

Introduction to Amateur Radio

- References:
- <http://www.arrl.org> American Radio Relay League – The National Association for Amateur Radio
- <http://taars.us> The Albemarle Amateur Radio Society
 - Ron Thomas N4WYR n4wyr1@gmail.com

- **Also known as “Ham” Radio**
- **Definition of Ham**
 - *In the late 1800’s, telegraph operators called a poor operator a “ham”*
 - *As communications carried over from wired telegraph to radio, the same people and same terminology carried over*
 - *The term spread to include people who were using radio as a hobby, as opposed to those who were doing it professionally*

Definition 2

- In the 1920's, there was a magazine titled "Home Amateur Magazine" HAM for short**
- They published Do It Yourself projects in many fields**
- They published plans for a homemade receiver and transmitter, and it was called "the HAM Radio" by the people who built it**
- Today, the terms Amateur (formally) and Ham (informally) are used interchangeably for people licensed by the FCC for hobby type communications, as defined in FCC Part 97**



ARRL The national association for
AMATEUR RADIO™

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The Latest News

New Book on Handheld
Transceivers, 2012 Periodicals



ARRL Executive Committee
Approves Resource Grants for



NEW ID-51A

VHF/UHF Dual Band Transceiver

Analog FM and D-STAR

Dualwatch with AM/FM Broadcast Receive

Slim, Compact with Integrated GPS



D-STAR ready

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Who is the Typical Ham?

- Amateur Radio operators come from all walks of life -
- movie stars, missionaries, doctors, students, politicians, truck drivers and even your average neighbor next door. They are of all ages, sexes, income levels and nationalities.
- They say "Hello" to the world in many languages and many ways. Whether they prefer Morse code on an old brass telegraph key, voice communication on a hand-held radio, or computerized messages transmitted via satellite, they all have an interest in what is happening in the world, and they use radio to reach out.

- Anyone you know could be an Amateur Radio Operator, or “Ham” – no matter what age, gender, or physical ability. Wait until you see what you can do with ham radio!
- <http://www.arrl.org/new-to-ham-radio>
- <http://www.arrl.org/public-service>



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Title 47: Telecommunication

PART 97—AMATEUR RADIO SERVICE

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FCC Part 97

- **§ 97.1 Basis and purpose.**
 - **The rules and regulations in this part are designed to provide an amateur radio service having a fundamental purpose as expressed in the following principles:**
 - *(a) Recognition and enhancement of the value of the amateur service to the public as a voluntary noncommercial communication service, particularly with respect to providing emergency communications.*
 - *(b) Continuation and extension of the amateur's proven ability to contribute to the advancement of the radio art.*
 - *(c) Encouragement and improvement of the amateur service through rules which provide for advancing skills in both the communication and technical phases of the art.*

- *(d) Expansion of the existing reservoir within the amateur radio service of trained operators, technicians, and electronics experts.*
- *(e) Continuation and extension of the amateur's unique ability to enhance international goodwill.*

FCC Part 97.113 Prohibited Transmissions

- Business communications on behalf of yourself or your employer
- Music
- Criminal acts
- Obscene or indecent language
- False or deceptive signals
- Broadcasting or one-way communications

Prohibited Uses continued

- Gathering news for commercial radio or TV unless immediate loss of life or property
- Third Party Traffic outside the United States unless an agreement is in place with that country
- Foreign languages or hidden codes unless a plain English text accompanies it

Frequency Bands

- Medium Frequency – 160 Meters
- High Frequency – 80, 40, 30, 20, 17, 15, 12, and 10 Meters
- Very High Frequency – 6, 2, and 1.25 Meters
- Ultra High Frequency – 70cm, 33cm, 23cm
- Microwave
- Frequency in MHz = $300 / \text{wavelength in meters}$
- 300 is speed of light in million meters per second

Modes of Operation

- **Voice**
 - AM
 - FM
 - Single sideband
- **Digital Data**
 - Radio Teletype
 - PSK31
 - Packet
- **Morse Code (CW or Continuous Wave)**

Various Facets of Ham Radio

- Communicate from your home
- Your car
- Portable such as camping
- Emergency Communications during natural or man made disasters
- Casual conversation
- Contesting
- Awards Chasing

