
Science
Technology
Experimentation
We Do That!
...with Amateur Radio
Ham Radio
in the 21st Century

Dreams Begin Here!

Science
Technology
Experimentation

Mixing radios with computers

D-Star, APRS, Winlink2000, PSK and more! Sure your dashboard GPS might tell you where you are. But how about seeing where *other* people are located in real time and sending them messages, email, text or pictures for free as you go along? Hams do that with modern hybrids of radios and computers.

The "Software Revolution" began when computer memory costs dropped and hams were quick to integrate the power of the soundcard into radio communications. With radio's transmitting and the computer's encoding capabilities, digital signals have blossomed around the world to the point where it is hard to tell where the radio stops and computers begin. New "hamware" for Windows, Mac and Linux applications is coming out almost daily.

A Nobel Prize?

K1JT is Joe Taylor. He won The Nobel Prize for his work in radio astronomy. He also has developed the WSJT computer programs allowing burst ham radio communications to ricochet off the trails of meteors.

Careers

"Having the ability to watch the raw packets flow back and forth on the two meter Amateur Band in the AX.25 protocol increased my ability to understand the landline X.25 protocol and other forms of data communications. Another ham, Phil Karn, KA9Q, developed TCP/IP applications. Ham radio is a fun way to experiment and has led to careers for myself and many people in new computer technologies."
— Gary Wilson, IT Manager, K2GW

Discover New Technology

Healing

John Kanzius, K3TUP, had an idea — killing cancer cells with radio waves. This had been tried before with poor results. John's experience in ham radio had taught him that radio energy (RF) can heat objects. But his idea went further. What if the cancer cells were tricked into taking in a metal target *inside* just the tumor cells? John was aware of "nanoparticles." If the tumor cells could be made to take in these metallic bits, and if they could then be heated up with RF, would that kill off the tumor or the patient? Recent university animal testing gave the answer — the tumor was destroyed. Now researchers are following John's lead in exploring a host of life-saving applications.

Green Radio

Larry Barr, K5WLF, has lived "off-grid," so it was only natural that he'd look for ways to combine Renewable Energy sources with Amateur Radio. His "Solar Powered Ham Station" started out in response to a need for an autonomous station to serve as Net Control for bicycle races each year. A generator would do the job, but they're noisy, require refueling and can be a fire hazards. Instead, Larry uses a pair of Uni-Solar US-64 photovoltaic (PV) panels — giving him total independence and truly "wireless" capabilities.

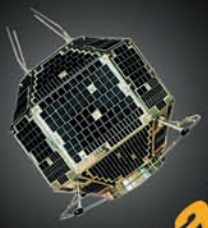
SuitSat was an Amateur Radio installed inside a surplus Russian space suit. It became an independently orbiting ham radio satellite deployed by the crew of the International Space Station. It was so much fun, hams plan to do it again!

SETI - ARGUS

Perhaps the most ambitious microwave SETI project ever undertaken without Government equipment or funding, *Project Argus* is an effort to deploy and coordinate roughly 5,000 small radio telescopes around the world, in an all-sky survey for microwave signals of possible intelligent extra-terrestrial origin. Traditional research grade radio telescopes can view only a small fraction of the sky at a given time. *Project Argus* employs much smaller, Amateur Radio telescopes, built and operated by SETI League members.

Your Amateur Radio license is also your ticket to the **Amateur Satellite Service** worldwide. Over 18,000 hams already use the satellite radios of the service. They communicate with both voice and data into the farthest reaches of the globe with little more than a few watts RF and a handheld antenna.

Today and Tomorrow!



TIME and SPACE

Everyone knows that time is money. But did you know that it's also frequency? Time also varies with the density of gravity. Time and frequency are different ways to look at one of the fundamental dimensions of the universe (to be more precise, the frequency of a radio wave is defined by the number of its cycles per second, and the second is defined by the frequency of a specific atomic interaction — mathematically, time and frequency are inverse measurements of the same thing). While my interest in time and frequency started with the simple desire to be able to measure my ham transmitter's frequency, it led me into nooks and crannies of precise measurement as a hobby in and of itself. I've become a "time-nut."
— John Ackermann, N8UR

SDR Radio — the radio *IS* a computer

A whole new radio is just a download away

Since the beginning of radio itself, signals arrived at antennas and were processed by bits of hardware so that the information they carried could be understood by human beings. Regardless of the design, the common element of every radio was hardware — a technology locked into place and difficult to change. Today's amateurs have entered a new era. They've surpassed many of the limitations of hardware by using *software* instead. They're still sending and receiving signals, but now they're using computers to create "virtual" radios that can change in an instant, operating with any type of signal at the click of a mouse button. This incredible technology is known as ***Software Defined Radio*** and it promises a future that those early experimenters would never have dreamed possible.

Amateur Radio on the International Space Station (ARISS) is a volunteer program which inspires students worldwide to pursue careers in science, technology, engineering and math through Amateur Radio communications opportunities with the International Space Station (ISS) on-orbit crew. ARISS is an international working group, consisting of delegations from nine countries including several countries in Europe as well as Japan, Russia, Canada, and the USA. The organization is run by volunteers from the national amateur radio organizations and the international AMSAT (Radio Amateur Satellite Corporation) organizations from each country.

Satellites, Balloons and the Moon?

Amateur Radio operators were quick to realize that they could ricochet a radio signal through space off a passive reflector. After all, they had been bouncing signals off the ionosphere for decades. Amateurs now bounce signals off large balloons, the ionized trails of meteors, satellites and even the moon itself, with JT65 and MAP65.

Amateur Radio — *Your scientific national resource!*

The Amateur Radio Service frequency bands are *the* place in the usable radio spectrum where you as an individual can develop and experiment with wireless communications. Hams not only can make and modify their own equipment, but can create whole new ways to do things.

You sure can't do that with a cellphone!

Getting Your Own Ham Radio License

There are three levels of Amateur Radio licenses, and getting your first one is not all that hard. Many people pass their FCC exam in a week of spare time study and there are lots of groups and people who will help you.

You can get help from a local club at: **www.arrl.org/findaclub**.

There is even an online, self-teaching course at: **www.arrl.org/cce/courses.html#ec010**.

Costs

In general, you can expect to spend about $40 in books and fees to earn your first license. With another $200 you can purchase your first radio and the gear you will use to get on the air for yourself and start making contacts. Of course good, used equipment is available for less.

Simply stated, ham radio provides the broadest and most powerful wireless communications capability available to any private citizen anywhere in the world.

It's not your Granddaddy's Radio anymore!

ARRL *The national association for AMATEUR RADIO*

What is the ARRL?

Founded in 1914, the American Radio Relay League is the 150,000-member national association for Amateur Radio in the USA. Other countries have their own national associations.

ARRL is the primary source of information about what is going on in ham radio. It provides books, news, support and information for individuals and clubs, special events, all sorts of continuing education classes and other benefits for its members.

Amateur or "ham" radio has been around for a century. In that time, it's grown into a worldwide community of licensed operators using the airwaves with every conceivable means of communications technology. Its practitioners range in age from youngsters to grandparents.

Ham radio attracts those who have never held a microphone as well as the technical expert who grew up with a computer. Even rocket scientists and a rock star or two are in the ham ranks.

Most, however, are just normal folks like you and I who transmit voice, data and pictures through the airwaves, use the Internet, lasers and microwave transmitters, satellites and TV, and even travel to unusual places near and far to make contact.

Where do I start? Go to: www.WeDoThat-radio.org

You can find more information to get started on the Web site or contact the local group listed below: