Band Plan for the Amateur Radio in Bangladesh

Sahebul Karim Student ID: 05310003

Fahmida Wadud Chaity Student ID: 06310052

Department of Computer Science and Engineering

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BRAC University, Dhaka, Bangladesh

DECLARATION

I hereby declare that this thesis is based on the research of our self. Materials of work found by other researcher are mentioned by reference. This thesis, neither in whole nor in part, has been previously submitted for any degree.

Signature of
Supervisor

Sadia Hamid Kazi

Signature of
Author

Sahebul Karim
ID: 05310003

Fahmida Wadud Chaity
ID: 06310052
Call Sign: S21OC

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Abstract

A band plan is a plan for utilizing a particular band of radio frequencies that are a portion of the electromagnetic spectrum. Each band plan defines the frequency range to be included, how channels are to be defined, and what will be carried on those channels. An Amateur Radio Band Plan is an arrangement of how to use radio frequencies.

Amateur radio frequency allocation is done by national telecommunications authorities, in our case, it should have been done by Bangladesh Telecommunication Regulatory Commission. Globally, the ITU oversees how much radio spectrum is set aside for amateur radio transmissions.
In 2001 the National Frequency Allocation Plan was made and adopted in 2004 by BTRC. The commission allocated HF and VHF, UHF frequency range for HAM, but merely specified any details.

Radio amateurs use a variety of transmission modes, including Morse code, radioteletype, data, and voice. Specific frequency allocations are a matter of record and vary from country to country and between ITU regions as specified in the current ITU HF frequency allocations for amateur radio.

In our thesis we are aiming to come up with the band plan for amateur radio in Bangladesh. The proposal contains the distribution of amateur frequency to set the first such footing towards an effective utilization of the allocated frequencies. The proposed band plan is in accordance with the National Frequency Allocation Plan (NFAP) of Bangladesh, compatible with International Amateur Radio Union Region 3 (IARU R3) countries and it is done after taking consideration of our technology and resource.

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Introduction

Amateur Radio

Amateur Radio or Ham Radio is a community of people that use Radio transmitters and receivers to communicate with other Amateur Radio Operators. It is a non-commercial, non-profit Radio service. HAM emerged to be a friendly, hi-tech hobby, now being enjoyed by about 3 million (Latest statistics?) people all over the world.

Hams can communicate from the top of a mountain, from home or behind the wheel of their car. They can take their radio wherever they go! In times of disaster, when regular communications Channels fail, hams can swing into action assisting emergency efforts and working with public service agencies. At other times, they can talk to a shuttle astronauts or bounce signals off the Moon. They can use Telegraphy, Voice, Digital Data, even images in communication with other hams [1].

Ham started as a talented hobby and a personal means of enjoyment with the radio communication technology. Later it turned out to be something very serious in the field of emergency communication and research activities.

People make friends over radios from one corner of the globe to other. For becoming an amateur radio operator, one does not need to be a technical person. Anyone can have this hobby and affiliation. One just needs to get a license and a call sign to operate a wireless radio. Every Amateur Radio station around the world has its own call sign, which is a set of alphabets and numbers and is unique worldwide. The person who operates the station is called a HAM [1] [13].

History of Amateur Radio

It will not be exaggerated if it is said that, Main research on today's modern radio communication has been started by Amateur Radio. Though Bengali scientist Sir Jagadis Chandra Bose had started research on radio technology but in the year of 1901 Guglielmo Marconi has proved that it is possible to send message or data from one place to another on Spark Gaps within the air. At that time some other people started to research on the radio technology and they had started to make this kind of radios to communicate among themselves. Finally, they declared themselves as Amateur Radio Operators. These stations operated at Low Frequency at that time.
Gradually, after understanding the importance of Radio Communication different broadcasting stations started operating. They started broadcasting on Lower Frequencies. For that reason Amateur Radio Operators leave that frequency and begin to research with HF (High Frequency) for sending the radio signals to more distances. Presently the

speedy telecommunication is running around the world is totally dependent on the Satellites. Before the satellite age, HF SSB (High Frequency Single Side Band) was the only telecommunication media that was being used world wide for voice communication. They use HF SSB for voice communication to cover a distance of thousands miles. This HF SSB modulation technique is the great success of Amateur Radio Operators. Till now and forever this is the only modulation technique that does not need any third party object except ionosphere. With the development of radio communication, some Govt. Radio broadcasting company has started broadcast by the year 1912. During that time it needed to establish some rules and regulation with license. At the beginning of 1914, Mr. Hiram M Maxim gathered all Amateur Radio Operators together and established American Radio Relay League (ARRL) for running the Amateur Radio Activities smoothly. That is the world's largest Amateur Radio association. Presently International Telecommunication Union (ITU) and International Amateur Radio Union (IARU) have assigned some frequencies exclusively for Amateur Radio between 1800 KHz to 23 GHz [1] [21].

Amateur Radio Operators known as HAM

The word "HAM" as applied to 1908 was the station CALL of the first amateur wireless station operated by some amateurs of the Harvard Radio Club. They were ALBERT S. HYMAN, BOB ALMY and POOGIE MURRAY. At first they called their station "HYMAN-ALMY-MURRAY". Early in 1901 some confusion resulted between signal from amateur wireless station "HY-ALMU" and a Mexican ship named "HYALMO". They then decided to use only the first letter of each name and the station CALL became "HAM". Nation-wide publicity associated station "HAM" with amateur radio operators. From that day to this, and probably until the end of time in radio; and amateur is a "HAM" [1] [21].

Purposes of HAM

The main purpose of Amateur Radio is research and recreation. The reason behind calling it "Amateur Radio Service" because it also has a serious representation. The Government introduced this "Service" to fill up the need for a pool of experts who could provide backup emergency communication service.
Additionally, the Government acknowledged the ability of Amateur Radio operators to advance communication and technical skills, and to enhance international goodwill. A HAM needs to be Considerate, Loyal, Friendly, Balanced and Patriotic. Because Radio signals do not know territorial boundaries; Every HAM has a unique opportunity and scope to enhance international goodwill. This philosophy has paid off.

Countless lives have been saved where skilled hobbyists acted as emergency communicators to render aid, whether it is during or following a hurricane, tornado, ice storm, earthquake or some other disasters. Proper identification and recognition of operating capabilities and technical proficiency of amateur radio operators have been required in Bangladesh since 1991. [1]

Benefits of being a HAM

1. When a Radio Amateur talks to other HAM of different countries by his radio then naturally he is making many friends around the globe.

2. Generally English is the medium of speaking with a HAM Radio, so for the people of Bangladesh this is a great opportunity to increase the fluency in English.

3. The friends who want to be an electronics expert and want to take it as a profession, they can get direct help from Amateur Radio.

4. Not only with the friends, but also one can talk with family members. For example, if somebody lives in Australia and his/her family live in Bangladesh, and if the person and his/her parents are HAM and both have the HF Radio then they can talk free of cost for unlimited time.

5. Being HAM is a great chance for students to do group discussion about any subject of study.

6. HAM can participate in any natural disaster of country to save people and help people with Radio. Hams can even help other Emergency Service related organization like “Red Cross”, “Fire Service” etc.

7. Ham can use the radio as data transmission device from one PC to another PC. They can do experiments with different protocols and modulations.

8. Also there are many HAM Radio related Satellite in the sky, if anyone wants s/he can experiments through these satellites.

9. After passing the exam and getting the license and call sign you can talk using the “Club Station” Radio without purchasing a new Radio. [1]

Call signs

Each Amateur Radio Station has its own unique Call sign (Name) Allocated by the authorities, for examples, BTRC approves and allots call sing for hams in Bangladesh. The unique Callsign allows one to identify the Person (Station), for example the callsign of Late Prime Minister of India Mr. Rajib Gandhi was 'VU2RG' where "VU" stands for India, "2" Stands for Grade I and "RG" for Rajib Gandhi. The callsign is Universal Identifier and is Unique [9] [21].

Licensing

In Bangladesh the licensing authority for Radio Communication is Bangladesh Telecommunication Regulatory Commission (BTRC) conduct the test for HAM licensing. After passing the exam one gets call sign with license which means it's a get through to use radio transceivers. The renewal cost is TK 100 each year [9].

Activities and practices

Radio amateurs use various modes of transmission to communicate. Voice transmissions are most common, with some such as frequency modulation (FM) offering high quality audio, and others such as single sideband (SSB) offering more reliable communications when signals are marginal and bandwidth is restricted.

Radiotelegraphy using Morse code is an activity dating to the earliest days of radio. Technology has moved past the use of telegraphy in nearly all other communications, and a code test is no longer part of most national licensing exams for amateur radio. BTRC has also recently excluded the Morse code from the licensing exam.

Many amateur radio operators continue to make use of the mode, particularly on the shortwave bands and for experimental work such as earth-moon-earth communication, with its inherent signal-to-noise ratio advantages. [11]

Ham Tech over time

Morse, using internationally agreed code groups, allows communications between amateurs who speak different languages. It is also popular with homebrewers as CW-only transmitters are simpler to construct. A similar "legacy" mode popular with home constructors is amplitude modulation (AM), pursued by many vintage amateur radio enthusiasts and aficionados of vacuum tube technology. For many years, demonstrating a proficiency in Morse code was a requirement to obtain amateur licenses for the high frequency bands (frequencies below 30 MHz), but following changes in international regulations in 2003, countries are no longer required to demand proficiency. As an example, the United States Federal Communications Commission phased out this requirement for all license classes on February 23, 2007. Modern personal computers have encouraged the use of digital modes such as radioteletype (RTTY), which previously required cumbersome mechanical equipment. Hams led the development of packet radio, which has employed protocols such as TCP/IP since the 1970s. Specialized digital modes such as PSK31 allow real-time, low-power communications on the shortwave bands. Echolink using Voice over IP technology has enabled amateurs to communicate through local Internet-connected repeaters and radio nodes, while IRLP has allowed the linking of repeaters to provide greater coverage area. Automatic link

establishment (ALE) has enabled continuous amateur radio networks to operate on the high frequency bands with global coverage. Other modes, such as FSK441 using software such as WSJT, are used for weak signal modes including meteor scatter and moonbounce communications.