Area Clubs

- From Virginia Beach Amateur Radio Club
- <http://www.w4ug.com/links.htm>

	<u>Virginia DX Century Club</u> We are a specialty amateur radio club that specializes in distance communication or DX. Our premise is to make contacts with all Countries listed throughout the world by the International Amateur Radio Union and its various country organizations. Contacts are made via two way radio frequency transmissions on authorized amateur radio bands. To learn more about amateur radio please go to the Amateur Radio Relay League or ARRL.
	<u>QCWA Chapter 119</u> The 2008 QCWA National Convention will be held October 3rd thru the 5th in Virginia Beach at the waterfront landmark and hotel, The Cavalier. Surf to this site for all the latest info!
	<u>USS Wisconsin Radio Club</u> The purpose of the USS Wisconsin Radio Club is to promote public interest in the Battleship USS WISCONSIN, BB-64, the United States Navy, Nauticus National Maritime Center, the Hampton Roads Naval Museum and Norfolk, Virginia. We serve as volunteer Goodwill Ambassadors for the Tidewater community. We strive to display our wonderful hobby, Amateur Radio, to the public in a favorable way and to help educate young people about Radio Communication and its usefulness to the Navy. By means of "Ham Radio" many persons throughout the United States and the world will learn about the presence of this great ship in our Historic Seaport. Our services are provided without charge.
	<u>Chesapeake Amateur Radio Service</u> The Chesapeake Amateur Radio Service was started in 1979 with approximately 12 charter members. The club continues to have a group of operators dedicated to provide SKYWARN and emergency communication services and educational opportunities to citizens of the City of Chesapeake and the South Hampton Roads community.
	<u>Portsmouth Amateur Radio Club</u> Club Meeting Fourth Thursday of each month @ 7:30 p.m. Churchland Baptist Church, 3031 Churchland Blvd, Chesapeake VA. Founded 1922.
	<u>Radio Amateur Society of Norfolk</u> The Radio Amateur Society of Norfolk (RASON) is dedicated to the hobby as well as its members. The society was created to instill the ideals and principles of ham radio. Even if you do not have an amateur radio license, we have a place for you. Whatever your favorite aspect of amateur radio is, whether it is Morse code, HF, single sideband, public service, or even emergency communications, we have a home for you.
	<u>Western Tidewater Radio Association</u> We are a non-profit amateur "ham" radio club based in Smithfield Virginia. Amateur Radio is a friendly, high-tech hobby that's got something fun for everyone!
	<u>The Albemarle Amateur Radio Society</u> TAARS meetings are held the 3rd Thursday of the month at the College of the Albemarle in Elizabeth City NC building "C" at 1930 local time. Before the meeting we have dinner at the Golden Corral in Elizabeth City at 1800 local time. Visitors are always welcome! TAARS participates in Field Day each June and always places respectably in our class. Check out the Field Day Page for more information. Visitors are welcome, including prospective new Hams and Hams visiting the area.



Virginia Beach Hamfest - held in mid September of every year.



Wakefield SKYWARN

The Wakefield SKYWARN Amateur Radio Support Team exists to help facilitate communication between Trained SKYWARN Spotters in the amateur radio community and the National Weather Service Forecast Office in Wakefield, Virginia.

The efficient collection of severe weather reports via amateur radio frees critical NWS staff from answering phones and allows them to focus on assessing weather scenarios and issuing appropriate warnings while still receiving necessary reports from Spotters in the field.

The Wakefield SKYWARN Amateur Radio Support Team exists to maintain and staff the amateur radio station at the National Weather Service Forecast Office, call sign WX4AKQ. The Team also continually works to grow and support a number of Trained Skywarn Net Control Stations who can run local subnets remotely and Trained Responders who can quickly and effectively operate WX4AKQ inside the Forecast Office.



K4AMG Memorial Amateur Radio Club

K4AMG Mission & Vision...

To provide amateur radio equipment to students who have studied and passed the Technician License Exam while enrolled in the WFOS broadcast radio class at the Chesapeake Center for Science and Technology.

This site is dedicated to honoring the memory of Robert G. Siff (Uncle Bob) 1919-2006.

