The Low Power FM application

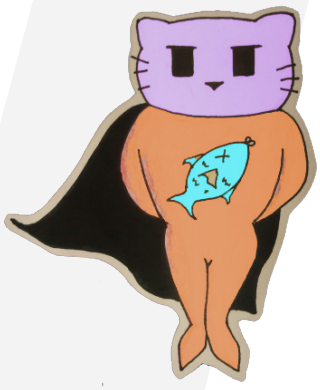
What you need to know for the technical section
by
Prometheus Radio Project

Inspired by Nan Rubin's LPFM Technical guide

INDEX

Introduction
Part A
- Area of Coverage: How far will it go?
- Rural vs Urban, Mono vs Stereo
- Line-of-Sight
- Power and Height
- How FM radio transmission works
- How to find an engineer
- How to find a transmission site
- Channel Search
- Channels available
- How to secure Reasonable Assurance

Part B
- Filling out your Application: Form 318, Section VI, "Tech Box"
- Tech Box, Line by Line
- Introduction (FCC Instructions and RFree)
  - 1. Channel
  - 2. Antenna Coordinates
  - 3. Antenna Structure Registration Number
  - 4. Site Elevation
  - 5. Tower Height
  - 6. Antenna Height
  - 7. Power and Height Limitations
  - 8(a). Interference to Other Stations and Exhibit 11
  - 8(b). Interference to Translator Inputs and Exhibit 12
  - 9. Interference to TV Channel 6
  - 10. Environmental and Safety
- Preparer's certification



Part A

INTRODUCTION

So you are getting ready to apply for a Low Power FM radio station license! For more than a decade, Prometheus Radio Project has advocated for a more just media system and worked to build participatory radio as a tool for social justice organizing and a voice for community expression. The newly available Low Power FM licenses are the result of this work. As the application window in October approaches, we want to help you navigate the labyrinths of the FCC towards a successful application.

Filling out FCC forms is not an easy task. There can be a lot information to sift through and plenty of confusing language. Defective or incomplete applications will be returned without consideration by the FCC. And a small mistake on your application, particularly in the technical section, can knock you out of the running for a station.

This guide will provide some relevant background information and explain the technical section of the LPFM application (Form 318, Section VI, LPFM Engineering, Tech Box). We will explain the technical information you will need to understand in order to fill out the application. This document does not include information about how to fill out the rest of Form 318--the legal aspects, nonprofit information, etc. We have several other resources that can help you with the legal parts of the application. Visit our website prometheusradio.org and call our Help Desk for more information.

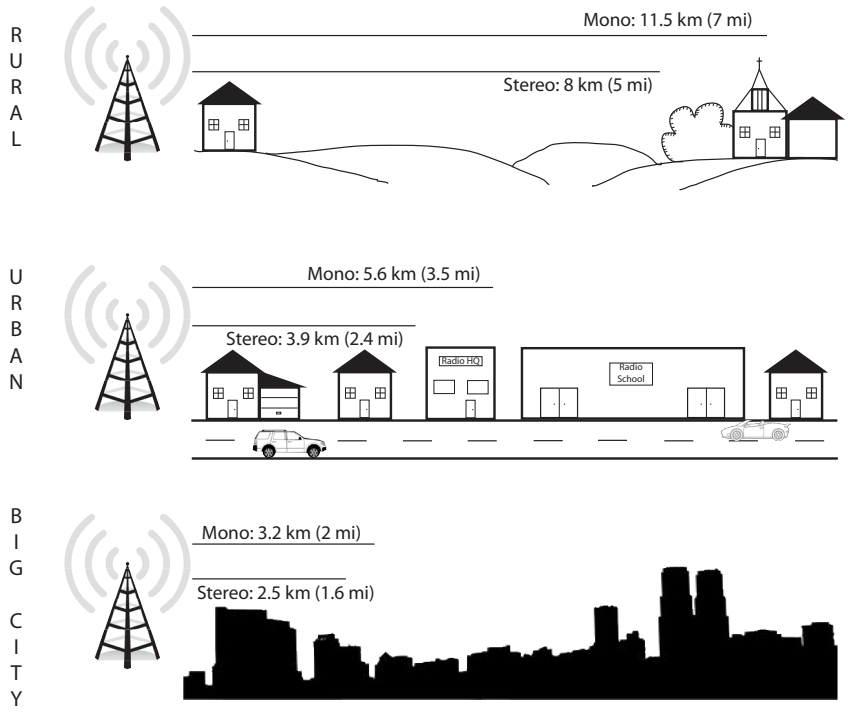
Area of Coverage: How far will it go?

The $20,000-dollar question is who can hear your radio broadcast! It is difficult to predict precisely how strong a radio signal will be, so here are some guidelines which apply if the area around your station is fairly flat -- we'll talk about some other situations later. We'll also assume that your LPFM is broadcasting using its maximum allowed power of 100 watts and that your antenna is 30 meters (100ft) higher than the average ground height in the area.

Helpful Hint

A monophonic, or mono, signal only plays through one speaker, like on a cell phone or an overhead public address system. A stereophonic, or stereo, signal is played through two speakers at once, like on a boombox, headphones, or car stereo. This is why some instruments sound like they're on the right or the left when you listen to music. A stereo signal is actually two mono signals in one, one each for the left and right speakers.

Signal Distance



You will be able to choose whether to broadcast in mono or stereo. The distance from your antenna to that circle is approximately:

Rural mono 11.5km (7mi, 44dBu), stereo 8km (5mi, 48dBu)
Urban mono 5.6km (3.5mi, 60dBu), stereo 3.9km (2.4mi, 66dBu)
Big City mono 3.2km (2mi, 70dBu), stereo 2.5km (1.6mi, 74dBu)

For example, a stereo signal in an urban area will approximately fill

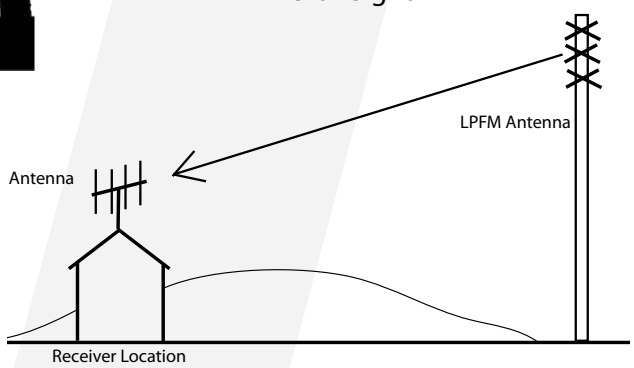
At places where your signal is strong enough, radios will be able to receive your signal. Not all radios are the same, and radios in the basement have a tougher time than radios in the attic, so we have to generalize.

Think of your coverage area like a circle centered on your radio station's antenna. People within the circle have a strong enough signal to tune in. How big is the circle? Like most things in life, the answer is... that depends.