Fast scan amateur television has gained popularity as hobbyists adapt inexpensive consumer video electronics like camcorders and video cards in home computers. Because of the wide bandwidth and stable signals required, amateur television is typically found in the 70 cm (420 MHz–450 MHz) frequency range, though there is also limited use on 33 cm (902 MHz–928 MHz), 23 cm (1240 MHz–1300 MHz) and higher. These requirements also effectively limit the signal range to between 20 and 60 miles (30 km–100 km), however, the use of linked repeater systems can allow transmissions across hundreds of miles.

These repeaters, or automated relay stations, are used on VHF and higher frequencies to increase signal range. Repeaters are usually located on top of a mountain, hill or tall building, and allow operators to communicate over hundreds of square miles using a low power hand-held transceiver. Repeaters can also be linked together by use of other amateur radio bands, landline or the Internet.

Communication satellites called OSCARs (Orbiting Satellite Carrying Amateur Radio) can be accessed, some using a hand-held transceiver (HT) with a stock "rubber duck" antenna. Hams also use the moon, the aurora borealis, and the ionized trails of meteors as reflectors of radio waves. Hams are also often able to make contact with the International Space Station (ISS), as many astronauts and cosmonauts are licensed as Amateur Radio Operators.

Amateur radio operators use their amateur radio station to make contacts with individual hams as well as participating in round table discussion groups or "rag chew sessions" on the air. Some join in regularly scheduled on-air meetings with other amateur radio operators, called "Nets" (as in "networks") which are moderated by a station referred to as "Net Control". Nets can allow operators to learn procedures for emergencies, be an informal round table or be topical, covering specific interests shared by a group. [20]

Amateur Radio Aspects

BANDS	**HF, VHF, UHF (and Microwave)**
SPECIAL	**Repeaters, Internet Lin ks, Packet/UIView, DX Cluster, RAYNET and Satellites/ISS**
MODES	**Voice, Morse, Data/Packet, SlowScan TV**
MODULATION	**CW, AM, SSB, FM, FSK, PSK31 etc**

Amateur Radio often refer to their bands in terms of either wavelength or frequency.

Bands may be described as:

HF: 3-30 MHz	**7MHz = 40m**	**10MHz = 30m**	**29MHz = 10m**

VHF:30-300 MHz	**50MHz = 6m**	**145MHz = 2m**

UHF: >300 MHz	**430MHz = 70cms**

The Amateur Radio Equipment

Around the world there are millions of HAMs using different types of radio. They always use the frequencies allocated by the International Telecommunication Union (ITU). Generally to communicate in short distance say within 10 to 50 kilometer you need to use VHF frequency. For that you need a VHF Walkie-Talkie. You can easily take it in your hand. You can get a VHF Walkie-Talkie for around 7,000 to 10,000 Taka. To communicate around the world you need to use HF band, for this you need a HF Radio. HF Radios are quite expensive starting from 25,000 to 80,000 Taka. There are several companies make these radios, like ALINCO, YAESU, KENWOOD, MOTOROLLA, and ICOM etc. [22]

An Amateur Radio Station Setup

To setup a basing Amateur Radio Station, all you need an Amateur band Transceiver (transmitter & receiver), a power supply unit, an antenna system and a Logbook. Optional stations accessories e.g. SWR meter, Antenna tuner, Rotator, Clocks, Temperature monitors etc. can be used to enhance your operational environment. The simplest type of antenna used is a wire dipole antenna. One can use Beam antenna (Yagi & Log periodic arrays), Quad antenna, Loop antenna, and Vertical antenna to boost up the signal quality. [23]

Uses of amateur radio

1. During any natural disaster, Amateur Radio operators set up and operate organized local and long-distance communication, as backup of the Government and emergency official communication system, as well as non-commercial communication for private citizens affected from the disasters. Amateur Radio operators are most likely to be active after disasters that damage regular lines of communication due to power outages and/or destruction of the telephone infrastructure.

2. Talk around the world - With HF radios hams can talk to other hams in literally any part of the globe. They can talk from the top of the mountain to deep sea.

3. Talk around town - With small portable VHF and UHF transceivers hams enjoy extremely reliable communications within their local community. They can talk with a minimum range of 20 Kilo Meters up to 500 Kilo Meters by using multiple repeaters.

4. QRP - Communicating with "very low power" is a challenge that many hams enjoy. QRP is usually practiced on the HF bands.

5. Packet Radio - Ham radio operators enjoy a digital network of their own, all without wires!

6. Amateur Television - It's just like real television because it is real television. Slow Scan TV Send pictures around the world for little or no cost.

7. Contests - They can put their radio operating skills up against other hams and teams of hams.

8. Hopefully they will use their radio less for calling the fireman, the police, and emergency road-side assistance, 911 and other telephone-linked services.

9. Emergency and other volunteer services - Floods, hurricanes, mudslides, earthquakes, ice storms ... when ever normal communications go out, hams are ready to use their radios to provide emergency communication services to their communities.

10. Satellite Communications - Hams have their own satellites. Amateur's satellites are easy to Use. Even Hams can talk with the astronauts of ISS (International Space Station or Alpha Station) and they used to talk with MIR station on the space.

11. Emergency Traffic Handling - "Ham Telegrams" are used to send messages to people around the world at no cost to the sender or the recipient; all done by ham radio operators Volunteering their time and resources.

12. Emergency Medical Support - Ham Medical Team formed with some Doctors who are HAM. This kind of team work on any natural disaster and urban incident.

Prohibited Transmissions in Amateur Radio

There are some specific things one can not do on the Amateur Band. [2]
1. Accepting direct & indirect payments for operating an Amateur Station.
2. Broadcasting.
3. Political discussions.
4. Transmitting Music.
5. Aiding Criminal Activities.
6. Transmitting Code and Cipher.
7. Engaging in Obscenity, Profanity and Indecency

Communication Modes used by Ham

HF Communication (High Frequency - Voice)

In this mode of communication, one can communicate with any ham around the world by using their HF Sets. It is possible talking to a station in USA or a station in Alaska or a station in Japan, anywhere in the world without any problem without any Cost (No Airtime expect for the initial cost of the equipment) for hours to exchange information. This is the most popular and widely used mode of communication.

VHF Mobile Communication (Very High Frequency)

This mode of communication is very similar to the Mobile Telephones but with a difference, here there is no air time, one can carry VHF Handy (Mobile Set) and communicate with any ham in a radius of about 50 Kilo Meters. It is possible to communicate with far off stations with the help of Ham Repeaters. It is also possible to carry the VHF handy set while traveling and keep in touch with other hams from car. [15]

Satellite Communication

Ham Radio around the world is so popular that Hams have their own satellite network, they are known as 'OSCAR' (Orbiting Satellite Carrying Amateur Radio). Hams have as many as 44 Oscars at their disposal. Hams communicate globally with the help of this satellite, for example, one can communicate with a station in Japan with your hand Set even if you are Mobile in your Vehicle. Hams have also been communicating with the MIR Space Station on regular basis. The International Space Station (ISS) is having an Amateur Radio and it is already functional. Hams around the world are known for experimenting with their radio Set. A step up on the evolutionary ladder of Hamming is the Moon Bounce, or Earth Moon Earth (EME).

Digital Communication

In this mode of communication, Hams interface their computer with their radio by using Radio Modems (Hardware or Software Modems). After setting up it is possible to do almost anything which is doable on the Internet, i.e., sending mails, pictures, data files. Video conferencing is also possible in this mode. The application can be endless because tons of software is available (mostly developed by Hams) for digital communication using Ham radio. Incidentally Linux has a complete module for Ham radio.

Basic concepts for Band Plan

Some necessary things we need to know before we go for the band plan.

Carrier wave

In telecommunications, a carrier wave, or carrier is a waveform (usually sinusoidal) that is modulated (modified) with an input signal for the purpose of conveying information. This carrier wave is usually of much higher frequency than the input signal.

Single-sideband modulation

Single-sideband modulation is a refinement of amplitude modulation that more efficiently uses electrical power and bandwidth.
Amplitude modulation produces a modulated output signal that has twice the bandwidth of the original baseband signal. Single-sideband modulation avoids this bandwidth doubling, and the power wasted on a carrier, at the cost of somewhat increased device complexity.

QRP

In amateur radio, QRP operation means transmitting at reduced power levels while aiming to maximize one's effective range while doing so. The term QRP derives from the standard Q code used in radio communications, where "QRP" and "QRP?" are used to request, "Reduce power," and ask "Should I reduce power?" respectively. The opposite of QRP is QRO, or high-power operation.

Radioteletype

Radioteletype (RTTY) is a telecommunications system consisting of two or more teleprinters using radio as the transmission medium.
The term radioteletype is used to describe: either the entire family of systems connecting two or more teleprinters over radio, regardless of alphabet, link system or modulation, or specifically the original radioteletype system, sometime described as "Baudot".

Slow-scan television

Slow-scan television is a picture transmission method used mainly by amateur radio operators, to transmit and receive static pictures via radio in monochrome or color.
A technical term for SSTV is narrowband television. Broadcast television requires 5, 6 or 8 MHz wide channels, because it transmits 25 or 30 pictures per second (in the NTSC, PAL or SECAM systems), but SSTV usually takes up to only 3 kHz of bandwidth. It is a much slower method of still picture transmission, usually lasting from about eight seconds to a couple of minutes.
Since SSTV systems operate on voice frequencies, amateurs use it on shortwave (also known as HF by amateur radio operators), VHF and UHF radio. [16]

Earth-Moon-Earth

Earth-Moon-Earth, also known as moon bounce, is a radio communications technique which relies on the propagation of radio waves from an earth-based transmitter directed via reflection from the surface of the moon back to an earth-based receiver.