Uncle Bob was a family man and US Navy veteran. He was an electronics enthusiast, businessman and innovator. Bob was involved in every aspect of ham radio. One of the founders of the Dayton Hamvention, the Sarasota Emergency Radio Club, the Sarasote power Squadron and the QCWA.

Uncle Bob was a political activist and supporter of the Sarasota Senior Center. His memory will live on through those that knew him and those that share his ideals.



Tidewater Wireless W4VB

W4VB serves the Amateur Radio Community of Southeastern Virginia, including the cities of Norfolk, Hampton, Portsmouth, Chesapeake, Suffolk, Newport News, and Virginia Beach.

Field Day

- A fun emergency preparedness drill and contest
- Last full weekend in June, 2 PM Saturday through 2 PM Sunday
- Portable stations and antennas
- Generator power
- Contact as many ARRL Sections as possible using voice, CW, or digital modes

- ARRL Section is usually a state, but some states have more than one, such as EPA and WPA in Pennsylvania
- Exchange your station call sign, Section name, and a two digit code
 - Examples 1D is a single person from home
 - 3A is three stations operating outdoors using emergency power

- TAARS usually operates 3A at Northeastern High School in Elizabeth City, under the football bleachers
- We include a family picnic Saturday evening
- Open to the public (we get extra points for that)

- **Three Classes of License, each with its own privileges**
 - **Technician, General, Amateur Extra**
 - **Three additional classes no longer issued – Novice, Technician Plus HF, and Advanced**
 - **\$15 Exam Fee – entitles you to take 1 each of the three exams**

- **All three exams must be passed to receive the Amateur Extra license**
- **The Technician and General exams are 35 questions, the Amateur Extra exam is 50 questions**
- **The subject material is divided up into 35 or 50 topics, with 5 to 10 questions on each topic in the question pool. The exam will contain 1 question from each topic.**

US Amateur Radio Bands

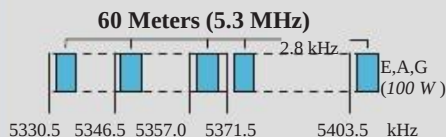
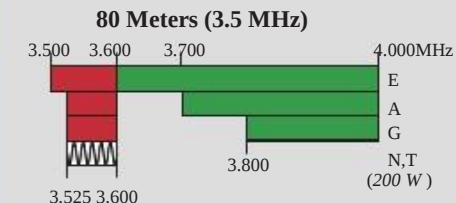
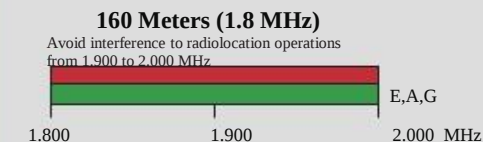
US AMATEUR POWER LIMITS

FCC 97.313 An amateur station must use the minimum transmitter power necessary to carry out the desired communications. (b) No station may transmit with a transmitter power exceeding 1.5 kW PEP.

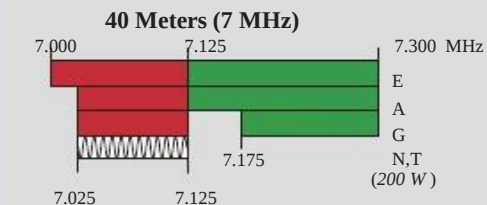
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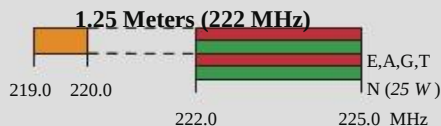
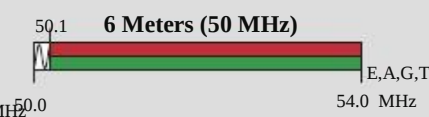
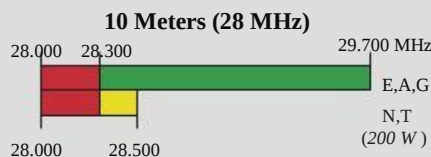
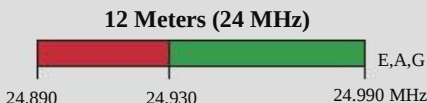
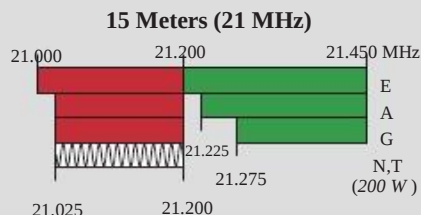
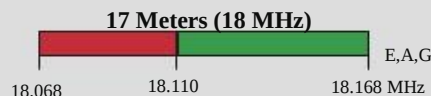
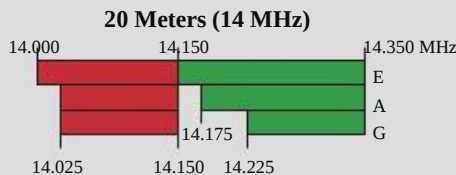
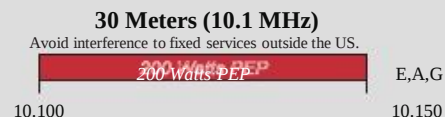
225 Main Street, Newington, CT USA 06111-1494