Rural vs Urban, Mono vs Stereo

The distance is different in rural areas, urban areas, and big cities with lots of tall buildings, because buildings and trees affect radio signals. It also depends on whether people are receiving a monophonic signal, or a stereo signal -- mono can be received further. An FM radio signal can be either mono or stereo. A stereo FM radio signal cannot be received as far away as a mono signal.

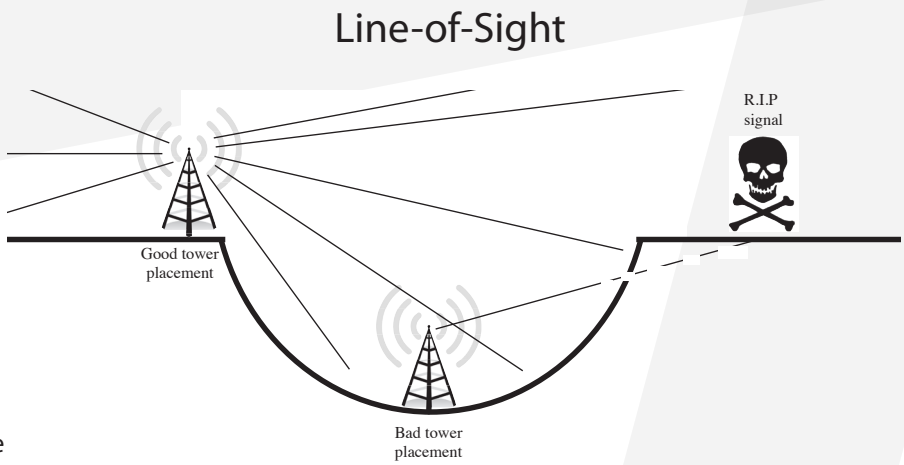
Line-of-Sight



a circle 4.8 miles across (2.4 miles in all directions from the antenna). A good radio will probably be able to receive the signal somewhat further away, and a poor one might not quite receive it that far. It depends.
The coverage estimates above are the normal ranges expected for an LPFM station but lots of other things can affect your coverage.

Line-of-Sight

One of them is "line of sight" which means literally what it says. The closer you are to being able to directly see from the transmitter antenna to the radio receiver, generally the stronger the signal will be. Since you can see further from high places, you can usually improve your signal with a higher antenna. The FCC won't let you raise your antenna past a certain point without adjusting (reducing) your wattage/power, but even so, you may be better off with a higher antenna and lower power, at least in rural and some urban areas. The exception is big cities, where you need a lot of power to have any chance to reach listeners in and on the other side of the forest of huge buildings. In big cities, keep your antenna low enough that the FCC will allow you at least 20 watts or more (up to the LPFM limit of 100 watts).



Think of your antenna like a light bulb. Anywhere the light bulb shines is in its line-of-sight. Areas where an obstruction casts a shadow are outside its line-of-sight. FM antennas work in much the same way. Obstacles in between an FM antenna and a radio will cast a shadow and the radio will have difficulty receiving a signal.
How can you figure out "line of sight"? One way is to use geographic software or radio prediction software, but we don't know of any that are free -- it can be done manually with a topographic map too. Another way is to climb (carefully) to where you might want to put your antenna and take photographs all around, maybe at different heights. Or you might be able to fly a balloon or mount a bright light where your antenna might go, and see if you can see it from different places around your listening area.
Sometimes it makes sense to put the antenna on a hill at the edge of where your listeners are if it has better lines of sight, than to put it close to the middle. If you have a depression in your desired listening area, it might make sense to put your antenna at the edge of that even if it isn't the exact center of the listening area, so there's less shadow in the depression.

Power and Height

Low Power FM radio stations are permitted to broadcast with an Effective Radiated Power of up to 100 watts. While you can bring your power down, you cannot increase it to more than 100 watts. A violation of this rule could result in a fine, and fines can be quite a nuisance!

Helpful Hint

Effective Radiated Power (ERP) is the final power output from your antenna which is used to predict the broadcast range of your radio signal. In mathematical terms, ERP = [Antenna Power] X [Antenna Power Gain]. Since both the vertical and horizontal polarized antenna components contribute to the broadcast range, the FCC mandates that neither component can exceed 100 ERP. For more information see our, Hang 'Em High guide prometheusradio.org/transmission#antennas_towers.

Your LPFM station can broadcast with 100 watts of power as long as your antenna is at or below 30 meters Height Above Average Terrain. There is a direct relationship between height and power. As you increase the height of your antenna, you are required by the FCC to reduce your power in order to maintain the same broadcast range.

Helpful Hint

Height Above Average Terrain (HAAT) refers to the antenna's height relative to the average ground height in the area surrounding the antenna. The FCC calculates the HAAT by estimating the average altitude above sea level of the land in the surrounding area, and subtracting that from the height of the antenna above sea level.

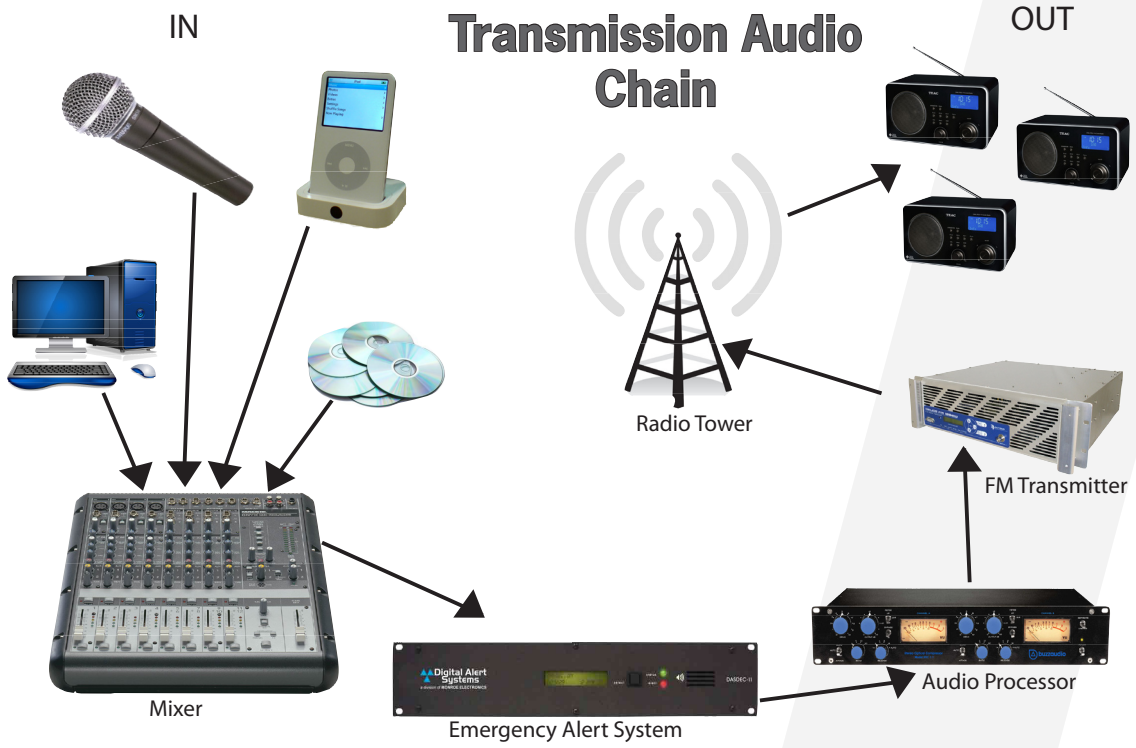
Terrain will determine where you would build your station. Remember our discussion of height and lines of sight? Well, you may want to find the highest place in your town to place your antenna. If the terrain around you provides natural height, it is possible to place your antenna on a hill on a short structure without building a big tower. But if you are in a low part of town and you want to be able to reach your community, you might have to build a tall tower, find a tall existing building, or use an existing tower.

