

# Design Proposal for Installing a Community Radio Station in a Remote Locality of Pabna in Bangladesh

Akhlaqur Rahman, Shuva Paul, A. A. Amin, Md. Wahiduzzaman, Delwar Hossain

**Abstract**—Community Radio is a type of radio service specially focused on the interest of a specific geographic community. Community radio stations are operated, owned and influenced by the communities they serve. It is generally a non-profit service and commercial benefits are completely overlooked. Especially for a country like Bangladesh, community radio has significant applications that range from educational to entertainment purposes. A country where remote localities are devoid of many facilities and therefore in danger of many of its consequences, establishment of community radios can go a long way in solving this problem. One of those remote localities is “Pabna Sadar”, the location for our proposed community radio. For this study, we have done a thorough research on the proposed locality followed by a detailed mapping of the area. We have then gone through the necessary technical specification for installing the community radio. After that, a proper analysis has been completed that shows the amount of expenditure for 2 years as well as the administrative structure. All of these elements work as the perfect backdrop for the proposal of installing a community radio in the remote locality- “Pabna Sadar” in Bangladesh.

**Index Terms**— Community Radio, Remote Locality, Transmitter, Antenna, Technical specification, Administrative Structure, Expenditure.

## 1 INTRODUCTION

About 30% people of Bangladesh live under poverty. Most of them live in rural areas. They are deprived of all kinds of modern amenities and entertainment. Education is a luxury for them. Community radio services can help them to a great extent. Cultural programs, folks, dramas can be broadcasted on the radio. Knowledge can be disseminated among the people through educational programs. Important emergency news can be spread rapidly through the radio. Thus the people of remote areas can enjoy these facilities for improving their standard of life. That is why our main concern is an easy and wide installation of community radios in the remote areas of Bangladesh. In this paper we have picked out a remote place in PABNA sadar Upazila. Pabna Sadar is an Upazila of Pabna District in the Division of Rajshahi, Bangladesh. Pabna Sadar is located at 24.0042°N 89.2500°E. As of the 1991 Bangladesh census; Pabna Sadar has a population of 431513. Males constitute 51.76% of the population, and females 48.24%. This Upazila's eighteen up population is 215133. Pabna Sadar has an average literacy rate of 29.1%. Therefore, Pabna Sadar can be a perfect place for the establishment of community radio. We have attached all technical and non-technical specification for the design proposal. We have done the total cost analysis and also marked the limitations of the proposal.

## 2 RESEARCH METHODOLOGY

To conduct the research study of this paper, design method has been used. To design a Community Radio in the remote locality of Bangladesh several factors have been taken into account. The first factor to install the Community Radio is to select the locality. Such kind of locality has been selected where the people can be benefited from this Community Radio. According to the demand of the people of that area the Community Radio has been proposed. Then according to the design, the technical specifications have been allotted. And finally the cost management has been analyzed according to the sponsored budget for the Community Radio.

## 3 HISTORY AND RADIO TECHNOLOGY

Radio is by far the most dominant and most important mass medium in the human civilization from the earlier time. The flexibility, oral characters and low cost is making it a necessary part to the mass people. Radio was first invented in 1895 and the broadcasting of radio started in 1920. In Bangladesh radio broadcasting has started during the liberation war of Bangladesh. In short, Radio Communication can be explained in the process shown by a flow chart in Fig. 1.

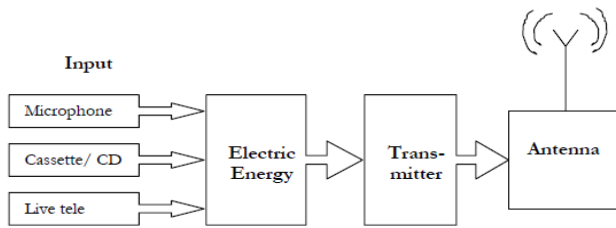


Fig.1: Radio Communication Transmission [4].