General, Advanced, and Amateur Extra licensees may operate on these five channels on a secondary basis with a maximum effective radiated output of 100 W PEP. Permitted operating modes include upper sideband voice (USB), CW, RTTY, PSK31 and other digital modes such as PACTOR III as defined by the FCC Report and Order of November 18, 2011. USB is limited to 2.8 kHz centered on 5332, 5348, 5358.5, 5373 and 5405 kHz. CW and digital emissions must be centered 1.5 kHz above the channel frequencies indicated above. Only one signal at a time is permitted on any channel.



Phone and Image modes are permitted between 7.075 and 7.100 MHz for FCC licensed stations in ITU Regions 1 and 3 and by FCC licensed stations in ITU Region 2 West of 130 degrees West longitude or South of 20 degrees North latitude. See Sections 97.305(c) and 97.307(f)(11). Novice and Technician licensees outside ITU Region 2 may use CW only between 7.025 and 7.075 MHz and between 7.100 and 7.125 MHz. 7.200 to 7.300 MHz is not available outside ITU Region 2. See Section 97.301(e). These exemptions do not apply to stations in the continental US.



*Geographical and power restrictions may apply to all bands above 420 MHz. See *The ARRL Operating Manual* for information about your area.



All licensees except Novices are authorized all modes on the following frequencies:

2300-2310 MHz	10.0-10.5 GHz *	122.25-123.0 GHz
2390-2450 MHz	24.0-24.25 GHz	134-141 GHz
3300-3500 MHz	47.0-47.2 GHz	241-250 GHz
5650-5925 MHz	76.0-81.0 GHz	All above 275 GHz

* No pulse emissions

KEY

Note:

CW operation is permitted throughout all amateur bands.

MCW is authorized above 50.1 MHz, except for 144.0-144.1 and 219-220 MHz.

Test transmissions are authorized above 51 MHz, except for 219-220 MHz

- = RTTY and data
- = phone and image
- = CW only
- = SSB phone
- = USB phone, CW, RTTY, and data
- = Fixed digital message forwarding systems only

E = Amateur Extra
A = Advanced
G = General
T = Technician
N = Novice

See *ARRL Web* at www.arrl.org for detailed band plans.

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Toll-Free 1-800-326-3942 (860-594-0355)
email: newham@arrl.org

Exams: 860-594-0300 email: vec@arrl.org

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2 Meter FM

- Technician class license or better required
- Local communications
- Person to person communications have a range of a few miles
- Repeaters can extend the range by rebroadcasting the signal
- A repeater receives on one frequency and retransmits simultaneously on another

- The Elizabeth City Repeater transmits on 146.655 and receives on 146.055
- All the radios communicating through it do the opposite
- Range from Edenton to the south and Great Bridge to the north
- Columbia is on 146.835 -.600
- Virginia Beach is on 146.970 -.600
- They both have wider coverage than E. City

Repeater Linking

- Seven area repeaters can be linked by pressing a 2 or 3 digit Touch Tone code
- <http://taars.us/cera/covlink.htm>
- For example, when using the Elizabeth City repeater, press 351 and you will be simultaneously on the Greenville repeater

http://taars.us



TAARS

The Albemarle Amateur Radio Society

It's Wednesday, January 9, 2013 and the time is 17:11:38 UTC

"Promoting the hobby of Ham Radio as well as providing a service to our community"

NEW! If RED

Solar-Terrestrial Data - http://www.n0nbh.com									
09 Jan 2013 1638 GMT		VHF Conditions		HF Conditions					
SFI	150	SN	144	Item	Status	Band	Day	Night	
A	3	K	1	PIntry					
X-Ray	C3.0			Aurora	Band Closed	80m-40m	Fair	Good	
304A	171.6	@ SEM		6m EsEU	Band Closed	30m-20m	Fair	Good	
PIn Flx	0.12			4m EsEU	Band Closed	17m-15m	Good	Good	
E1c Flx	10.50			2m EsEU	Band Closed	12m-10m	Good	Poor	
Aurora	3	/n=0.99		2m EsNR	Band Closed	Geomag Field	VR	QUIET	
Aur Lat	65.6°			EHE Deg	Very Poor	Sig Noise Lvl	S0-S1		
Bz	-0.9	SW	340.6	MUF	ES - SEASON BREAK	MUF US Boulder	9.30		
				MS	METEOR SYSTEM OFFLINE				

Welcome to the home page of The Albemarle Area Amateur Radio Society, located in Elizabeth City, Pasquotank County, North Carolina. We are an active group of hams from several counties in northeastern North Carolina with an interest in all facets of ham radio. We come from all walks of life and are bonded by a mutual love for ham radio. TAARS members' interests range from antennas to amplifiers, from traffic nets to DX ragchewing, computers to vacuum tubes...and the list goes on. Our monthly meetings are short and informal, with educational and "show-and-tell" sessions on a regular basis.

Field Day is the highlight of our activities for the year. While we don't necessarily always score high up there on the QST listings, we have oodles of fun and offer some of the finest culinary presentations in this part of the state!

Our motto, "Promoting the hobby of Ham Radio as well as providing a service to our community" is not a hollow phrase. TAARS members give of their time several times a year to provide communications and sweat to local organizations in the public good.

To find out more about us, click on "Club Info". And if you would like to make a comment, suggestion, complaint, etc., click on "Webmechanic".

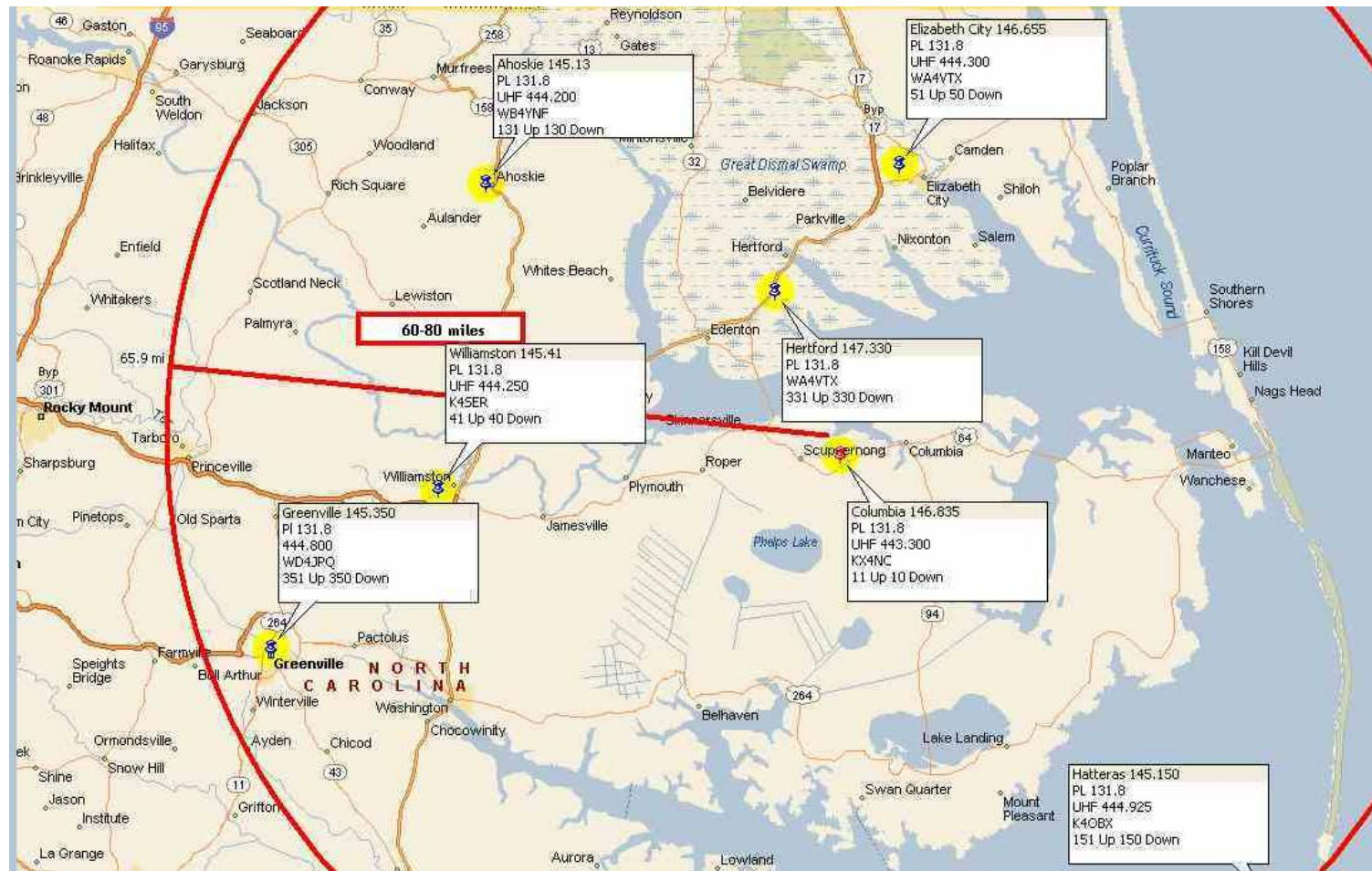
Thanks for stopping by. *GL es 73...*

You are visitor number **14508** since 12/10/2004

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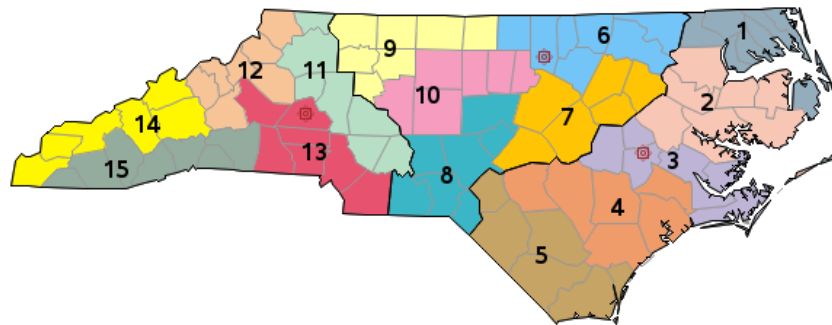
Public Service

- ARES – Amateur Radio Emergency Service
- Organized at the National, State, and County level
- <http://www.ncarri.org/ares>
- Eight counties in northeast NC form Area 1

<http://www.ncarri.org/ares>

North Carolina Emergency Management Areas

State of NC and ARES



Hover over county for name, branch, and division.
Click county to go to ARES County EC.
Click bullseye for map to Branch Office.

Eastern Branch		Central Branch		Western Branch	
ARES	NC Emergency Management	ARES	NC Emergency Management	ARES	NC Emergency Management
ASEC: Vacant	Dianne Curtis	ASEC: Steve Misel K4WEB	Joe Wright	ASEC: Paul Robinette KD4OZ	Mike Cook
Area 1	Champion Cox , K2IUN	Area 6	Thomas Hillary, KG4EDY	Area 11	Gary H. Lang, K4GHL
Area 2	Bill Dawson, WA4SLC	Area 7	Vacant	Area 12	Bob Rodgers, KC4TVO
Area 3	Vacant	Area 8	Rhett Isley, KB4HG	Area 13	Ben Melvin, KM4C
Area 4	Vacant	Area 9	Dal Williams, W4YQY	Area 14	Tommy Queen, K4BNP
Area 5	Vacant	Area 10	Dwayne Ayers, N4MIO	Area 15	H.C. "Duke" Knief, W4DK
	Paula Brown		Ricky Tuttle		Danny Gee