More information about how to define the ideal transmitter/antenna site can be found further in this guide.
The FCC would grant licenses for new LPFMs that will not cause any kind of interference with existing FM signals. In some situations, particularly in big cities with crowded radio markets, you might have to prove that your new LPFM won't cause any new interference. An experienced broadcast engineer will be able to write an engineering exhibit for your application to demonstrate that your station will not be interfering with an existing signals.

How FM radio transmission works

While we won't get into the technical details, we want to give you a general idea of how an FM broadcast works. Imagine a simple audio system. You might have a sound source like a microphone or mp3 player, an amplifier, and speakers. An audio signal goes into the system from a microphone or mp3 player, is amplified, and comes out through the speakers.

An FM transmission works in a similar way, but we replace the amplifier and speakers with a transmitter, antenna, and radio receivers. A broadcast radio system also starts with a sound source like a microphone or mp3 player. The sound source is sent to a mixer board (console), to an audio processor, and then to a transmitter that will convert the audio signal into an electrical signal that will be send through an antenna as FM airwaves. On the other side you will have a receiver like a car radio or handheld radio.



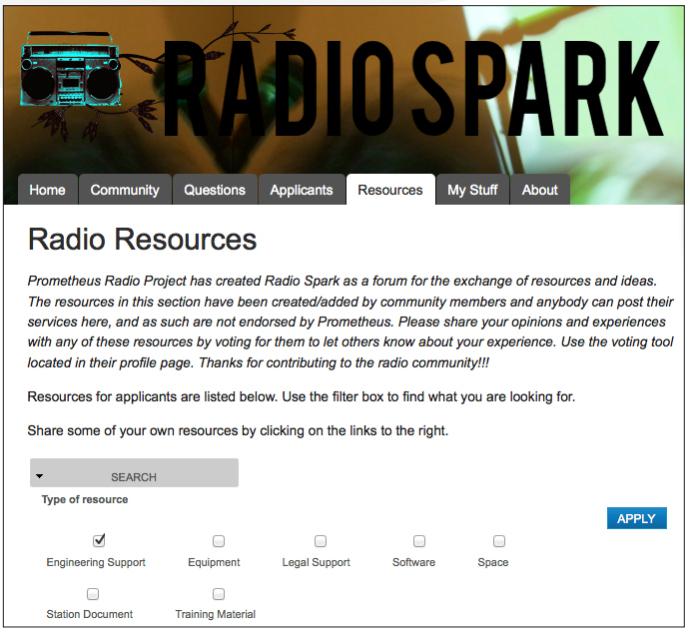
Each FM station has a specific frequency, also known as the FCC channel number. FM radio, TV, cell phones, microwaves, airport communications, all of them need to be assigned with a specific channel, that way they will not cause interference with each other. If you want to listen you need to know where to tune!!!

In order to apply for an Low Power FM radio station you will need to find your own channel. An available frequency in your community is a requirement to apply for a Low Power FM. To know more about how to find out if there is an available frequency in your community go to the chapter *Channel Search*.

How to find an engineer

In order to apply for a radio station from the FCC you will need to be able to answer a few technical questions such as: Where will your antenna and transmitter be located? Which frequencies are available in your area and which one are you going to apply for? How high does your antenna need to be to reach the maximum number of people?

If you can't answer these questions you'll need to hire the services of an engineer. There are many types of radio engineers out there but you need a special kind– one that can do allocations studies and submit applications to the FCC. You can find a directory of engineers on Radio Spark. Call some of them up and ask them if they have ever submitted applications to the FCC and if any of those applications have been granted. The range of costs we've been hearing for this type of work has been $200 to $3,000 depending on what your location and what you need.



Let us know what engineer you are working with by emailing support@prometheusradio.org. If you have any good or bad experiences with an engineer listed on Radio Spark add your comments to their listing and vote them up or down. Remember to be aware of scams. Anyone can post their services on Radio Spark, and as such are not endorsed by Prometheus.

You can also search in the FCC database records of applications that have been submitted for FM licenses. The database will show the information and will tell you if the form prepared was actually been granted with the license. If the technical box of an application was prepared by an engineer, the actual form will show the name of the engineer.

http://www.fcc.gov/encyclopedia/fm-query-broadcast-station-search

You can search by Facility ID No, or signal call letters. Then you can scroll down and click in Application List. You can choose app 318 for the FM applications.

It is possible that you won't need an engineer to help you with your application because you are in an area with little interference. If this is your situation use section B in this guide to help you fill out the form.

CDBS: Station Info Application Info
Application List CDBS Search Page

Application Search Results

File Number		Form	Paper/ Elect	Call Sign	Facility Id	Service	Status	Status Date	Details
BRED	20130522ABT	303	E	KXCI	22167	FM	ACCEPTED FOR FILING	05/23/2013	Info | Application
BTCED	20130123ACF	315	E	KXCI	22167	FM	GRANTED	03/15/2013	Info | Application
BTCED	20110421AAG	315	E	KXCI	22167	FM	GRANTED	07/07/2011	Info | Application

How to find a transmission site

Selecting a good transmission site is the key to a successful LPFM application. A transmission site, also known as a tower site or antenna site, houses the equipment that broadcasts an FM signal out to the world. Transmission sites are often located at the same place as the broadcast studio. This makes it easy to send audio to the transmitter.

Often the best transmission site in an area is not the best place to put a publicly accessible radio studio. For example, the best location for your radio studio is usually on a main street or at a central location in your town or city. On the other hand, your transmission site might work best if it's located on a nearby hill or on top of a tall building. If your transmission site and broadcast studio are located in two different places, you will need a studio-to-transmitter link (abbreviated STL) to send audio from your main studio to the transmission site. For more information on studio-to-transmitter links, visit our guide *Sound Around Town* at prometheusradio.org/transmission#sound_around_town.

The transmission site has three components: a transmitter, an antenna, and a structure where the antenna will be mounted—a tower, a mast, a building, a flagpole, or water tower. The transmitter needs shelter from the elements, a power source, and a connection to the audio from your broadcast studio. The antenna does not need a power source because it is powered by the transmitter.