Amplitude-companded single sideband

ACSSB (amplitude-companded single sideband) is a narrowband modulation method using a single sideband with a pilot tone, allowing an expander in the receiver to restore the amplitude that was severely compressed by the transmitter. This mode promised greater robustness and fade resistance on HF than even SSB, but was pretty much leapfrogged in favor of spread spectrum, which solves the problem even better. [17]

Amateur television

Amateur television is the hobby of transmitting broadcast-quality video and audio over radio waves allocated for amateur radio using the broadcast standards of NTSC in North America and Japan, and PAL or SECAM in Europe and elsewhere, using the full refresh rates of those standards. It also includes the study of building of such transmitters and receivers and the propagation between these two. ATV is an extension of amateur radio. It is also called HAM TV or Fast Scan TV (FSTV). Ham operators are also allowed to transmit Slow Scan TV (SSTV) which is similar to video facsimile. SSTV may be transmitted within the voice segments of all ham radio frequency bands, though it is used primarily below 28 MHz. [14]

OSCAR

OSCAR is an short form for Orbiting Satellite Carrying Amateur Radio. OSCAR series satellites use amateur radio frequencies to communicate with Earth. They are conceived, designed, and built by amateur radio operators under the general direction of national organisations such as AMSAT.

Beacon

A Beacon is an intentionally conspicuous device designed to attract attention to a specific location.

Beacons give an indication of band conditions and provide a warning of DX openings. They also serve as test signals for receiver calibration and testing. There should be no other transmissions within the beacon segments or on their band edges. This applies even if you are hundreds of kilometres away from the nearest beacon!

On the VHF/UHF bands, beacon frequencies are allocated according to a geographic allocation plan with a frequency spacing of 2 kHz.

Amateur Radio Bands and Frequency

Look at the dial of an old AM radio and you'll see frequencies marked from 540 KHz to 1600 KHz. Imagine that band extended out many thousand kilohertz, and you'll have some idea of how huge additional radio spectrum is available for the Amateurs, Government and Commercial radio bands. Here you'll find all the aircrafts, shipping lines, fire service and police communications, you will also find the so-called "shortwave" stations, which are worldwide commercial and Government broadcast stations. Amateurs are allocated nine basic "bands" (i.e. groups of frequencies) in the High Frequency (HF) range between 1800Hz to 29700 KHz, and other seven bands in the Very High Frequency (VHF) bands and Ultra High Frequency (UHF) ranges, Super High Frequency (SHF) or microwave bands. Even though many Amateur Radio conversations may be heard around the world by anyone with a suitable radio receiver, given the right frequency and propagation conditions, Amateur Radio is basically a two-way communication system among radio amateurs.

Frequency Allocation from ITU (International Telecommunication Union) for Amateur Radio

HF	VHF / UHF	SHF / EHF
1800-2000 KHz	50 - 54 MHz	3.300-3.500 GHz
3500-4000 KHz	144 - 148 MHz	5.650-5.925 GHz
7000-7300 KHz	220 - 225 MHz	10.00-10.50 GHz
10100-10150 KHz	420 - 450 MHz	24.00-24.25 GHz
14000-14350 KHz	902 - 928 MHz	47.00-47.20 GHz
18068-18168 KHz	1240 - 1300 MHz	75.50-76.00 GHz
21000-21450 KHz	2300 - 2450 MHz	76.00-81.00 GHz
24890-24990 KHz		119.98-120.02 GHz
28000-29700 KHz		142.00-144.00 GHz

Spectrum Management

International spectrum management is the responsibility of the International Telecommunications Union (ITU). The ITU Radio Regulations allocate separate bands for each service such as fixed, mobile, broadcasting or amateur. Some bands are shared by more than one service. When bands are shared, services designated “Primary” are entitled to full protection from interference caused by secondary services. Secondary services must tolerate interference from primary services operating in the same band, and not cause any interference to primary services. Other services may also be permitted to share bands with primary and secondary services on a non-interference basis. Each ITU member nation implements the Radio Regulations within its borders. Most member nations follow the ITU allocation tables fairly closely, although they do have the right to make variations to suit local requirements. [19]

Band Planning Guidelines

The radio spectrum is divided into agreed allocations to coordinate various uses.
Amateurs have to share radio spectrum with many other services.
Other services may be in adjacent bands, but sometimes may be within an Amateur band.

Band plans need to satisfy a number of conflicting criteria:

- They should take local conditions into account, but they should be consistent with international usage.

- They should encourage spectrum efficiency, but they should also ensure that all modes have their fair share of spectrum space.

- They should take the popularity of each mode into account, while still providing enough spectrum space for less popular activities. For example, ATV requires far more bandwidth per operator than other modes; and activities such as EME are of major importance regardless of the number of stations involved.

- Band plans must be flexible enough to adapt to changing needs, but they tend to lose support if they are changed too often. The aim must be to think ahead and to make sure that future options are not closed off. [18] [19]

Mode Compatibility

Some modes require exclusive band segments, but others can coexist with similar modes in the same part of the band. On the HF bands, there are three main mode divisions: CW, digital data modes, and SSB. Image modes such as SSTV are usually sent as SSB signals, so these modes can be used in the SSB band segments. The same applies to digital voice modes that occupy much the same bandwidth as an SSB signal.
AM receives little use nowadays because it is less efficient than SSB and occupies twice as much bandwidth. But it can still be found, mainly on 160 metres and sometimes around 29 MHz. On 10 metres, there is also a fourth category for FM. This mode is quite popular above 29 MHz, but it
should not be used on lower frequencies because of its wide bandwidth.

The three main groups are:
CW and SSB: the preferred modes for weak signal work, including digital DX modes using SSB bandwidths.
FM: not suitable for weak signal work and not compatible with SSB or CW. This category also includes modes such as packet, which usually use FM mode on the VHF bands.
ATV: requires a very large bandwidth but has a very low power density, so it needs an exclusive interference-free band segment. [19]

Calling Frequencies

On the VHF bands, the band plans include calling frequencies. These frequencies are "meeting places" and should be used only to make initial contact before moving to another frequency. If you "hog" the calling frequency you will prevent others from making calls or hearing more distant stations that may appear on the frequency. [19]

Methodology:

Our National Frequency Allocation Plan (NFAP) merely specifies any details, and the document is also too summarised. This was a barrier for us to meet International Telecommunication Union (ITU) standard. As a result Bangladeshi hams were facing different problems. For example,

a) Resource sharing and research and development
b) Frequency overlapping with neighboring country due to different modulation technique in same band. For example, if in a particular frequency one ham sends CW (Morse Code) but another ham one sends PSK (Phase Shift Keying) then there will be problem in communication. Only noise will be produced and no communication will be established.
c) Amateur satellite use very precise modulation technology. If anyone is ignorant about what specific modulation an amateur satellite uses in a specific frequency he or she might send signal in that frequency with a different modulation, which would cause interference with the satellite station.

How did we approach to the problem:

We approached to the problem in four steps.

a) Firstly we did a detail analysis of NFAP
b) Then we separated amateur portion in NFAP, keeping in mind if amateur are the primary user or the secondary user in the specified band and other purposes for what the amateur band might need to be shared. We were always aware of the fact that band plan is a national document, so we tried to fit all our planning within the NFAP.
c) Thirdly, we explored landplaning done by International Telecommunication Union
d) Finally we came up with a band plan for Bangladesh

Three features of our band plan:

a) Falls under NFAP
b) Compatible with IARY R3 countries
c) It is done after taking consideration of our technology and resource

Band Allocations

Footnotes for these bands appear after the Band Plan.

1.8-2.0 MHz (160 Meters) by NFAP

1800-2000	Primary Use	Secondary Use	Main Use
	AMATEUR FIXED MOBILE except aeronautical mobile RADIONAVIGATION Radiolocation	AMATEUR FIXED MOBILE except aeronautical mobile RADIONAVIGATION Radiolocation	Radiodetermination applications Maritime applications Amateur applications

Proposed Band Plan

1.800 - 2.000	CW
1.800 - 1.810	Digital Modes
1.810	CW QRP
1.843-2.000	SSB, SSTV and other wideband modes
1.910	SSB QRP
1.995 - 2.000	Experimental
1.999 - 2.000	Beacons

3.5-4.0 MHz (80 Meters) by NFAP

3500-3550 kHz	Primary Use	Secondary Use	Main Use
	AMATEUR FIXED MOBILE	AMATEUR Fixed Mobile BGD35.1	Amateur applications
3550-3600	AMATEUR FIXED MOBILE	FIXED MOBILE Amateur BGD1.2	Civil fixed and land mobile applications Amateur applications
3600-3850	AMATEUR FIXED MOBILE	AMATEUR Fixed Mobile BGD35.1	Amateur applications
3850-3900	AMATEUR FIXED MOBILE	FIXED MOBILE Amateur BGD1.2	Civil fixed and land mobile applications Amateur applications

Proposed Band Plan

3.590	RTTY/Data DX
3.570-3.600	RTTY/Data
3.790-3.800	DX window
3.845	SSTV
3.885	AM calling frequency

Note: 3.5-3.55MHz and 3.6-3.85MHz Reserve band for Fixed and Mobile Service in Bangladesh.