#### 4 SIGNIFICANCE OF COMMUNITY RADIO IN BANGLADESH

From the prospective of Bangladesh, a community radio can bring a revolutionary change in rural areas which are deprived of mainstream media. As it offers rare and direct media access for all perspectives in our communities, a resurgence of local media highlighting local issues, opinions and voices in contrast to mainstream medias increasingly centralized content production, the skills, resources and the opportunity to understand media by members of respective communities through actively participating in its creation and delivery, a powerful tool in providing services and support to communities, especially disadvantaged and excluded communities, the opportunity to promote democracy, human rights and sustainability, a challenge to global media blandness in reinforcing local identities while acting as a catalyst for integration and inclusion. Thus Community radio can play a significant role dealing with the issues like poverty, agriculture, gender inequality, education, natural disaster and other social problems. In Bangladesh, role played by the community radios during the cyclone MAHASSEN shows us the necessity for the installation of more community radios in remote area. And, considering all this, it is fair to say, installing community radios will have a significant impact in the remote localities of Bangladesh.

#### 5 DESCRIPTION OF THE PROPOSED AREA FOR INSTALLATION

Pabna Sadar is situated between 23053' and 24005' north latitudes and between 89009' and 89025' east longitudes. The upzilla is bounded on the north by Atgharia upzilla, on the east by Santhia and Sujanager upzillas, on the south by Pansha upzilla of Rajbari zilla and khoksha and kumarkhali upzillas of Kusthia zilla and on the west by Ishwardi upzil-

las. It has 1,38,839 units of household and total area 439.30 sq. km including 0.03 sq. km . According to the 2011 Bangladesh Census the total population of Pabna is 5,90,914. 50.24% of total population is males and 49.76% are females. Population density in Pabna sadar is 1345/km<sup>2</sup>. Pabna sadar has an literacy rate of 51.4 % while the national average is 51.8%. Pabna Sadar consists of 10 unions, 1 Pourosova, 228 mouzas and 291 villages [3].



Fig.1: Location of Transmitter and Antenna at Community Radio Station (proposed) approx. 24.0042°N 89.2500°E in Pabna Sadar Upazila, Pabna, Bangladesh by ETP Organization (Not to the scale).

#### 5 TECHNICAL SPECIFICATIONS OF THE PROPOSED COMMUNITY RADIO

For community radio the power of the FM transmitter is 100 watt and the coverage region is 25 km since this radio station is for a selected community. Moreover the frequency should be unique than any other radio stations in between 87.5-108 MHz. So that it will not interfere with any other station. In case of community radio, the coverage area should be strictly maintained because some time any specific information could be broadcast for a certain community or some confidential information could be dispatched for some community. So if the coverage is high enough it could be transmitted to other area moreover it may interfere with other community radio stations of another area which may have same frequency. So the total architecture consists of studio, broadcasting and community radio station infrastructure. The detailed specifications are given below:

##### 5.1 Studio Equipments:

*DAW (Digital Audio Workstation) for Production & Broadcast Studio:*

High Performance Cases: Black Case with 2 x12.0 mm Quiet Case Fans;, Intel Core i7, 3.06 (MHZ, 8MB Cache CPU Quiet Noctua NH-U12 With Dual 120mm Fans, Gigabyte X58A- UD7 1366 socket, Intel 3420 DDR3, 4xDIMM Slots, Motherboard  
 Silent nVidia GT 240 1GB Passive Cooled Graphics Card, 8GB (4 x 2GB) PC10600 1333MHz DDR3 Ram, Two Massive Storage Drives: 300GB Western Digital Hard Drive For OS & Programs, 2000GB SATA II For Data and Audio / MP3; Samsung Blueraay/DVD / CD Rom Reader / writer Quiet Sony / NEC SATA 24x Dual Layer DVD +/- Rewriter M-audio professional Sound grabber; Windows: 7 Profession-

al.

*Mixing Console (Mackie CFX16):*

16-channels; 8 mic preamps; 4 full stereo channels; 50dB Input Gain control; 18dB Octave; 100Hz low cut filter; 3-band Equalizer; 2 Aux send, Pan, Mute; USI3/ USB through interface; Phantom power; 12 segment LED meter; XLR and TRS stereo output jacks; 7-band Graphic Equalizer for monitor output; Digital effects.

*Condenser Microphones (AKG3000B):*

Transducer- Condenser pressure gradient large diaphragm capsule; Polar pattern- Cardioid; Frequency response- 30Hz- 20 kHz; Sensitivity- 15mV/Pa; Impedance- 200  $\Omega$ ; S/N ratio- 80dB; Equivalent noise level- 20 dB; 0.5% THD; 48V Phantom power; Shock mount.

*Studio Microphones (Shure 8M58):*

Frequency response- 50-15,000 Hz, Polar Pattern- Cardioid, Sensitivity- -54.5 dBV/Pa, Impedance- 1500, Polarity- Positive, Connector- XLR male.