There are two types of locations to look for when siting your transmission setup. You can either rent space on an existing tower or find your own location where you can mount your antenna on a new tower or other structure. Finding your own location is often

much more affordable than renting space on an existing radio tower.

First, consider any buildings or properties that your organization already rents or owns. Can any of those locations reach your desired coverage area? Could you mount an antenna on the building or build a tower there? Can you get approval from the owner of the property?

In general, it is easier to mount an antenna on an existing building or tower then to build a new tower. You can mount an antenna on the top or side of a building using a small tower or mast. However, smaller do-it-yourself towers (well under 30 meters) can be constructed with the help of a big group of friends and neighbors and a knowledgeable amateur radio enthusiast or structural engineer.

So, you will have to search for a building-top or piece of land that you can purchase, rent, or use pro bono. One important factor in site choice is the optimal height of your antenna at any given location (see HAAT explanation above). You will need to determine the HAAT of an antenna at each location you consider. This will allow you to determine whether a building's roof is too high or too low for your antenna or if building a new tower at a location makes sense. If you find a location where a small tower will be enough to get your antenna to 30 meters HAAT, building your own tower is usually a very good option.
If you choose to build a tower, be sure to check your local zoning laws and building codes. You might need a building permit from your city. In rare cases, you might need to file additional information with the FCC about the environmental impacts of your new tower. And, if your tower is very high--more than 60 meters--or near an airport you might need to have it registered with the FAA and painted and lighted for flight safety. For more information check out our guide Hang 'Em High at prometheusradio.org/transmission#antennas_towers.
If you don't own the building or property that you plan to use as your transmission site, you must get a Reasonable Assurance Agreement from your potential landlord before submitting your LPFM application to the FCC. This Reasonable Assurance Agreement is a written promise from a property owner that says they will allow you to locate your transmission site on their property if you are granted an FCC license. More on this later.
For more detailed information on finding a transmission site, visit prometheusradio.org/transmission#transmissiontoolkit.

Channel Search

Channels available

Helpful Hint

Frequencies and Channels

In the U.S., the FM band starts at 88.1 MHz and ends at 107.9 MHz, even though we sometimes say "88 to 108". Only the odd frequencies are used -- 88.1 yes, but 88.2 no -- so that makes a total of 100 frequencies on the FM dial.
Radio geeks and the FCC call these 100 frequencies "channels", and for some reason the first one, corresponding to 88.1, is channel 201. 107.9 MHz is called channel 300. Although it is rare, channel 200, or 87.9 MHz, is allocated to some radio stations. You won't have to know the channel number very often, but when you do need it, here are the conversion formulas:
channel = 201 + (frequency - 88.1) / 0.2
*frequency = 88.1 + (channel - 201) * 0.2*

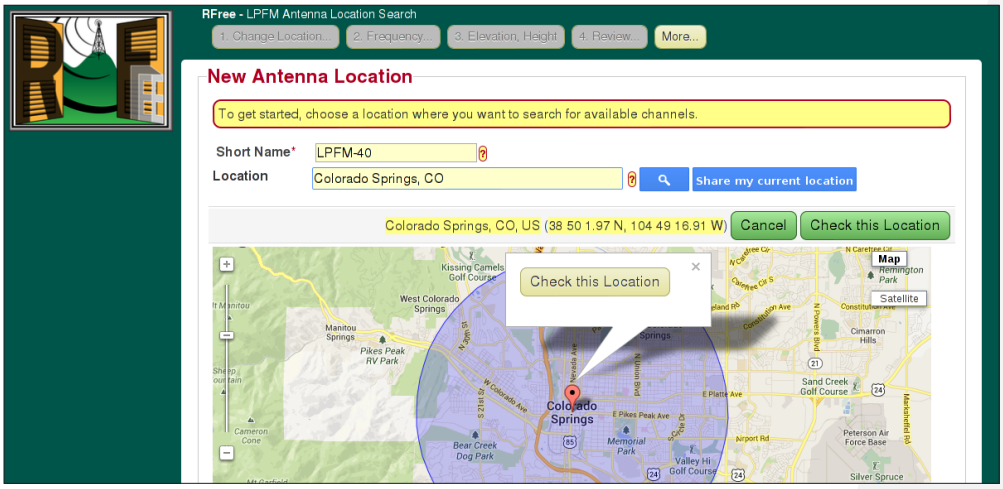
To apply for an LPFM, you will mainly need:
1. a **location (longitude, latitude)** for the place you will be building your antenna
2. the **elevation** of that location
3. the **height of the antenna**
4. and the **frequency**, or channel.

The process for finding a great transmission site will involve a process of trial and error. You might try one location that has a perfect elevation and height but no good frequencies. Or, you might find a location where several great frequencies are available but its elevation is too low to realistically build a tower. It is not always simple.
But if in your search everything magically goes right the first time, this is what the process would look like:
1. You already know where you want to put your antenna, so plug the coordinates, or address at least, into a channel finder (we'll use RFree for our examples) to see which frequencies might be available there.
2. Discover that exactly one frequency is available, and it involves no complications, what we call a "green channel".
3. You are certain you will have no competitors also applying for LPFM in your area.
4. Discover that the radio reception will cover the audience you care about.
5. Fine-tune your antenna coordinates if you started with an approximate location.
6. Discover that the allowable range of antenna heights at that location (usually you'll chose the lowest allowed height)
    i. is cost effective -- your group can afford the tower, antenna, or other structure(s) which need to be purchased and/or constructed

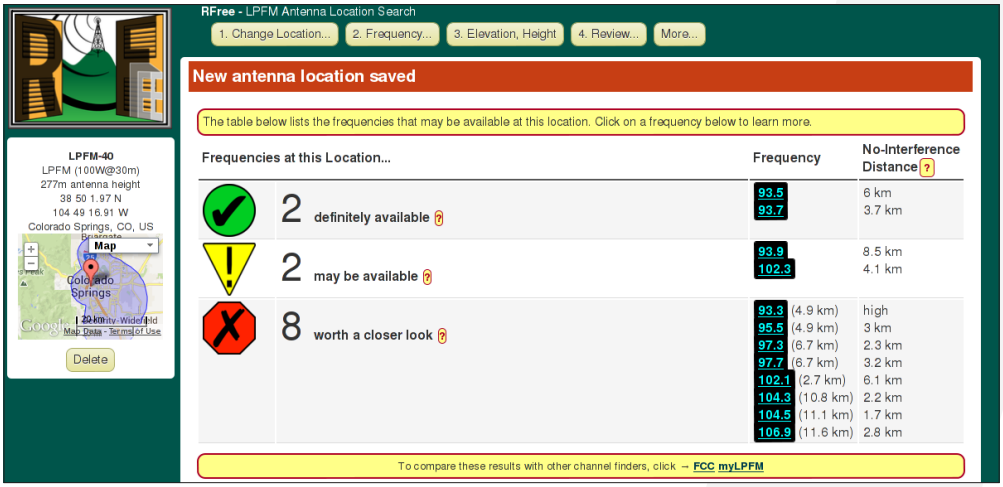
ii. is legal, considering local ordinances, zoning, covenants, and so forth
iii. the property owner is supportive of you making the necessary modifications
iv. the property owner is happy to give you a letter of **reasonable assurance**

If that is all true, you're already prepared to fill in the technical part of your LPFM radio station FCC application! But things are rarely that simple, so let's revisit the steps one at a time.