- Champion Cox K2IUN is Area 1 Coordinator
- County Coordinators
 - Kerry Krauss KD4CEB Camden (and Pasquotank)
 - Stanley Griggs KD4ATK Currituck
 - Tom Ponte WB1CZX Perquimans

- TAARS is affiliated with Camden, Pasquotank and Perquimans Counties
- In an emergency, we would man the 911 Center in Elizabeth City and any shelters that may be open
- Our job is to communicate with our counterparts in other locations
- FEMA classes IS-100, IS-200, IS-700, IS-800b are required

Skywarn

- Communication in conjunction with amateurs at NWS (National Weather Service) offices
- Activated during weather emergencies – tornadoes, severe thunderstorms, hurricanes, snowstorms
- Members are required to take weather identification classes
- <http://www.skywarn.org>

APRS

- Automatic Packet Reporting System
- <http://www.aprs.org/aprs.html>
- <http://www.aprs.fi>
- <http://www.findu.com>
- Frequency of 144.390
- Packetized digital information, transmits position, other info, and messages

Typical Mobile setup

- 2 meter radio tuned to 144.390
- A dedicated modem preprogrammed with APRS software
- A GPS that interfaces into the modem

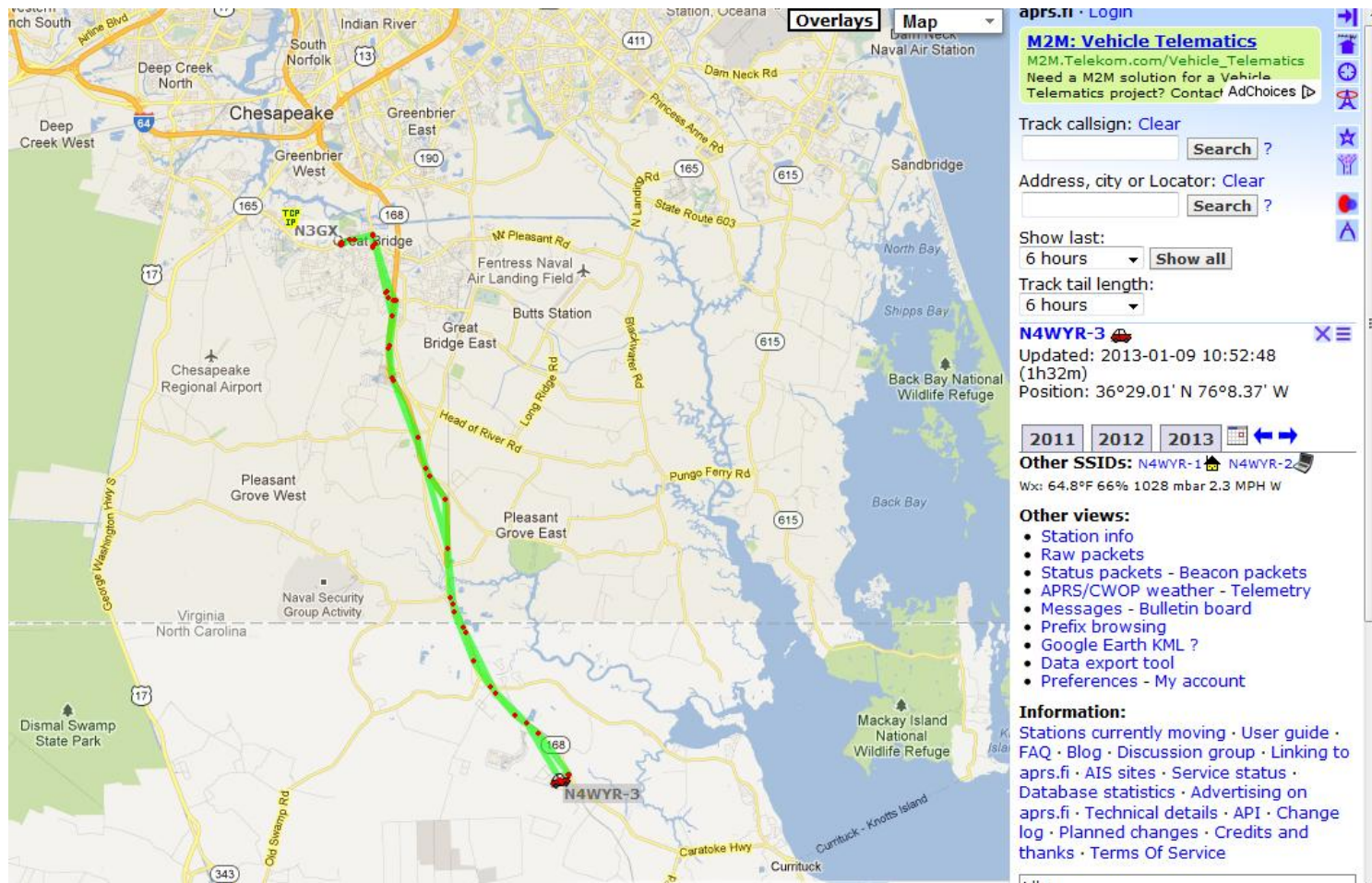
Typical Fixed Station Setup

- 2 meter radio tuned to 144.390
- APRS modem
- Computer connected to the internet
- APRS mapping software
- The radio and modem are optional

Digipeaters

- APRS Digipeaters (digital repeater) stores a message and rebroadcasts it a few seconds later
- Generally a home or club station with a high antenna for good coverage, and internet access
- Internet data is not rebroadcast over RF unless it contains a message for a station known to be in its coverage area

http://www.aprs.fi



2 Meter Equipment

- Hand Held Radios using rechargeable batteries or AA alkaline batteries
- Power level of $\frac{1}{2}$ to 5 watts
- Mobile radios using 12 VDC and a power level of up to 50, or in some cases 75 watts
- Frequencies are channelized
- Price ranges from around \$100 to over \$1000
- 70cm band can also be used, dual band equipment is available

Internet Modes

