broadcasting are ineligible for any broadcast license. Eligible licensees will be subject to the same character qualifications as currently applied to full power licensees.

## NAB's campaign of "disinformation"

Fearing competition, the *National Association of Broadcasters* has been fiercely opposing the establishment of LPFM. NAB has been distributing a compact disc to members of Congress that supposedly demonstrates excessive interference to existing commercial FM radio stations. The FCC's *Office of Engineering and Technology* called the CD demonstration "...misleading disinformation" and "...simply wrong."

The Commission said "The NAB CD was produced by artificially mixing two previously recorded radio signals and is not a demonstration of actual interference between two FM radio stations. ...The NAB 'crosstalk' demonstration simply does not represent actual FM radio performance and therefore is meaningless." The Commission added that the CD "...can only be viewed as a deliberate misrepresentation of the FCC's findings and analysis."

"We believe the Commission took a thorough and indeed conservative approach in designing a low power FM radio service that protects the integrity of the broadcast radio spectrum," FCC said.

## LPFM applications are pouring in...

The filing of applications is being handled in five phases. The FCC has already received 750 Low Power radio Form 318 applications in the first filing window which ended June 8<sup>th</sup>. The FCC Form 318 application has been added to the FCC's Forms page located at <<http://www.fcc.gov/formpage.html>> LPFM applicants may only submit one application for a single frequency.

Among those applying were hundreds of state and local governments as well as community based organizations ...especially churches and schools. A seven page (Acrobat reader) *Applicant's Guide to LPFM* is posted at <<http://www.fcc.gov/mmb/prd/lpfm/lpfmguide.pdf>>.

So far, ten states plus two territories (selected by lottery) have been authorized to submit applications.

In **Group 1** were: Alaska (27 applications have been submitted so far), California (309), District of Columbia (4), Georgia (109), Indiana (73), Louisiana (66), Maine (12), Mariana Islands, Maryland (17), Oklahoma (61), Rhode Island (25) and Utah (19).

The second filing period (**Group 2, Aug. 2000**) will take applications from Connecticut, Illinois, Kansas, Michigan, Minnesota, Mississippi, Nevada, New Hampshire, Puerto Rico, Virginia, and Wyoming.

**Group 3 (Nov. 2000)** includes: American Samoa, Colorado, Delaware, Hawaii, Idaho, Missouri, New York, Ohio, South Carolina, South Dakota and Wisconsin.

**Group 4 (Feb. 2001):** Arizona, Florida, Iowa, New Jersey, North Dakota, Oregon, Tennessee, Texas, U.S. Virgin Islands, Vermont and West Virginia.

**Group 5 (May 2001):** Alabama, Arkansas, Guam, Kentucky, Massachusetts, Montana, Nebraska, New Mexico, North Carolina, Pennsylvania and Washington.