Step 1: People often start with the question: "can I put an LPFM anywhere nearby the area I care about?", and don't yet have an exact antenna location in mind. So the first step is sometimes to plug your town name, or address, into a channel finder, just to see if you have any frequencies there. If you find frequencies which roughly cover your audience, then you can try evaluating some specific locations. [go back to step 1]
Sometimes there aren't any frequencies, and you might try some other nearby locations. [go back to step 1]
To make this discussion easier, we'll use an example of Colorado Springs, CO



Step 2: Frequently there are several frequencies available with different technical, cost, and strategic characteristics:
The RFree summary page shows two "green channels(√)", 93.5 and 93.7; two "yellow channels(!)" which "may be available", 93.9 and



102.3; and, some "red channels(X)" which may be available by moving the antenna a certain distance: 2.7km for 102.1 for example. Each frequency has different strategic and competitive considerations, costs to build and to maintain, and a different clearest-signal distance. The web page shows the clearest-signal distance in the third column -- 6km for 93.5 for example, the other green channel is only 3.7km, so the preferred choice (avoiding the yellow for now) would be 93.5 in this situation. However if you only want to cover a small area, around 3.7km from the antenna or less, then maybe 93.7 is a better strategic choice, considering competitors. More on that when we talk about step 3.
You might be getting curious about the "yellow" channel 93.9 because it has an 8.5km clearest-signal distance. What does yellow mean anyway? It means that an expert will need to review the details for that channel; that you are likely to need extra technical information for your FCC application; that it is possible the channel may not be available; and that it is more likely cost more to engineer and purchase equipment for that channel than for a "green" one. Those technical details are beyond this document, but usually *it is a good idea to evaluate yellow channels even when green channels are present!*
One other thing to notice is that three of the four frequencies are next to each other on the FM dial: 93.5, 93.7, and 93.9 (in the

US, 93.6 and 93.8, for example, are not available). There's no way to build two stations on 93.9 in the same location -- they would severely interfere with each other and the FCC won't allow it. One click away on the radio dial is still bad -- you can't build a station at 93.7 AND 93.9 at the same location for the same reason. This means that even though there are three 93.something frequencies, either there can be one station at 93.7; or two stations (93.5 and 93.9); but not three. Allowing for 102.3; this means a maximum of three stations at this location, but possibly only two.

Step 3: Are you going to have LPFM competitors? It is hard to know, but one clue is to look at the area on a map where an antenna could be located at the frequency you're considering. RFree can show that, and for the 93.5 for example, an antenna could be located pretty far to the south and east of the current location. So 93.5 would be open to possible competition from applicants in towns east and south. But LPFMs on the same frequency can be placed as close as 24km to each other, so an applicant on 93.5 in the southern valley would not compete (LPFMs one frequency apart can be as close as 14km to each other). So that gives one idea where to look for your potential competitors, and cooperators.
The strategic questions of which channel is best, given the FCC dispute-resolution rules, your geography, political and cultural situation, and how to use allies, are beyond this document, however a table with the following headings for each potential channel and location is a good start:

- Frequency & Location
- Clearest-signal Distance
- Covers desired listeners
- Application engineering costs
- Antenna costs, especially when fancier ones are required
- Mounting structure cost
- Site or Tower rental cost
- Adjacent to other frequencies?
- Competition

Step 4: You'll notice on the left side of the web page a little blue outline on a map. That's a prediction using the FCC formula of the good coverage area of this potential LPFM station, not including interference. Colorado Springs is dramatically mountainous on its west side and further west, and slopes slowly down into prairie to the east. Using what you know from the "How Far will it Go?" section, you should be a little cautious -- that the signal may possibly go a little further to the west than is predicted, and maybe not quite so far to the east. Think: line of sight.

Step 5: Sometimes you might start with an approximate location, like a street address or a click on the map. Before you can be definite about step 6, it is a good idea to fine-tune the location, because small location differences can be pretty dramatic.

Step 6: LPFM regulations put limitations on antenna height, and RFree calculates the height above ground which is permitted at your location. For the Colorado Springs example the recommended height is 277 meters, which is crazy high! It's also probably not necessary, but more on that in a minute.
If 277 meters was a legitimate value, then unless there's already a really tall structure at your location, like a skyscraper or antenna tower, it would be unlikely that you could achieve it. If zoning would allow it, constructing a tower that high would be very expensive! (see section on antennas and zoning) You might want to try locations not far away, which are higher, or have tall structures already -- the side of a big hill or the top of a small hill perhaps. Or you may need to build a lower antenna, and suffer the coverage area reduction.
But 277 meters in Colorado Springs is not as necessary as it might first seem and a lower antenna might work well enough. To find out, contact an expert who can use sophisticated computer software to get a good coverage prediction.
There are also some additional technical factors, especially on yellow channels, which might unrealistically limit your antenna height and position because of disallowed interference.
Step 6 often ends with going back to step 1.

How to secure Reasonable Assurance

If you don't own the building or property that you plan to use as your transmission site, you should get a Reasonable Assurance Agreement from your potential landlord before submitting your LPFM application to the FCC. This Reasonable Assurance Agreement is a written promise from a property owner that says they will allow you to locate your transmission site on their property if you are granted an FCC license.

Securing this agreement in writing is extremely important and absolutely necessary! If you lose your transmission site after your application has been approved by the FCC, you will have start over, find a new transmission site, and file more paperwork with the FCC. This will take away from the time you will need to organize your community and build your station! Even if you plan to put your tower and antenna in your grandmother's backyard for $1 a year, get her to sign an agreement!
Here is an example of a Reasonable Assurance Letter from a tower owner to an LPFM applicant:

Reasonable assurance

Dear [LPFM APPLICANT ORGANIZATION],

Based on our discussion this confirms that, should your FCC construction permit application be granted for a low-power FM non-commercial authorization with antenna at coordinates [XX XX XX.X N XXX XX XX.X W], [I/WE] have space available at [MY/OUR] tower, and would be willing to enter into a lease of tower space with you, subject to final determination of a rental rate based on market conditions at the time.