7.0-7.2 MHz (40 Meters) by NFAP

7000-7100 kHz	Primary Use	Secondary Use	Main Use
	AMATEUR AMATEURSATELLITE	AMATEUR AMATEURSATELLITE	Amateur applications Amateur-satellite Applications
7100-7200 kHz	AMATEUR 5.141C	AMATEUR 5.141C BGD5	Amateur applications

Proposed Band Plan

7.040	RTTY/Data DX
7.080-7.125	RTTY/Data
7.171	SSTV
7.290	AM calling frequency

10.1-10.15 MHz (30 Meters) by NFAP

10100-10150	Primary Use	Secondary Use	Main Use
	Amateur FIXED	Amateur FIXED	Amateur applications Civil fixed applications

Proposed Band Plan

10.130-10.140	RTTY
10.140-10.150	Packet

14.0-14.35 MHz (20 Meters) by NFAP

14000-14250	Primary Use	Secondary Use	Main Use
	AMATEUR AMATEURSATELLITE	AMATEUR AMATEURSATELLITE	Amateur applications Amateur-Satellite Applications
14250-14350	AMATEUR	AMATEUR	Amateur applications

Proposed Band Plan

14.070-14.095	RTTY
14.095-14.0995	Packet
14.100	NCDXF Beacons
14.1005-14.112	Packet
14.230	SSTV
14.286	AM calling frequency

18.068-18.168 MHz (17 Meters) by NFAP

18068-18168 kHz	Primary Use	Secondary Use	Main Use
	AMATEUR AMATEURSATELLITE	AMATEUR AMATEURSATELLITE	Amateur applications Amateur-satellite Applications

Proposed Band Plan

18.100-18.105	RTTY
18.105-18.110	Packet

21.0-21.45MHz (15 Meters) by NFAP

21000-21450	Primary Use	Secondary Use	Main Use
	AMATEUR AMATEURSATELLITE	AMATEUR AMATEURSATELLITE	Amateur applications Amateur-Satellite Applications

Proposed Band Plan

21.070-21.110	RTTY/Data
21.340	SSTV

24.89-24.99 MHz (12 Meters) by NFAP

24890-24990 kHz	Primary Use	Secondary Use	Main Use
	AMATEUR AMATEURSATELLITE	AMATEUR AMATEURSATELLITE	Amateur applications Amateur-Satellite Applications

Proposed Band Plan

24.920-24.925	RTTY
24.925-24.930	Packet

28.0-29.7 MHz (10 Meters) by NFAP

28-29.7 MHz	Primary Use	Secondary Use	Main Use
	AMATEUR AMATEURSATELLITE	AMATEUR AMATEURSATELLITE	Amateur applications Amateur-satellite Applications

Proposed Band Plan

28.000-28.070	CW
28.070-28.150	RTTY
28.150-28.190	CW
28.200-28.300	Beacons
28.300-29.300	Phone
28.680	SSTV
29.000-29.200	AM
29.300-29.510	Satellite Downlinks
29.520-29.590	Repeater Inputs
29.600	FM Simplex
29.610-29.700	Repeater Outputs

50-54 MHz (6 Meters) by NFAP

50.0 - 54.0	Primary Use	Secondary Use	Main Use
	AMATEUR **5.167**	AMATEUR **5.167** BGD6	Amateur applications

Proposed Band Plan

50.0-50.1	CW, beacons
50.060-50.080	beacon subband
50.1-50.3	SSB, CW
50.10-50.125	DX window

50.125	SSB calling
50.3-50.6	All modes
50.6-50.8	Nonvoice communications
50.62	Digital (packet) calling
50.8-51.0	Radio remote control (20-kHz channels)
51.0-51.1	Pacific DX window
51.12-51.48	Repeater inputs (19 channels)
51.12-51.18	Digital repeater inputs
51.62-51.98	Repeater outputs (19 channels)
51.62-51.68	Digital repeater outputs
52.0-52.48	Repeater inputs (except as noted; 23 channels)
52.02, 52.04	FM simplex
52.2	TEST PAIR (input)
52.5-52.98	Repeater output (except as noted; 23 channels)
52.525	Primary FM simplex
52.54	Secondary FM simplex
52.7	TEST PAIR (output)
53.0-53.48	Repeater inputs (except as noted; 19 channels)
53.0	Remote base FM simplex
53.02	Simplex
53.1, 53.2, 53.3, 53.4	Radio remote control
53.5-53.98	Repeater outputs (except as noted; 19 channels)
53.5, 53.6, 53.7, 53.8	Radio remote control
53.52, 53.9	Simplex

Note: Geographical sharing with wind profiler radars in the range 46-68 MHz.

144-148 MHz (2 Meters) by NFAP

144-146	Primary Use	Secondary Use	Main Use
	AMATEUR AMATEURSATELLITE	AMATEUR AMATEURSATELLITE	AMATEUR AMATEUR-SATELLITE
146-146.55	AMATEUR FIXED MOBILE **5.217**	MOBILE **5.217**	Governmental mobile systems
146.55-148	AMATEUR FIXED MOBILE **5.217**	MOBILE **5.217** BGD11 BGD35.1	PMR

Proposed Band Plan

144.00-144.05	EME (CW)
144.05-144.10	General CW and weak signals
144.10-144.20	EME and weak-signal SSB
144.200	National calling frequency
144.200-144.275	General SSB operation
144.275-144.300	Propagation beacons
144.30-144.50	New OSCAR subband
144.50-144.60	Linear translator inputs
144.60-144.90	FM repeater inputs
144.90-145.10	Weak signal and FM simplex (145.01,03,05,07,09 are widely used for packet)
145.10-145.20	Linear translator outputs
145.20-145.50	FM repeater outputs
145.50-145.80	Miscellaneous and experimental modes
145.80-146.00	OSCAR subband
146.01-146.37	Repeater inputs
146.40-146.58	Simplex
146.52	National Simplex Calling Frequency

146.61-146.97	Repeater outputs
147.00-147.39	Repeater outputs
147.42-147.57	Simplex
147.60-147.99	Repeater inputs

Notes: The frequency 146.40 MHz is used in some areas as a repeater input. This band plan has been proposed by the ARRL VHF-UHF Advisory Committee.

Notes: 146.55-148 Annex 1a, Annex 4a MTx paired with 151.6 -153.05 MHz

430-440 MHz (70 Centimeters) by NFAP

430-432	Primary Use	Secondary Use	Main Use
	RADIOLOCATION Amateur **5.276**	FIXED MOBILE except aeronautical mobile RADIOLOCATION Amateur BGD17 **5.276** BGD18	Civil and governmental fixed and mobile services Amateur
432-433.05 MHz	RADIOLOCATION Amateur Earth Exploration Satellite (active) 5.279A **5.276**	FIXED MOBILE except aeronautical mobile RADIOLOCATION AMATEUR BGD17 Earth Exploration Satellite (active) 5.279A **5.276** BGD18	Civil and governmental fixed and mobile services Amateur
433.05-434.79 MHz	RADIOLOCATION Amateur Earth Exploration-Satellite (active) 5.279A **5.276**	FIXED MOBILE except aeronautical mobile RADIOLOCATION AMATEUR BGD17 Earth Exploration-Satellite (active) 5.279A **5.276** BGD18	SRD Civil and governmental fixed and mobile services Amateur
434.79-435	RADIOLOCATION Amateur Earth Exploration Satellite (active) 5.279A **5.276**	FIXED RADIOLOCATION MOBILE except aeronautical mobile AMATEUR BGD17 Earth Exploration Satellite (active) 5.279A	Civil and governmental fixed and mobile services Amateur

		5.276 BGD18	
435-438 MHz	RADIOLOCATION Amateur Earth Exploration Satellite (active) 5.279A **5.276**	FIXED RADIOLOCATION AMATEUR BGD17 Amateur satellite BGD17 Earth Exploration Satellite (active) 5.279A **5.276** BGD18	Civil and governmental fixed services Amateur
438-440	RADIOLOCATION Amateur **5.276**	FIXED MOBILE except aeronautical mobile RADIOLOCATION Amateur BGD17 **5.276** BGD18	Civil and governmental fixed and mobile services Amateur

Proposed Band Plan

432.00-432.07	EME (Earth-Moon-Earth)
432.07-432.10	Weak-signal CW
432.10	70-cm calling frequency
432.10-432.30	Mixed-mode and weak-signal work
432.30-432.40	Propagation beacons
432.40-433.00	Mixed-mode and weak-signal work
433.00-435.00	Auxiliary/repeater links
435.00-438.00	Satellite only (internationally)
438.00-440.00	Shared by auxiliary and control links, repeaters and simplex (local option)

Note: 430-432 MHz Annex 1b Paired with 438 – 440 MHz

Note: 438-440 MHz Annex 1b Paired with 430 – 432 MHz

Note: 432-438 Amateur only primary within Metropolitan and District Areas after 2011.

Note: 435-438 Amateur Satellite Service restricted to 435-438 MHz.

1240-1300 MHz (23 Centimeters) by NFAP

1240-1260 MHz	Primary Use	Secondary Use	Main Use
	EARTH EXPLORATION SATELLITE (active) RADIOLOCATION RADIONAVIGATION SATELLITE (S/E) SPACE RESEARCH (active) Amateur 5.282 5.328B 5.329 5.329A **5.330** 5.331 5.332	RADIOLOCATION RADIONAVIGATION SATELLITE (S/E) EARTH EXPLORATION SATELLITE (active) SPACE RESEARCH (active) RADIONAVIGATION FIXED MOBILE Amateur 5.282 5.328B 5.329 5.329A **5.330** 5.331 5.332 BGD1.2 BGD27 BGD28	Low Looking Radar (LLR)
1260-1270 MHz	EARTH EXPLORATION SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active) RADIONAVIGATION SATELLITE (S/E)(S/S) 5.329 5.329A 5.328B Amateur 5.282 **5.330** 5.331 5.335A	RADIOLOCATION EARTH EXPLORATION SATELLITE (active) SPACE RESEARCH (active) RADIONAVIGATION RADIONAVIGATIONS ATELLITE 5.329 5.329A 5.328B FIXED MOBILE Amateur Amateur-Satellite 5.282 **5.330** 5.331 5.335A BGD1.2 BGD27 BGD28	DME LLR Radionavigation Amateur

1270-1300	EARTH EXPLORATION SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active) RADIONAVIGATION SATELLITE 5.329 5.329A 5.328B Amateur 5.282 **5.330** 5.331 5.335A	RADIOLOCATION EARTHEXPLORATION SATELLITE (active) SPACE RESEARCH (active) RADIONAVIGATION RADIONAVIGATIONS ATELLITE 5.329 5.329A 5.328B FIXED MOBILE Amateur 5.282 **5.330** 5.331 5.335A BGD1.2 BGD27 BGD28	Wind profiler radars Radionavigation LLR Amateur