- Echolink can link 2 meter amateur through the internet
- Enter a Touch Tone code from your radio
- A code to activate the system and a code for where you want your signal to be heard
- You can also enter the system directly from a computer with a password

HF Communication

- Long distance communication when internet is not available
- General class license or better is required
- Communications can be voice (SSB Single Side Band) or digital
- There are many digital modes using the computer sound card as a modem
- Some digital modes have built in error detection and correction
- Digital offers the sending of long and detailed messages

HF Nets

- There are regularly scheduled networks on various frequencies
- Tar Heel Emergency Net meets nightly at 7:30 P.M. local time
- <http://www.ncarri.org/nets/THEN/index.html>
- Frequencies of 3923 KHz (80 meters) and 7232 KHz (40 meters)
- These times and frequencies cover the entire state and more

HF Equipment

- Core bands are 80, 40, 20, 15, 10 meters
- Equipment made in the past 25 years should also have 30, 17, and 12 meters WARC 79
- Most radios today also have 160 meters and 6 meters
- Some may have VHF and UHF bands
- Cost ranges from a few hundred dollars to over \$10,000

- The most common power level is 100 watts
- A 12 volt deep cycle battery can be used
- Or an AC power supply capable of 22 amps at 12 VDC
- On most mode – frequency combinations, 1500 watts is legal, but rarely necessary
- Many digital communication modes are intended for around 25 watts

Antennas

- For hand held radios, the “rubber duck” antenna that comes with it is often sufficient
- Mobile antennas are a few feet long at VHF
- At HF, vertical antenna around 35 feet in length
- Or a horizontal wire 130 feet long and 50 feet up
- There are dozens of styles and sizes available

Equipment Availability

- Used equipment on Craigslist or Ebay
- Hamfests – Flea Markets – dealers and private sales
 - Raleigh, Virginia Beach, Charlotte
 - Many smaller ones
- Ham Radio Outlet
- Amateur Electronic Supply
- MFJ Enterprises
- Radio Works – local in Portsmouth
- Many others