Sincerely, _____ [INDIVIDUAL and/or OWNER]
On behalf of [FACILITY/TOWER OWNER/ORGANIZATION]

[FACILITY-ID ###### or ANTENNA ASRN ######]

Date: _____

Part B

Filling out your Application: Form 318, Section VI, "Tech Box"

Tech Box, Line by Line

Tech Box & Rfree

The LPFM application, FCC Form 318, is completed and submitted electronically on the FCC's website.

http://www.fcc.gov/encyclopedia/low-power-fm-broadcast-radio-stations-lpfm

The FCC also supplies a sample version of the application as a PDF file which also includes detailed instructions.

http://transition.fcc.gov/Forms/Form318/318.pdf

The following section is a supplement to the FCC's instructions that explains the technical section of Form 318.

RFree, an LPFM channel finder developed by Prometheus Radio Project, includes a "Tech Box generator" that can calculate values for many of the fields based on user input.

http://rfree.radiospark.org

For instructions in how to create an account in CDBS go to

http://www.prometheusradio.org/cdbshowto

Section VI - LPFM Engineering, Tech Box

TECHNICAL SPECIFICATIONS

Applicants must list technical specifications accurately. Contradictory data found elsewhere in this application will be disregarded. All items must be completed. The response "on file" is not acceptable.

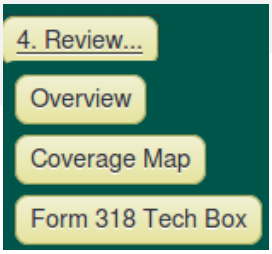
TECH BOX

1.	Channel:	
2.	Antenna Location Coordinates: (NAD 27) Latitude: Degrees Minutes Seconds ◉ North ○ South Longitude Degrees Minutes Seconds ◉ West ○ East	
3.	Antenna Structure Registration Number: ☐ Not Applicable ☐ Notification filed with FAA	
4.	Antenna Location Site Elevation Above Mean Sea Level: meters	
5.	Overall Tower Height Above Ground Level: meters	
6.	Height of Radiation Center Above Ground Level: meters	
7.	**Power and height limitations.** By checking "Yes", the applicant acknowledges that it will be authorized to operate within the parameters defined in 47 C.F.R. Section 73.811 as calculated based on the data specified herein.	○ Yes ○ No

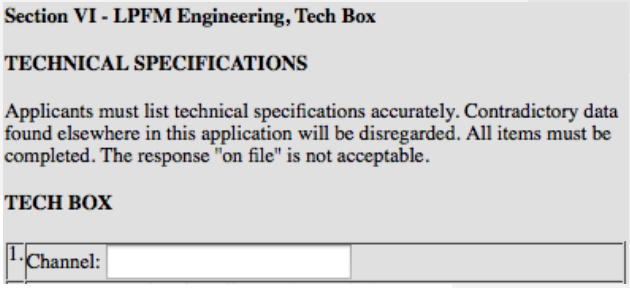
1. Channel

This is the channel that your station will use. Your channel is a number between 201 and 300, which corresponds to your frequency on the radio dial. If you don't already know the channel corresponding to your frequency, you can convert using the formula:

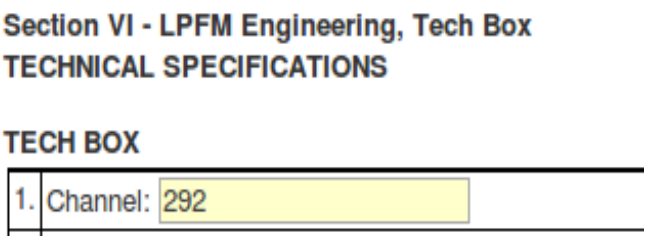
channel = 201 + (frequency - 88.1) / 0.2 Channel numbers range from 201 to 300.



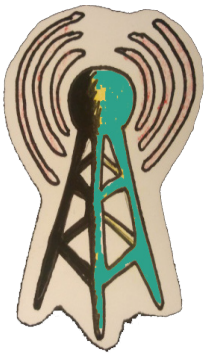
RFree's tech box will compute the channel number for you.



Check!! channel numbers are from 201 to 300 -- do not use frequencies, like 98.1, in box #1



2. Antenna Coordinates



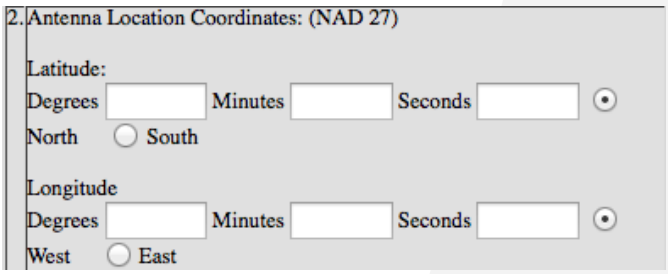
This is the location where you will place your antenna. The proposed antenna site must be located using NAD27 geographic coordinates, however Google Maps, GPS devices, and other current mapping technology uses the newer NAD83 standard (also called WGS84), so you will have to convert to NAD27 before you fill out this section. NAD27 and NAD83 is a little like Fahrenheit and Celsius -- they mean the same thing but use different numbers to do so. The FCC web site has a converter or if you use RFree, the RFree tech box converts for you (see also the RFree [Change-Location->Latitude, Longitude] page).

If you use the FCC antenna tower registration system, be aware that it uses and expects the newer NAD83 coordinates, so you will need to convert, or let RFree do it automatically. If you are sharing space with the antenna of an existing station, you can use that station's coordinates from the FCC database directly on line 2 because the FCC FM database uses NAD27.

You can enter fractional seconds on line 2, like 30.32 seconds, so how precise do the coordinates need to be? One second of latitude or longitude represents 30 meters (100 feet) or less, and has historically been accepted, but tenths of seconds is even better these days (3 meters, 10 feet) if you have it. RFree uses 100ths of seconds internally. You should list your coordinates at least to the nearest second.

Check! If you will use a registered tower, that your coordinates match those of the registered tower.

Check! coordinates are NAD27 not NAD83



3. Antenna Structure Registration Number

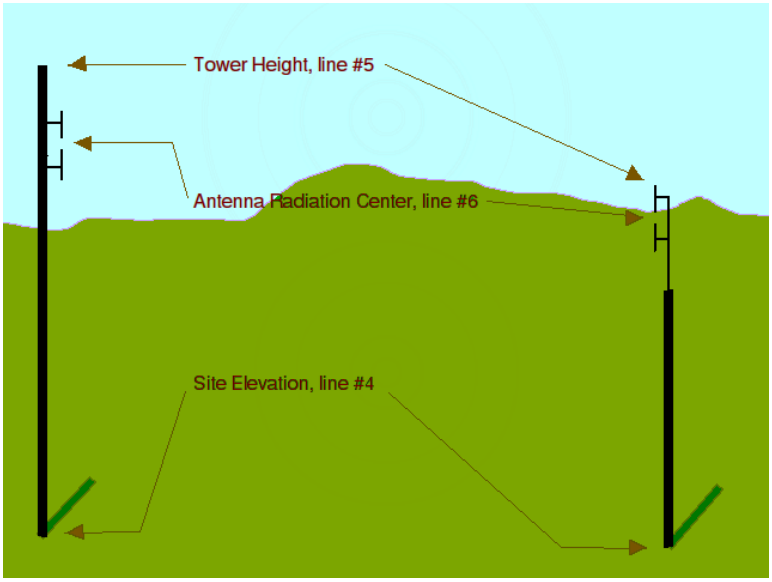
3. Antenna Structure Registration Number: ☐ Not Applicable ☐ Notification filed with FAA