*Monitor Speakers (Mackie MR8):*

Type- 2-way Active; Nominal (RMS) Output Power- 90 Watts; Response bandwidth- 40-20,000 Hz; Input Impedance- 10 k $\Omega$ ; Crossover frequency- 2000 Hz; Output features- Bass Reflex; Magnetically Shielded; Connectivity- Wired; Controls- Middle, Treble; 81- amplified; 1x Woofer, 1x Tweeter; Connector- 1x balanced audio input (XLR), 1x balanced audio input (stereo 6.3mm)

*Studio Monitoring Headphones (AKG27-1):*

Type- 2-way Active; Nominal(RMS) Output Power-90 Watts; Response bandwidth-40-20,000 Hz; Input Impedance-10 kil; Crossover frequency-2000Hz; Output features-Bass Reflex; Magnetically Shielded; Connectivity-Wired; Controls-Middle, Treble; Bi amplified; 1X Woofer, 1 X Tweeter; Connector-1x balanced audio input(XLIR), 1 x balanced audio input (Steno 6.3mm).

*Monitoring Headphones (Shure SRH240):*

Transducer- Dynamic air coupling-Circumaural. Closed; Frequency response-8Hz- 25 kHz; Charecteristics SPL- 113dB (at 1 kHzliVrms); THS-<0.1%; Nominal Impedance- 64 $\Omega$ ; Connector-3.5 stereo mini jack with screw on " adaptor; Up to 32 dB ambient noise attenuation; Neodymium magnets.

*Rack Mountable CD Player/Writer (Tascam CC- 222SL Professional CD Recorder):*

Rack mount, Stereo; Capable Discs- CD, CD-DA, CD-RI RW (including MP3 and WAV CDs), Sample rates- 16/ 44.1 kHz; CD-Text and ID3 Support; RCA and XLR I/O; Digital

Coaxial Output, CD to Tape dubbing; CD and Cassette Pitch control; Dolby B Noise reduction.

*Digital Portable Audio Recorder (Zoom H4n):*

Recording media- SD or SDHC; Bit rate- WAV: 16/ 24 bit, MP3: 32 - 320 kbps, VBR; Sampling Frequency- 44.1 and 48k1-Iz, 2-Channels; Frequency response- 20Hz - 20kHz; AID & D/A conversion- 24-bit; Connectors- 3.5mm Line, Mic, Headphone Input, Line out, Mini USB port, power input; Battery life- 7.5 hours or better.

*ALTOPATCH 114" Patchbay:*

1U, 1/4" TRS Connections

*19" Rack Cabinet:*

22U, Active Fans, Power strip

*Phone-in Program Console:*

Input- Send1: Balanced XLR- Female; Send 2: 3.5 mm mini mono; Output: Balanced XLR male, Unbalanced 3.5. stereo; Handset- RJ11 Jack; Isolation 1500 VAC; Phone Line- RJ11 Phone line; Impedance- Inputs Send 1: 1k, Send 2: 20k $\Omega$ , Outputs Balanced 200 $\Omega$ , Unbalanced 50 $\Omega$ , Headphones 80 $\Omega$ .

*Microphone Boom Stand:*

Table top Stand

*Editing Software ACID Pro7 (Professional Digital Audio):*

ACID Pro7 (Professional Digital Audio Workstation)

## 2.2 Broadcast Equipment:

*FM Transmitter 100 Watts:*

Operating Frequency Range: 87.5 - 108 MHz, Input/ Output Impedance 50  $\Omega$ ; Spurious and harmonic suppression < - 80 dBc, RF Probe -50 dBc, 500, BNC; Power Stability <1%, RF efficiency 64% - 84% typ; Forced air cooling; Continuous 24/24 h service; Operating temperature -5°C to +45°C; Relative humidity Up to 95%; Operating voltage 110/220/240 V<sub>ac</sub>  $\pm$ 10%, single phase, 50Hz; Automatic power regulation with a 2% stability; Intelligent Protection for VSWR, Insufficient cooling, Output unbalance, Fault in RF and Power supply stages.

*Antenna System:*

Frequency range 87.5 - 108 MHz; Bandwidth- Broadband; Polarization-Vertical; Connector N-female; Power Handling Capacity- 1 kW, Gain- 6 dBi (max); Impedance- 50  $\Omega$ ; VSWR- <1.3:1.