Proposed Band Plan

1240-1246	ATV #1
1246-1248	Narrow-bandwidth FM point-to-point links and digital, duplex with 1258-1260.
1248-1258	Digital Communications
1252-1258	ATV #2
1258-1260	Narrow-bandwidth FM point-to-point links digital, duplexed with 1246-1252
1260-1270	Satellite uplinks, reference WARC '79
1260-1270	Wide-bandwidth experimental, simplex ATV

1270-1276	Repeater inputs, FM and linear, paired with 1282-1288, 239 pairs every 25 kHz, e.g. 1270.025, .050, etc.
1271-1283	Non-coordinated test pair
1276-1282	ATV #3
1282-1288	Repeater outputs, paired with 1270-1276
1288-1294	Wide-bandwidth experimental, simplex ATV
1294-1295	Narrow-bandwidth FM simplex services, 25-kHz channels
1294.5	National FM simplex calling frequency
1295-1297	Narrow bandwidth weak-signal communications (no FM)
1295.0-1295.8	SSTV, FAX, ACSSB, experimental
1295.8-1296.0	Reserved for EME, CW expansion
1296.00-1296.05	EME-exclusive
1296.07-1296.08	CW beacons
1296.1	CW, SSB calling frequency
1296.4-1296.6	Crossband linear translator input
1296.6-1296.8	Crossband linear translator output
1296.8-1297.0	Experimental beacons (exclusive)
1297-1300	Digital Communications

Note: LLR from 1250 MHz
Co-ordination of civil and defence radionavigation systems to be effected.

Note: This band 1260-1300 MHz is proposed to be protected for distance measurement equipment (DME) Co-ordination of civil and defence radionavigation systems to be effected.
Note: Wind profiler radars between 1270 MHz and 1295 MHz Co-ordination of civil and defence radionavigation systems to be effected.

2300-2310 & 2390-2450 MHz by NFAP

2300-2400 MHz	Primary Use	Secondary Use	Main Use
	FIXED MOBILE RADIOLOCATION Amateur 5.282 5.393 5.396	FIXED MOBILE RADIOLOCATION Amateur 5.282	Fixed and mobile applications Amateur
2400-2450 MHz	FIXED MOBILE RADIOLOCATION Amateur	FIXED MOBILE RADIOLOCATION Amateur Amateur Satellite 5.150 5.282 BGD1.2	FIXED Links Amateur SRDs RLAN AVI RFID WLAN ISM

Proposed Band Plan

2300.0-2303.0	High-rate data
2303.0-2303.5	Packet
2303.5-2303.8	TTY packet
2303.9-2303.9	Packet, TTY, CW, EME
2303.9-2304.1	CW, EME
2304.1	Calling frequency
2304.1-2304.2	CW, EME, SSB
2304.2-2304.3	SSB, SSTV, FAX, Packet AM, Amtor
2304.30-2304.32	Propagation beacon network
2304.32-2304.40	General propagation beacons
2304.4-2304.5	SSB, SSTV, ACSSB, FAX, Packet AM, Amtor experimental
2304.5-2304.7	Crossband linear translator input
2304.7-2304.9	Crossband linear translator output
2304.9-2305.0	Experimental beacons
2305.0-2305.2	FM simplex (25 kHz spacing)

2305.20	FM simplex calling frequency
2305.2-2306.0	FM simplex (25 kHz spacing)
2306.0-2309.0	FM Repeaters (25 kHz) input
2309.0-2310.0	Control and auxiliary links
2390.0-2396.0	Fast-scan TV
2396.0-2399.0	High-rate data
2399.0-2399.5	Packet
2399.5-2400.0	Control and auxiliary links
2400.0-2403.0	Satellite
2403.0-2408.0	Satellite high-rate data
2408.0-2410.0	Satellite
2410.0-2413.0	FM repeaters (25 kHz) output
2413.0-2418.0	High-rate data
2418.0-2430.0	Fast-scan TV
2430.0-2433.0	Satellite
2433.0-2438.0	Satellite high-rate data
2438.0-2450.0	WB FM, FSTV, FMTV, SS experimental

Note: The band 2400-2500 MHz is designated for ISM Industrial Scientific and Medical applications. Radiocommunications must accept any interference caused by ISM apparatus in this band.

3300-3400 MHz by NFAP

3300-3400	Primary Use	Secondary Use	Main Use
	RADIOLOCATION Amateur 5.149 **5.429**	RADIOLOCATION FIXED MOBILE Amateur 5.149 **5.429**	RADARS Amateur
3400-3410 MHz	FIXED FIXED-SATELLITE (S/E) Amateur 5.282 Mobile Radiolocation 5.433	FIXED FIXED-SATELLITE (S/E) Amateur Amateur satellite 5.282 Mobile Radiolocation 5.433	Fixed Links
3410-3500 MHz	FIXED FIXED-SATELLITE (S/E) Amateur 5.282 Mobile Radiolocation 5.433	FIXED FIXED-SATELLITE (S/E) Mobile Radiolocation 5.433	Fixed Links Fixed Wireless access systems

Proposed Band Plan

3400.0-3402.0	CW, EME, SSB
3402.0-3456.0	All Modes
3456.3-3456.4	Propagation beacons
3456.4-3458.0	CW, EME, SSB
3458.0-3475.0	All Modes

Note: Airborne Radars of other administrations may impact spectrum up to 3410 MHz.
Note: 3400-3410MHz Paired with 3500-3510MHz
Note: 3410-3500MHz Paired with 3510-3600MHz

5650-5925 MHz by NFAP

5650-5725	Primary Use	Secondary Use	Main Use
	RADIOLOCATION MOBILE except aeronautical mobile 5.450A 5.446A Amateur Space Research (deep Space) 5.282 **5.453**	FIXED MOBILE 5.450A 5.446A RADIOLOCATION Amateur **5.453** 5.282	Governmental systems Wireless Access RLANs Shipborne and VTS Radar Amateur applications
5725-5830 MHz	RADIOLOCATION Amateur 5.150 **5.453**	FIXED MOBILE RADIOLOCATION Amateur 5.150 **5.453**	Amateur applications ISM SRDs Radars
5830-5850 MHz	RADIOLOCATION Amateur Amateur-Satellite (S/E) 5.150 **5.453**	FIXED MOBILE RADIOLOCATION Amateur Amateur-Satellite (S/E) 5.150 **5.453**	FIXED Links Amateur applications ISM SRDs Radars

Proposed Band Plan

5650.0-5668.0	Satellite Uplinks
5668.0-5670.0	CW, EME, SSB
5670.0-5680.0	All Modes
5775.0-5760.0	All Modes
5760.0-5762.0	CW, EME, SSB
5762.0-5765.0	All Modes
5820.0-5830.0	All Modes
5830.0-5850.0	Satellite Downlink

Note: Amateur satellite service (Earth to space), 5650-5670 MHz from RR 5.282
Note: The band 5725-5875 MHz is on ISM band RTTT in the band 5805-5815 MHz SRDs 5725-5875
Note: Amateur Satellite 5830-5850 MHz (S/E)

10.0-10.50 GHz by NFAP

10.00-10.15 GHz	Primary Use	Secondary Use	Main Use
	FIXED MOBILE RADIOLOCATION Amateur 5.479	FIXED MOBILE RADIOLOCATION Amateur 5.479 BGD1.2	FIXED Links Amateur applications SAB
10.15-10.30	FIXED MOBILE RADIOLOCATION Amateur	FIXED MOBILE RADIOLOCATION Amateur BGD1.2	FIXED Links including FWA
10.30-10.45	FIXED MOBILE RADIOLOCATION Amateur	FIXED MOBILE RADIOLOCATION Amateur BGD1.2	FIXED Links Amateur applications SAB
10.45-10.50 GHz	RADIOLOCATION Amateur Amateur Satellite	RADIOLOCATION FIXED Amateur Amateur Satellite BGD1.2	FIXED Links Amateur applications SAB

Proposed Band Plan

10.0-10.125	Digital Modes
10.225-10.250	All Modes
10.25-10.35	Digital Modes
10.35-10.368	All Modes
10.368-10.37	CW, EME, SSB, Beacon
10.37-10.45	All Modes
10.45-10.475	All Modes, Satellites
10.475-10.50	All Modes, Satellites

Note: 10.15-10.50GHz Annex 1 of Channel Arrangement ITU R F. 1568 Channel Separation 350 MHz.
Note: Narrow band calling frequency 10.3683-10.3684 Propagation beacons.
Note: 10.3640 Calling frequency

Above 10.50 GHz:*
All modes and licensees (except Novices) are authorized on the following bands:

24.0-24.25 GHz by NFAP

24.00-24.05	Primary Use	Secondary Use	Main Use
	AMATEUR AMATEURSATELLITE 5.150	AMATEUR AMATEURSATELLITE 5.150	Amateur ISM
24.05-24.25 GHz	RADIOLOCATION Amateur Earth exploration Satellite (active) 5.150	RADIOLOCATION Amateur Earth exploration Satellite (active) Fixed Mobile 5.150	Amateur ISM SAB Motion Sensors SRDs

Proposed Band Plan

24.0-24.05	Satellites
24.05-24.25	All Modes

Note: 24.0-24.25 ISM 24-24.5GHz

47.0-47.20 GHz by NFAP

47.00-47.20	Primary Use	Secondary Use	Main Use
	AMATEUR AMATEURSATELLITE	AMATEUR AMATEURSATELLITE	Amateur applications Amateur satellite applications