This section is only required if your antenna structure (tower) is near an airport and tall enough to be of concern to air traffic. Most towers taller than 62 meters (200 feet) located near airports are registered with the FAA with an Antenna Structure Registration Number. If you are NOT using one of these towers, (because you are putting your antenna on the roof of your building or a small tower) check the box "Not Applicable." If you are using space on an existing tower, confirm that the tower is registered using the FCC antenna database and check the box "FAA Notification Filed with FAA." If you are constructing a tower, check to see if it needs to be registered with the FAA using their TOWAIR evaluator. You can find the TOWAIR evaluator and the Antenna Registration system at ***http://wireless.fcc.gov/antenna/index.htm?job=home.***

Be aware of when to use NAD27 and when to use NAD83 coordinates when using the registered antenna databases (RFree line-by-line tech box help includes instructions).

Check! If you wil use a registered antenna tower, be sure that your antenna location coordinates (line #2) are the same as those in the antenna tower registration database. In the past, the FCC checked that the coordinates were within 0.5 seconds of latitude and longitude.

4. Site Elevation



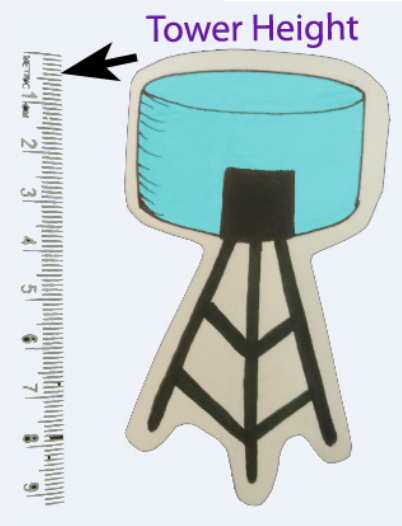
All heights are in meters -- rounded to the nearest meter. RFree will supply an elevation automatically -- you can verify it against another reliable source like a topographic map, surveyor, or perhaps Google Earth. If you are co-locating with another FM station, you can use their elevation from FCC records or a more precise elevation if it is to your advantage.

Check! If you will use a registered antenna, your site elevation should be close or identical to the elevation listed in the registered antenna database, rounded to the nearest meter.

4. Antenna Location Site Elevation Above Mean Sea Level: _____ meters

5. Tower Height

5. Overall Tower Height Above Ground Level: _____ meters



This is the height of the highest point of anything on your tower OR antenna OR the building you are mounting upon -- the highest thing which could hit an airplane. If you put your antenna on top of a telephone pole, it is not the height of the pole, it is the height of the top tip of your antenna. This helps determine if you need to register your antenna with the FAA, and if you are using a registered antenna, the FCC may reject your application if line #5 is different than the registered antenna's "Overall Height above Ground Level (AGL)".

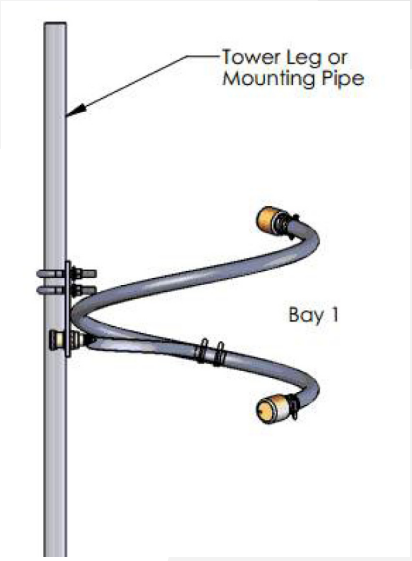
Check! If you will be using a registered tower, that the "Overall Height Above Ground Level (AGL)" from the on-line tower database matches your line #5, rounded to the nearest meter.

Check! Line #5 is at least 1 meter higher than line #6. The FCC performed this check in the past and may do so again.

6. Antenna Height

5.	Overall Tower Height Above Ground Level:	meters

Since FM antennas can be from 1 meter to over 3 meters from bottom to top, what is the height of the "radiation center"? Usually it is the height of the vertical center of your antenna. If you have two antenna bays, like the drawing, it is the point halfway between them. To be certain, use the manufacturer's specifications from your antenna.



If you haven't yet chosen a specific antenna, or if you want to start with an inexpensive one and upgrade later, then you can conservatively estimate that a one-bay antenna (the simplest and cheapest) will be 2 meters tall (some are a lot shorter than that) and a two-bay will be 4 meters tall, and so forth -- two meters per bay. Different models may be a lot more compact, or slightly larger, than this estimate.

Check! Line #5 is at least 1 meter higher than line #6. The FCC performed this check in the past and may do so again.

7. Power and Height Limitations

Just check "yes" unless you intend to violate the law and disregard the power levels the FCC allows on your construction permit, in which case they will disregard your application!

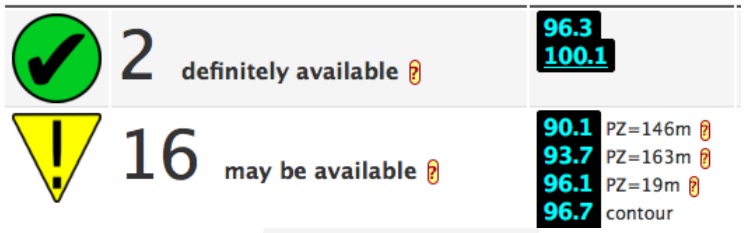
7.	**Power and height limitations.** By checking "Yes", the applicant acknowledges that it will be authorized to operate within the parameters defined in 47 C.F.R. Section 73.811 as calculated based on the data specified herein.	○ Yes ○ No

Check! The only correct answer is "yes".

Exhibits

An explanatory exhibit providing full particulars must be submitted for each question for which a "No" response is provided.

8(a). Interference to Other Stations and Exhibit 11



This question asks you to certify that your station is far enough away from other stations that you won't cause interference. RFree, myLPFM, the FCC's LPFM channel finder, and commercial software, will help you answer this question. If your station meets the distance requirements (most software says you have a "green" channel), then check "Yes". If you are short spaced to a second-adjacent station (most software codes this as "yellow"), check "No", and attach "exhibit 11" to demonstrate that you will not actually cause interference.

RFree's example Form 318 tech box shows the correct box checked. In some cases, RFree can produce Exhibit 11 for you. In other cases, you may need to hire an engineer to complete this exhibit.You can look for engineers under "Resources" at RadioSpark.org.