*Audio Compressor/ Limiter:*

Frequency response- 20 Hz - 20 kHz; Dynamic range- 110 dB min, A-weighted; D/A, A/D conversion- 24 bit; Impedance- Input: 10kci, Output: 120 kΩ; Output Clipping Level- +24 dBu, +12 dlitu with 12 dB pad engaged, +6 dBu with 18 pad engaged; THD- <0.05%, +4 dBu, 20 Hz to 20 KHz; Polarity- non-inverting; Crossover- adjustable slopes; Butterworth, Bessel & Linkwitz- Riley up to 24 dBI octave; Dynamic Processing- AGC: 12 dB boost; Compressor/ Limiter- Selectable soft knee or fixed hard knee, Single-channel or stereo, Peak stop limiter; Delay- 10 seconds, 20 microsecond resolution; Matrix mixer- Routes any input to any output, Adjust- cross point gain, muting and polarity.

**5.3 Community Radio Station infrastructure:**

*GI pipe guyed mast tower:*

Galvanized 4 inch base, Stainless Still guy wire support. Automatic tower warning light.

*Station Grounding (Copper):*

Lightning protector for the tower, Grounding for the Antenna, Studio & Transmitting equipment.

*Studio Acoustic Treatment:*

Voice studio, Production Studio and Broadcast Studio with sound proofing for recording and broadcasting.

*Studio Furniture for Production & Broadcast:*

Voice Studio, Production Studio and Broadcast Studio Custom built tables and ergonomic chairs.

*Power back up for Studio Equipment and DAWs (UPS/ IPS 30 min):*

Delixi 2KVA Voltage Stabilizer, Zebo Power 2.5KVA Voltage Stabilizer, 6KWh Low Noise Generator.

*Wiring, connectors:*

Low noise/ loss audio wiring; Professional quality connectors.

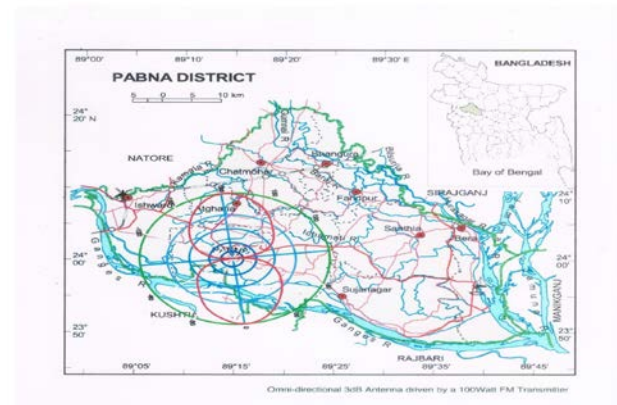


Fig. 3: RF Footprint of the (proposed) Community Radio Station at Pabna Sadar Upazila, Pabna by ETP Organization (Omni-directional 3dB Antenna driven by a 100 Watt FM Transmitter) (District View)

Figure 2 visualizes the position of the proposed community radio in the map. It will be established at Pabna sadar Upazila, Pabna, Bangladesh. Afterwards figure 03 shows the coverage region (approximately 25km) by Omni directional 3dB antenna of the transmitter. Moreover Figure 3 also highlights the position of the district in the map of Bangladesh.

**6 ADMINISTRATIVE STRUCTURE:**

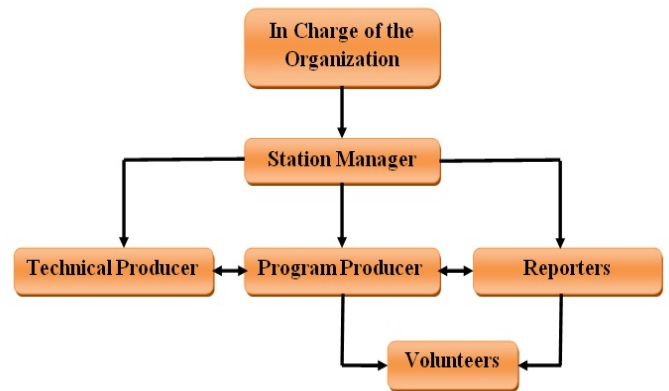


Fig. 4: Administrative Structure of the Community Radio.