47.0-47.2 GHz

47.0-47.2	Narro Band

76.0-84.0 GHz by NFAP

76.00-77.50	Primary Use	Secondary Use	Main Use
	RADIO ASTRONOMY RADIOLOCATION Amateur Amateur-Satellite Space Research (S/E) 5.149	RADIO ASTRONOMY RADIOLOCATION Amateur Amateur-Satellite Space Research (S/E) 5.149	Amateur applications Amateur Satellite Applications Civil radiolocation Radio astronomy Applications RTTT
77.50-78.00 GHz	AMATEUR AMATEUR SATELLITE Radio Astronomy Space Research (S/E) 5.149	AMATEUR AMATEUR SATELLITE Radio Astronomy Space Research (S/E) 5.149	Amateur applications Radio astronomy applications
78.00-79.00 GHz	RADIOLOCATION Amateur Amateur Satellite Radio astronomy Space Research (S/E) 5.149 5.560	RADIOLOCATION Amateur Amateur-Satellite Radio astronomy Space Research (S/E) 5.149 5.560	Amateur applications Radio Astronomy applications
79.00-81.00 GHz	RADIO ASTRONOMY RADIOLOCATION Amateur Amateur Satellite Space Research (S/E) 5.149	RADIO ASTRONOMY RADIOLOCATION Amateur Amateur Satellite Space Research (S/E) 5.149	Amateur applications Radio Astronomy applications
81.00-84.00	FIXED FIXED-SATELLITE (E/S) MOBILE MOBILE-SATELLITE (E/S) RADIO ASTRONOMY Space Research (S/E) 5.149 5.561A	FIXED FIXED-SATELLITE (E/S) MOBILE MOBILE-SATELLITE (E/S) RADIO ASTRONOMY Space Research (S/E) 5.149 5.561A	Amateur Applications Radio Astronomy applications

Note: 76-84GHz Spectral line and wide band continuum observations
Note: 76-77 GHz Transport and Traffic Telematics 76-77GHz Rader
Note: 81-84 GHz Amateur (secondary) 81-81.5 GHz Pairing of this band with 71-74 GHz may be required for future governmental systems.

122.25-123 GHz by NFAP

122.25-123 GHz	Primary Use	Secondary Use	Main Use
	FIXED INTER-SATELLITE MOBILE 5.558 Amateur 5.138	FIXED INTER-SATELLITE MOBILE 5.558 Amateur 5.138	Amateur applications Amateur satellite applications SRD

134-141 GHz by NFAP

134-136	Primary Use	Secondary Use	Main Use
	AMATEUR AMATEURSATELLITE Radio Astronomy	AMATEUR AMATEURSATELLITE Radio Astronomy	Amateur applications Amateur Satellite applications
136-141 GHz	RADIO ASTRONOMY RADIOLOCATION Amateur Amateur satellite 5.149	RADIO ASTRONOMY RADIOLOCATION Amateur Amateur satellite 5.149	Radio astronomy applications Amateur applications Amateur Satellite applications

Note 136-141 spectral line and wide band continuum observations.

134-141 GHz by NFAP

241-248 GHz	Primary Use	Secondary Use	Main Use
	RADIO ASTRONOMY RADIOLOCATION Amateur Amateur-Satellite 5.138 5.149	RADIO ASTRONOMY RADIOLOCATION Amateur Amateur-Satellite 5.138 5.149	Radio astronomy applications Amateur applications Amateur satellite applications SRD
248-250 GHz	AMATEUR AMATEURSATELLITE Radio Astronomy 5.149	AMATEUR AMATEURSATELLITE Radio Astronomy 5.149	Amateur applications Amateur satellite applications

Note: 241-248 spectral line and wide band continuum observations

Annex 1 – NFAP Footnotes

BGD1.2 This band identified for civil systems is shared with governmental systems on a coordinated basis.

BGD3 Additional Allocation: In Bangladesh the band 135.7 – 137.8 kHz is allocated nationally to the amateur service on a secondary basis. Stations of the amateur service in Bangladesh shall operate under the conditions of No.4.4 of the ITU Radio Regulations. Such stations shall not cause harmful interference to stations of other administrations operating in accordance with Article 5 of the ITU Radio Regulations.

BGD4 Additional Allocation: In Bangladesh the band 5250 - 5310 kHz is allocated nationally to the amateur service on a secondary basis for propagation experiments. Stations of the amateur service in Bangladesh shall operate under the conditions of No.4.4 of the ITU Radio Regulations. Such stations shall not cause harmful interference to stations of other administrations operating in accordance with Article 5 of the ITU Radio Regulations.

BGD5 Additional Allocation: Until 29 March 2009 the band 7100 – 7200 kHz In Bangladesh is allocated nationally to the amateur service on a secondary basis. Stations of the amateur service in Bangladesh shall operate under the conditions of No.4.4 of the ITU Radio Regulations. Such stations shall not cause harmful interference to stations of other administrations operating in accordance with Article 5 of the ITU Radio Regulations.

BGD6 The band 46-68 MHz may also be used in Bangladesh for wind profiler radars operating in the radiolocation service on a secondary basis. Any such radars shall operate in accordance with Resolution 217 of ITU WRC-97.

BGD17 Until 1 January 2011 the amateur service for the band 430 – 440 MHz and amateur-satellite service for the band 435 – 438 MHz is authorised to establish stations on a non-interference, non-protected basis within Metropolitan areas and District areas. Outside these geographical areas, the use of the band is restricted to the sub-bands 430–431 MHz and 435 – 436 MHz. After 1 January 2011 in the band 432 – 438 MHz (435–438 MHz for the amateur-satellite service) stations of the amateur service will have primary status ONLY in the aforementioned geographical areas. In the remainder of the territory of Bangladesh and in the bands 430 – 432 MHz and 438 – 440 MHz amateur stations shall operate on a secondary non-interference, non-protected basis to all other services which are allocated the bands 430 – 432 MHz and 438–440 MHz in this NFAP.

BGD18 In the band 432 – 438 MHz, in the vicinity of Metropolitan and District areas stations of the fixed and mobile services will be reassigned frequencies in the period 1 January 2006 to 1 January 2011, in the sub-bands 430-432 MHz and 438-440 MHz, or transferred to appropriate adjacent bands designated for such applications in this NFAP.

BGD27 At a future ITU WRC, Bangladesh intends to join No. 5.331 of the Radio Regulations concerning a primary allocation to the Radionavigation Service in the band 1215-1300 MHz.

BGD28 The use of the band1215-1300 MHz by the fixed and mobile services in Bangladesh shall be on a secondary basis to other primary services operating in accordance with the NFAP.

BGD35.1 From 1 September 2005 no new assignments to governmental stations will be made in this frequency band. Existing assignments to governmental stations will be transferred to alternative bands not later than 1 September 2010.

Annex 2 - Radio Regulation footnotes

5.064 Only classes A1A or F1B, A2C, A3C, F1C or F3C emissions are authorized for stations of the fixed service in the bands allocated to this service between 90 kHz and 160 kHz (148.5 kHz in Region 1) and for stations of the maritime mobile service in the bands allocated to this service between 110 kHz and 160 kHz (148.5 kHz in Region 1). Exceptionally, class J2B or J7B emissions are also authorized in the bands between 110 kHz and 160 kHz (148.5 kHz in Region 1) for stations of the maritime mobile service

5.097 In Region 3, the Loran system operates either on 1 850 kHz or 1 950 kHz, the bands occupied being 1 825-1 875 kHz and 1 925-1 975 kHz respectively. Other services to which the band 1 800-2 000 kHz is allocated may use any frequency therein on condition that no harmful interference is caused to the Loran system operating on 1 850 kHz or 1 950 kHz.

5.138 The following bands: 6 765 - 6 795 kHz (centre frequency 6 780 kHz), 433.05 - 434.79 MHz (centre frequency 433.92 MHz) in Region 1 except in the countries mentioned in No. 5.280, 61 - 61.5 GHz (centre frequency 61.25 GHz), 122-123 GHz (centre frequency 122.5 GHz),and 244-246 GHz (centre frequency 245 GHz) are designated for industrial, scientific and medical (ISM) applications. The use of these frequency bands for ISM applications shall be subject to special authorisation by the administration concerned, in agreement with other administrations whose radiocommunication services might be affected. In applying this provision, administrations shall have due regard to the latest relevant ITU-R Recommendations.

5.141C In Regions 1 and 3, the band 7 100-7 200 kHz is allocated to the broadcasting service until 29 March 2009 on a primary basis. (WRC 03)

5.149 In making assignments to stations of other services to which the bands: 13 360-13 410 kHz, 25 550-25 670 kHz, 37.5-38.25 MHz, 73-74.6 MHz in Regions 1 and 3, 150.05-153 MHz in Region 1, 322-328.6 MHz, 406.1-410 MHz, 608-614 MHz in Regions 1 and 3, 1 330-1 400 MHz, 1 610.6-1 613.8 MHz, 1 660-1 670 MHz, 1718.8-1

722.2 MHz, 2 655-2 690 MHz, 3 260-3 267 MHz, 3 332-3 339 MHz, 3345.8-3 352.5 MHz, 4 825-4 835 MHz, 4 950-4 990 MHz, 4 990-5 000MHz, 6 650-6 675.2 MHz, 10.6-10.68 GHz, 14.47-14.5 GHz, 22.01-22.21 GHz, 22.21-22.5 GHz, 22.81-22.86 GHz, 23.07-23.12 GHz, 31.2-31.3 GHz, 31.5-31.8 GHz in Regions 1 and 3, 36.43-36.5 GHz, 42.5-43.5 GHz, 42.77-42.87 GHz, 43.07-43.17 GHz, 43.37-43.47 GHz, 48.94-49.04 GHz, 76-86 GHz, 92-94 GHz, 94.1-100 GHz, 102-109.5 GHz, 111.8-114.25 GHz, 128.33-128.59 GHz, 129.23-129.49 GHz, 130-134 GHz, 136-148.5 GHz, 151.5-158.5 GHz, 168.59-168.93 GHz, 171.11-171.45 GHz, 172.31-172.65 GHz, 173.52-173.85 GHz, 195.75-196.15 GHz, 209-226 GHz, 241-250 GHz, 252- 275 GHz are allocated, administrations are urged to take all practicable steps to protect the radio astronomy service from harmful interference. Emissions from spaceborne or airborne stations can be particularly serious sources of interference to the radio astronomy service (see Nos. 4.5 and 4.6 and Article 29).

5.150 The following bands: 13 553 - 13 567 kHz (centre frequency 13 560 kHz), 26 957 - 27 283 kHz (centre frequency 27 120 kHz), 40.66 - 40.70 MHz (centre frequency 40.68 MHz), 902 - 928 MHz in Region 2(centre frequency 915 MHz), 2 400 - 2 500 MHz (centre frequency 2 450 MHz), 5 725 - 5 875 MHz (centre frequency 5 800 MHz), and 24 - 24.25 GHz (centre frequency 24.125 GHz) are also designated for industrial, scientific and medical (ISM) applications. Radiocommunication services operating within these bands must accept harmful interference which may be caused by these applications. ISM equipment operating in these bands is subject to the provisions of No. 15.13.

5.167 *Alternative allocation:* in **Bangladesh**, Brunei Darussalam, India, Indonesia, Iran (Islamic Republic of), Malaysia, Pakistan, Singapore and Thailand, the band 50-54 MHz is allocated to the fixed, mobile and broadcasting services on a primary basis.

5.217 *Alternative allocation:* in Afghanistan, **Bangladesh**, Cuba, Guyana and India, the band 146-148 MHz is allocated to the fixed and mobile services on a primary basis.

5.276 Additional allocation: in Afghanistan, Algeria, Saudi Arabia, Bahrain, **Bangladesh**, Brunei Darussalam, Burkina Faso, Burundi, Egypt, the United Arab Emirates, Ecuador, Eritrea, Ethiopia, Greece, Guinea, India, Indonesia, the Islamic Republic of Iran, Iraq, Israel, Italy, Jordan, Kenya, Kuwait, Lebanon, Libya, Liechtenstein, Malaysia, Malta, Nigeria, Oman, Pakistan, the Philippines, Qatar, Syria, Democratic People's Republic of Korea, Singapore, Somalia, Switzerland, Tanzania, Thailand, Togo, Turkey and Yemen, the band 430-440 MHz is also allocated to the fixed service on a primary basis and the bands 430-435 MHz and 438-440 MHz are also allocated to the mobile, except aeronautical mobile, service on a primary basis

5.279A The use of this band by sensors in the Earth exploration-satellite service (EESS) (active) shall be in accordance with Recommendation ITU R SA.1260 1. Additionally, the EESS (active) in the band 432- 438 MHz shall not cause harmful interference to the aeronautical radionavigation service in China. The provisions of this footnote in no way diminish the obligation of the EESS (active) to operate as a secondary service in accordance with Nos. 5.29 and 5.30. (WRC 03) 5.282 In the bands 435 - 438MHz,

1 260 - 1 270 MHz, 2 400 - 2 450 MHz, 3 400 - 3 410 MHz (in Regions 2 and 3 only) and 5 650 -5 670 MHz, the amateur-satellite service may operate subject to not causing harmful interference to other services operating in accordance with the Table (see No. 5.43). Administrations authorising such use shall ensure that any harmful interference caused by emissions from a station in the amateursatellite service is immediately eliminated in accordance with the provisions of No. S25.11. The use of the bands 1 260 - 1 270 MHz and 5 650 - 5 670 MHz by the amateur-satellite service is limited to the Earth-to-space direction.

5.282 In the bands 435-438 MHz, 1 260-1 270 MHz, 2 400-2 450 MHz, 3 400-3 410 MHz (in Regions 2 and 3only) and 5 650-5 670 MHz, the amateur-satellite service may operate subject to not causing harmful interference to other services operating in accordance with the Table (see No. **5.43**). Administrations authorizing such use shall ensure that any harmful interference caused by emissions from a station in the amateur-satellite service is immediately eliminated in accordance with the provisions of No. **25.11**. The use of the bands 1 260-1 270 MHz and 5 650-5 670 MHz by the amateur-satellite service is limited to the Earth-to-space direction.

5.286 The band 449.75 - 450.25 MHz may be used for the space operation service (Earth-to-space) and the space research service (Earth-to-space), subject to agreement obtained under No. 9.21.

5.328B The use of the bands 1 164-1 300 MHz, 1 559-1 610 MHz and 5 010-5 030 MHz by systems and networks in the radionavigation-satellite service for which complete coordination or notification information, as appropriate, is received by the Radiocommunication Bureau after 1 January 2005 is subject to the application of the provisions of Nos. 9.12, 9.12A and 9.13. Resolution [COM5/18] (WRC 03) shall also apply. (WRC 03)

5.329 Use of the radionavigation-satellite service in the band 1 215-1 300 MHz shall be subject to the condition that no harmful interference is caused to, and no protection is claimed from, the radionavigation service authorized under No. 5.331. Furthermore, the use of the radionavigationsatellite service in the band 1 215-1 300 MHz shall be subject to the condition that no harmful interference is caused to the radiolocation service. No. 5.43 shall not apply in respect of the radiolocation service. Resolution [COM5/5] (WRC 03) shall apply. (WRC 03)

5.329A Use of systems in the radionavigation-satellite service (space-to-space) operating in the bands 1 215-1300 MHz and 1 559-1 610 MHz is not intended to provide safety service applications, and shall not impose any additional constraints on other systems or services operating in accordance with the Table of Frequency Allocations.

5.330 Additional allocation: in Angola, Saudi Arabia, Bahrain, Bangladesh, Cameroon, China, the United Arab Emirates, Eritrea, Ethiopia, Guyana, India, Indonesia, Iran (Islamic Republic of), Iraq, Israel, Japan, Jordan, Kuwait, Lebanon, Libyan Arab Jamahiriya, Mozambique, Nepal, Pakistan, the Philippines, Qatar, Syrian Arab Republic,

Somalia, Sudan, Chad, Togo and Yemen, the band 1 215-1 300 MHz is also allocated to the fixed and mobile services on a primary basis. (WRC-03)

5.331 Additional allocation: in Algeria, Germany, Saudi Arabia, Australia, Austria, Bahrain, Belarus, Belgium, Benin, Bosnia and Herzegovina, Brazil, Burkina Faso, Burundi, Cameroon, China, Korea (Rep. of), Croatia, Denmark, Egypt, the United Arab Emirates, Estonia, the Russian Federation, Finland, France, Ghana, Greece, Guinea, Equatorial Guinea, Hungary, India, Indonesia, Iran (Islamic Republic of), Iraq, Ireland, Israel, Jordan, Kenya, Kuwait, Lesotho, Latvia, The Former Yugoslav Republic of Macedonia, Liechtenstein, Lithuania, Luxembourg, Madagascar, Mali, Mauritania, Nigeria, Norway, Oman, the Netherlands, Poland, Portugal, Qatar, Syrian Arab Republic, Slovakia, United Kingdom, Serbia and Montenegro, Slovenia, Somalia, Sudan, Sri Lanka, South Africa, Sweden, Switzerland, Thailand, Togo, Turkey, Venezuela and Viet Nam, the band 1 215-1 300 MHz is also allocated to the radionavigation service on a primary basis. In Canada and the United States, the band 1240-1 300 MHz is also allocated to the radionavigation service, and use of the radionavigation service shall be limited to the aeronautical radionavigation service. (WRC 03) {Bangladesh may join this footnote at a future WRC – see BGD27}

5.332 In the band 1 215-1 260 MHz, active spaceborne sensors in the earth exploration-satellite and space research services shall not cause harmful interference to, claim protection from, or otherwise impose constraints on operation or development of the radiolocation service, the radionavigation-satellite service and other services allocated on a primary basis.

5.335A In the band 1 260-1 300 MHz, active spaceborne sensors in the Earth exploration satellite and space research services shall not cause harmful interference to, claim protection from, or otherwise impose constraints on operation or development of the radiolocation service and other services allocated by footnotes on a primary basis.

5.393 Additional allocation: in the United States, India and Mexico, the band 2 310-2 360 MHz is also allocated to the broadcasting-satellite service (sound) and complementary terrestrial sound broadcasting service on a primary basis. Such use is limited to digital audio broadcasting and is subject to the provisions of Resolution 528 (WARC-92), with the exception of resolves 3 in regard to the limitation on broadcasting-satellite systems in the upper 25 MHz. (WRC-2000)

5.396 Space stations of the broadcasting-satellite service in the band 2 310-2 360 MHz operating in accordance with No. 5.393 that may affect the services to which this band is allocated in other countries shall be coordinated and notified in accordance with Resolution 33 (Rev.WRC-97). Complementary terrestrial broadcasting stations shall be subject to bilateral coordination with neighbouring countries prior to their bringing into use.

5.429 *Additional allocation:* in Saudi Arabia, Bahrain, **Bangladesh**, Brunei Darussalam, China, the Congo, Korea (Rep. of), the United Arab Emirates, India, Indonesia, Iran

(Islamic Republic of), Iraq, Israel, Japan, Jordan, Kenya, Kuwait, Lebanon, Libyan Arab Jamahiriya, Malaysia, Oman, Pakistan, Qatar, Syrian Arab Republic, Dem. People's Rep. of Korea and Yemen, the band 3 300-3 400 MHz is also allocated to the fixed and mobile services on a primary basis. The countries bordering the Mediterranean shall not claim protection for their fixed and mobile services from the radiolocation service. (WRC-03)

5.433 In Regions 2 and 3, in the band 3 400-3 600 MHz the radiolocation service is allocated on a primary basis. However, all administrations operating radiolocation systems in this band are urged to cease operations by 1985. Thereafter, administrations shall take all practicable steps to protect the fixed-satellite service and coordination requirements shall not be imposed on the fixed-satellite service.

5.446 Additional allocation: in the countries listed in Nos. 5.369 and 5.400, the band 5 150 - 5 216 MHz is also allocated to the radiodetermination-satellite service (space-to-Earth) on a primary basis, subject to agreement obtained under No. 9.21. In Region 2, the band is also allocated to the radiodeterminationsatellite service (space-to-Earth) on a primary basis. In Regions 1 and 3, except those countries listed in Nos. 5.369 and 5.400, the band is also allocated to the radiodetermination satellite service (space-to- Earth) on a secondary basis. The use by the radiodetermination-satellite service is limited to feeder links in conjunction with the radiodetermination-satellite service operating in the bands 1 610 - 1 626.5 MHz and/or 2 483.5 -2 500 MHz. The total power flux-density at the Earth's surface shall in no case exceed -159 dB(W/m²) in any 4 kHz band for all angles of arrival.