The Fig. 4 shows the administrative structure that has the following elements:

1. The person In-charge is always selected from the organization. He makes the executive decisions when needed.
2. The Station Manager is the key person to manage and run the CR Station properly. Generally he/she is a competent person who is on salary of the organization.
3. Program producer is the person responsible for designing and producing radio programs from the guideline of the station. This person is also under the salary structure.
4. Then there is the technical producer who is responsible to broadcast (on air) the programs. S/He also looks after the transmitter. This person is also salaried.
5. Reporters generally are field agents who gather stories and make reports on them. They are also under fixed salary payment from the organization.
6. The volunteers are there to primarily help the reporter. Program producer can also use volunteers

to help him/her out. Eventually, they will acquire the skills to be accommodated in expansion plan. Their salary is normally working based payments.

### 7 MANAGEMENT COMMITTEE

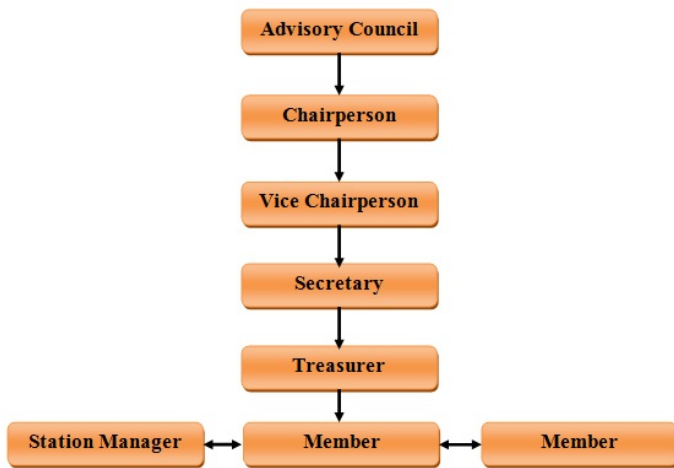


Fig. 5: Management Committee for the Community Radio.

According to Fig. 5, a management committee must have some necessary members to run properly:

1. The Advisory council is generally formed according to some organizational guidelines.
2. The Chairperson is the person in charge of the whole program. Every major decision must go through the chairperson. A Chairperson can come from the community.
3. The Vice Chairperson is normally in supporting capacity. However he/she has significant input in major decision making.
4. Secretary is a person that can be appointed from the organization. They are the connecting bridge between the general staff and the head of the program.
5. A treasurer is normally the person in charge of money allocation and distribution according to the needs of the program. A treasurer has to be very smart, honest and well equipped.
6. Station manager have a vital role, since she/he manages the work on a day to day basis. He/she must also work well with the other general members of the program.

For the sake of equity and proper environment, the Committee should be gender balanced and community centric.

### 8 FINANCIAL PLANNING AND COST ANALYSIS

CR station needs resources to operate. Both local and external resources can be mobilized for the purpose. A proposal of income and expenditure chart for a timeline of 2 years has been assessed:

TABLE 1  
PROPOSED INCOME AND EXPENDITURE FOR COMMUNITY RADIO FOR TWO YEARS

Particular	Year 1 (Taka)	Year 2 (Taka)	Total (Taka)
Grant			
Annual Periodic	5,00,000	8,00,000	13,00,000
Internal			
Projected Income	10,00,000/-	12,00,000/-	22,00,000/-
Donors' support			
Peoples participation			
Cash	2,00,000/-	2,50,000/-	4,50,000/-
Kind	1,00,000/-	1,20,000/-	2,20,000/-
Labor	50,000/-	75000/-	1,25,000/-
Other Income			
Total	18,50,000/-	24,45,000/-	42,95,000/-
Pre-operating expenditures (Station Setup)	30,00,000/-	-	30,00,000/-
Program expenditure	11,16,000/-	12,27,400/-	23,43,600/-
Administrative expenditure	6,21,000/-	6,25,100/-	12,46,100/-

From the table, the total income for the proposed CR has been calculated to be 42, 95,000. This has been calculated by calculating grants, projected incomes, donors and people's participations and other incomes.

All the possible sources of expenditure have also been tak-

en into consideration and the various types of expenditures has been assessed.