5.450B In the frequency band 5 470-5 650 MHz, stations in the radiolocation service, except ground-based radars used for meteorological purposes in the band 5 600-5 650 MHz, shall not cause harmful interference to, nor claim protection from, radar systems in the maritime radionavigation service. (WRC 03)

5.453 *Additional allocation:* in Saudi Arabia, Bahrain, **Bangladesh**, Brunei Darussalam, Cameroon, China, Congo, Côte d'Ivoire, Korea (Rep. of), Egypt, the United Arab Emirates, Gabon, Guinea, Equatorial Guinea, India, Indonesia, Iran (Islamic Republic of), Iraq, Israel, Japan, Jordan, Kenya, Kuwait, Lebanon**,** the Libyan Arab Jamahiriya, Madagascar, Malaysia, Nigeria, Oman, Pakistan, the Philippines, Qatar, the Syrian Arab Republic, the Dem. People's Rep. of Korea, Singapore, Sri Lanka, Swaziland, Tanzania, Chad, Thailand, Togo, Viet Nam and Yemen, the band 5 650-5 850 MHz is also allocated to the fixed and mobile services on a primary basis. In this case, the provisions of Resolution [COM5/16] (WRC-03) do not apply. (WRC-03)

5.479 The band 9 975 - 10 025 MHz is also allocated to the meteorological-satellite service on a secondary basis for use by weather radars.

5.558 In the bands 55.78-58.2 GHz, 59-64 GHz, 66-71 GHz, 122.25-123 GHz, 130-134 GHz, 167-174.8 GHz and 191.8-200 GHz, stations in the aeronautical mobile service may be operated subject to not causing harmful interference to the inter-satellite service (see No. 5.43).

5.561 In the band 74-76 GHz, stations in the fixed, mobile and broadcasting services shall not cause harmful interference to stations of the fixed-satellite service or stations of the broadcasting-satellite service operating in accordance with the decisions of the appropriate frequency assignment planning conference for the broadcasting-satellite service.

5.565 The frequency band 275-1 000 GHz may be used by administrations for experimentation with, and development of, various active and passive services. In this band a need has been identified for the following spectral line measurements for passive services: - radio astronomy service: 275-323 GHz, 327-371 GHz, 388-424 GHz, 426-442 GHz, 453-510 GHz, 623-711 GHz, 795909 GHz and 926-945 GHz;
– Earth exploration-satellite service (passive) and space research service (passive): 275-277 GHz, 294-306 GHz, 316-334 GHz, 342-349 GHz, 363-365 GHz, 371-389 GHz, 416-434 GHz, 442-444 GHz, 496-506 GHz, 546-568 GHz, 624-629 GHz, 634-654 GHz, 659-661 GHz, 684-692 GHz, 730-732 GHz, 851-853 GHz and 951-956 GHz. Future research in this largely unexplored spectral region may yield additional spectral lines and continuum bands of interest to the passive services. Administrations are urged to take all practicable steps to protect these passive services from harmful interference until the date when the allocation table is established in the above-mentioned frequency band.

Future work

Long Term

If anyone is wondering how this could help revitalize amateur radio, look at the following possible follow on effects:

- Even today's Internet surfing kids would be impressed with file transfers and amateur web sites operating in the megabit/second range.

- The technical expertise required to build such a network lies largely in the fields of software development and digital networking hardware, with some advanced radio design thrown in. This mix should prove more exciting to the young computer "hackers" out there. Armed with a Linux based system, they could cut code and tinker to their heart's content. As someone whose career got off the ground through computer hobby pursuits, I can see career benefits as well, and there's nothing more satisfying than a career based on one's interests.

- To provide the extremely high data rates the digital network requires would mean opening up the currently under utilised UHF and microwave amateur bands. This higher band occupancy, as well as the technical contribution Amateur Radio could provide to radio in general would be good reason for our spectrum space to be preserved. "Use it or lose it", in other words. The microwave bands are ideal for medium to long haul (multihop) backbone links. 802.11b looks like a promising foundation for building high speed links and also recruiting new amateurs from the ranks of wireless network experimenters, who have both an interest and expertise in technical areas.

- With LIPDs a reality on 70cm today, and the likelihood of shared amateur/commercial band segments in the future, the use of spread spectrum data in these bands could go a long way to allowing these conflicting services to peacefully co-exist. A 25 mW LIPD would be truly "low interference" to an amateur spread spectrum signal, and the reverse would largely hold true - the low power/unit bandwidth of spread spectrum would cause less disruption to LIPDs. Use of these "sharing friendly" arrangements would also demonstrate that we can adapt to the challenge of spectrum scarcity, and be good electromagnetic neighbours in the increasingly crowded bands.

The challenge is to get our act together and co-operate to advance amateur radio into the 21st Century, and restore its position as an exciting, leading edge technical hobby with many spin off benefits, both personally and in the art of radio, and to make it relevant in the digital age we currently live in. This challenge lies in many areas, such as sharing the development work, co-ordinating the system, and most important of all, attracting new amateurs with new ideas and skills into the fray, to carry the hobby into the future. If Linus and the many GNU/Linux code hackers managed to create a world class operating system, why can't we build a world class radio network? [11]

Short Term

Amateur radio in coastal area

- Bangladesh—50 million people of the land live along the wide stretch belt. 20 million of them are fishermen. 1.2 million of whom regularly stay in the deep sea with eyes full of dreams for a big catch. Storms leave thousand of them missing every year. The trawler owner and moneylender do not even provide them with any life insurance, not even with life jacket and radio. [51] (Source: COAST-Coastal Association for Social Investment Trust)

  We are aiming to build a strong partnership with the organization to facilitate coastal people with access to amateur radio. We strongly recommend that every fishing boat will have at least one ham set, so that they could be updated with weather bulletin and ask for help during emergency.

- Ham population in coastal areas should be encouraged. Not only the fishermen, young people should also be able to access radio wave and explore the benefits. It will open doors for education, information and security for our rural people.

Amateur radio for internal river route

For our internal river route we can create ham network. We propose that every trawler, launch should have a ham set attached. We can take the example of UN. All UN vehicles in Bangladesh move across the country being a part of their ham network, and each with an unique call-sign. We can create such a network among boatmen in our country.

Bangladesh Amateur Radio League (BARL)

BARL is a national platform for Bangladeshi amateur radio operators for research and learning. We already have strong partnership with BARL and hope to expand our good work and future plan through BARL. The league is in the leading position in Bangladesh for amateur radio related research and activities BRAL.

BARL liaison with government for Amateur radio promotion and also with universities or technical institutions for promoting A.R activity

Sundarban Tiger Project

According to official records of Sundarban Tiger project, there are approximately 15-50 people killed by tigers every year. The actual number is realistically double that, since people who die later from their injuries, or people who were working in the forest without a permit go unrecorded. Tigers are then sometimes killed in retaliation by the local people. This unnecessary human hardship and animosity towards tigers impedes conservation efforts. To try to alleviate this problem, the Forest Department has started to form Tiger Response Teams (PTRT).

A Tiger Response Team is made up of STP and Forest Department staff trained (or being trained) to deal with situations where tigers are threatening human lives. Stickers advertising a "Tiger Hotline" are posted throughout all the villages and Forest Department patrol posts in and around the Sundarbans. If a tiger wanders into a village or kills someone then people at the scene can call for advise. Whenever necessary, the PTRT will go immediately to the area in question to help.

There is no set strategy for the team responding to a call; every situation will be different and therefore require adaptive solutions to keep both people and tigers safe. The number one priority will always be to minimize the possibility of human injury or deaths. In this regard, much of the TRT's efforts will be simply in keeping tiger and humans apart. Further actions will be dictated by the behavior of the tiger, and the immediate level of threat to human life.

We recommend that ham activity should be encouraged in Sundarban areas, so the villagers can ask help when there is any tiger near to the locality. Forest guard and other security officers should also be brought under the ham network, so they can take necessary steps to save people and tiger by using common channel during emergency.

World Amateur Radio Day

Each year on 18 April, radio amateurs celebrate World Amateur Radio Day. On that day in 1925 the International Amateur Radio Union (IARU) was founded. In 2009, the theme of the event is Amateur Radio: Your Resource in Disaster and Emergency Communication.

It is not by coincidence that last year's meeting of the IARU Administrative Council chose this subject at this time. While the Amateur Radio Service has traditionally made its contributions to emergency and disaster response ever since its very beginnings almost 100 years ago, this role has gained a lot of importance just in the recent past. It has done so mainly for two reasons:

- The number and dimension of natural as well as man-made disasters is unfortunately on the increase.
- The modern communication technologies are increasingly complex, infrastructure-dependent and therefore also increasingly vulnerable.
- The Amateur Radio Services puts two equally valuable assets at its disposal for emergency and disaster prevention, preparedness and response:
- A large number of very flexible and mostly infrastructure-independent, local, national, regional and global networks, and
- A large number of skilled operators, who know how to communicate with often very limited means and to establish communications even under the most difficult circumstances.

  (Hans Zimmermann, F5VKP / HB9AQS, IARU International Coordinator for Emergency Communications. 2009)

Observing World Amateur Radio Day would be a useful attempt for popularization of this technology.

Conclusion

Working in the area of ham radio was an amazing experience for us. Going beyond the expensive technology it was more like a way to ensure access to technology for mass people in Bangladesh. More importantly, in this particular area we had a chance to think globally and act locally.

Friendly and cooperative attitude for providing license is a first and foremost condition for amateur radio promotion.

Radio wave is commons. Every citizen has the right to exercise his or her access radio wave, thus take part in individual and community development.

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