### 8.1 Assessment of Expenditures:

CR stations can assess three types of expenses:

- 1) Pre-operating expenditures
- 2) Program expenditures
- 3) Administrative expenditure

#### 1) Pre-operating expenditures:

The Pre operating expenditure basically means the expenses behind setting up a station. This is a one-time expense (for year 1 only). For our CR, the pre-operating expenditure has been proposed to be around 30, 00,000/-

#### 2) Program expenditures:

The Program expenditure includes elements like development expenditure, production expenditure, communication expenses and transportation expenses etc. For year 2, there has been a 10% increment assumed on years 1's expenses. For, the proposed CR, total program expenditure for 2 years are assumed be around 23, 43,000/-

TABLE 2  
 PROPOSED PROGRAM EXPENDITURE FOR COMMUNITY RADIO FOR TWO YEARS

Particular	Year 1 (Taka)	Year 2 (Taka)	Total (Taka)
Program development expenditure (Research, survey, interactions...)	1,20,000/-	1,32,000/-	252,000/-
Program production expenditures (Salary and allowances)	9,00,000/-	9,90,000/-	18,90,000/-
Communication expenses	60,000/-	66,000/-	1,26,000/-
Transportation expenses	36,000/-	39,600/-	75,600/-
Total expenditure	11,16,000/-	12,27,600/-	23,43,600/-

#### 3. Administrative expenditures:

The administrative expenditure for 2 years has been calculated with year 2 having a 10% increment on the expenses of year 1. Expenses like house rent, charges (electricity, communication and transportation), salaries, allowances, renewal fees and other logistics security are all calculated to find the total administrative expenditure for the proposed CR, which is 12,46,000/-

TABLE 3  
 PROPOSED ADMINISTRATIVE EXPENDITURE FOR COMMUNITY RADIO FOR TWO YEARS

Particular	Year 1	Year 2	Total
House rent	96,000/-	105,600/-	2,01,600/-
Electricity charges	36,000/-	42,000/-	78,000/-
Communication charges	45,000/-	49,500/-	94,500/-
Transportation charges	24,000/-	36,000/-	60,000/-
Salaries	1,20,000/-	1,32,000/-	2,52,000/-
Allowances	20,000/-	25,000/-	45,000/-
Other logistics Security (2 persons)	60,000/-	75,000/-	1,35,000/-
Renewal fees	2,20,000/-	1,60,000/-	3,80,000/-
Total expenditure	6,21,000	6,25,000	12,46,000/-

## 9 DISCUSSIONS

A community radio in the remote locality "Pabna sadar" has a lot of upsides and potential. However, considering all the situations, there are some limitations that need to be considered as well.

First of all, the community radio needs to have some definite motive.

### 9.1 Vision and Mission:

The vision and mission for the community radio is

- i) Medium of communication
- ii) Creating mass awareness
- iii) Spreading education
- iv) Training
- v) Inspiring for Development
- vi) Weather forecast
- vii) Crisis management medium
- viii) Source of entertainment

### 9.2 Scope of the work:

A community radio in "Pabna Sadar" has a lot of scopes to contribute to the development of the community. First of all, there is the obvious social aspect. A community radio can be utilized to build social awareness in this relatively backward locality that is devoid of a lot of facilities, some of which that the people are not even aware of. It also works as a source for people to be encouraged to accept higher level of education than they are already getting. The other aspect is of course the entertainment. For people living in the locality that is miles away from an actual city, entertainment may mean completely different and unfortunately less advanced to the general people. The most important aspect however is the fact that a community radio works as the main medium of communication for the locals of the "Pabna Sadar". A place that has very little support to provide to the uninformed masses, miscommunication can mean catastrophic in many cases. For example, in scenarios of flood or cyclones, having a community radio will play a pivotal role in making sure that people take proper pre-cautions and remain safe. This alone can be a key factor behind backing the idea of installing a community radio in this locality.

## 10 LIMITATIONS

In comparison with FM radio, community radio has some limitations. The basic difference between FM and community radio is that FM radio does not have any limitation of broadcast boundary whether community radio policy has fixed coverage area of 17 km. The proposed community radio will be established in a rural area. The rural area is low fading terrain because Pabna sadar upazilla does not have high rise building or structures. So the fading will be less hence the antenna height of community radio should be less than or equal to 106 meter. The antenna height is a major limitation because when the antenna height is increased then the coverage area is increasing too. In this case the coverage area should be not more than 17 km. If the height of antenna is increased the coverage area will increase as well and as a result that frequency may interfere with another nearby radio stations. Another major limitation is high installation and non refundable license cost moreover the equipment prices are not very low. So the initial installation cost is bit high moreover the maintenance cost is also not a little amount as well [1] [2].

## ACKNOWLEDGMENT

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