8.	a.	**Interference.** The applicant certifies that the proposed facility complies with all pertinent distance separation requirements of 47 C.F.R. Section 73.807. You must prepare exhibit 11. Click "No" and read the help →	○ Yes ◉ No See Explanation in Exhibit 11

Check! Your channel-finder or other allocations software's assessment of proper spacing to comply with LPFM rules.

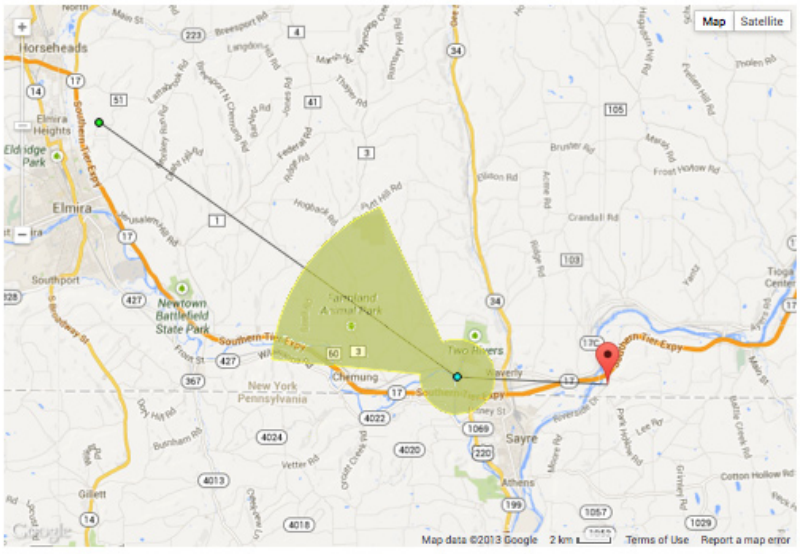
8(b). Interference to Translator Inputs and Exhibit 12

This question asks if your station complies with rules related to the protection of input signals of certain FM translators. It only applies if you are located near one of these translators.

Check "YES" if:

- your location has one or more translators "near" -- within the keyhole-shaped protection region described in FCC rule 73.827
- and one or more of them is, or might be (translator data is sometimes missing), receiving directly off the air from another FM station or translator
- and is receiving on a frequency third-adjacent to your frequency
- your location meets all the requirements of 73.827.

Translator W229AR/FX/D/LIC 93.7 MHz WAVERLY, NY, US More from FCC REC CMA
ERP @ HAAT
0.005 kW @ -39.3 m
Site elevation
311 m
Antenna elevation
337 m
Coordinates NAD-27
42 0 31 N 76 33 28 W
Coordinates NAD-83
42 0 31.27 N 76 33 26.8 W
Facility ID
157446
Antenna ID



Check "N/A" if your station is not near a translator that must be protected according to the rules above.

Checking "No" will result in your application being dismissed.

b.	**Interference to Translator or Booster Input Signals**. The applicant certifies that the proposed facility complies with all pertinent requirements of 47 C.F.R. Section 73.827(a).	○ Yes ○ No ○ N/A See Explanation in Exhibit 12
	Note: Where Section 73.827(a) is applicable, an applicant must certify that the proposed facility complies with the distance separation requirements set forth in that section or demonstrate that "no actual interference" would occur based on either the signal strength ratio showing or minimum distance separation formula set forth in 47 C.F.R. Section 73.827(a) or an alternative technical arrangement agreed to by both the applicant and the affected FM translator or FM booster station.	

RFree will check "N/A" if your station is definitely not affected by this rule, however RFree cannot check all factors so will not check "Yes" or "No" -- you have to do the research.

Check! Answering "No" will result in dismissal of your application.

b.	**Interference to Translator or Booster Input Signals**. The applicant certifies that the proposed facility complies with all pertinent requirements of 47 C.F.R. Section 73.827(a).	○ Yes ○ No ◉ N/A See Explanation in Exhibit 12
	Note: Where Section 73.827(a) is applicable, an applicant must certify that the proposed facility complies with the distance separation requirements set forth in that section or demonstrate that "no actual interference" would occur based on either the signal strength ratio showing or minimum distance separation formula set forth in 47 C.F.R. Section 73.827(a) or an alternative technical arrangement agreed to by both the applicant and the affected FM translator or FM booster station.	

9. Interference to TV Channel 6

Stations on Channels 200-220 must meet special requirements so that they do not interference with TV Channel 6. Check "Yes" if your application is for a channel less than 221 (Channel 200 - 220) and you meet all the required spacings, which channel finders will tell you. Check "N/A" if you are not applying for a channel between 200 and 220. Check "No" to get your application rejected. You should not need to supply exhibit 13 unless you are short-spaced and have a good reason why that is ok, like for example the TV station is going off the air before you will go on the air. RFree's form 318 sets this checkbox correctly.

Check! Answering "No" will result in dismissal of your application.

9.	**TV Channel 6 Interference (Channel 201-220).** The applicant certifies that the proposed facility complies with 47 C.F.R. Section 73.825.	○ Yes ○ No ○ N/A See Explanation in Exhibit 13

10. Environmental and Safety

The only correct answer is "Yes". Complete the worksheet on your own to be sure you comply, but you do not have to submit it. Supply exhibit 14 if your proof of compliance is more complicated than the worksheets. If the worksheet is missing from the FCC instructions, here is an old version which will probably be similar to the new one:

http://www.radiospark.org/content/form-318-old-environmental-and-rf-safety-worksheets

Check! Answering "No" will result in dismissal of your application.

10.	**National Environmental Policy Act.** The applicant certifies, based on its completion of Worksheets 2 and 3 and its review of the instructions to this application, that the proposed facility is excluded from environmental processing under 47 C.F.R. Section 1.1306 (i.e., the facility will not have a significant environmental impact and complies with the maximum permissible radiofrequency electromagnetic exposure limits for controlled and uncontrolled environments). Unless the applicant can determine compliance through the use of the attached General Environmental and RF Exposure Worksheets, an **Exhibit is required**.	○ Yes ○ No See Explanation in Exhibit 14

PREPARER'S CERTIFICATION

If you are working with a Consulting Engineer his information should be enter here.

THE FOLLOWING PREPARER'S CERTIFICATION MUST BE COMPLETED AND SIGNED.

PREPARER'S CERTIFICATION

I certify that I have prepared Section V (Engineering Data) on behalf of the applicant, and that after such preparation, I have examined and found it to be accurate and true to the best of my knowledge and belief.

Name	Relationship to Applicant (e.g., Consulting Engineer)	
Signature	Date	
Mailing Address		
City	State or Country (if foreign address)	Zip Code
Telephone Number (include area code)	E-Mail Address (if available)	

WILLFUL FALSE STATEMENTS ON THIS FORM ARE PUNISHABLE BY FINE AND/OR IMPRISONMENT (U.S. CODE, TITLE 18, SECTION 1001), AND/OR REVOCATION OF ANY STATION LICENSE OR CONSTRUCTION PERMIT (U.S. CODE, TITLE 47, SECTION 312(a)(1)), AND/OR FORFEITURE (U.S. CODE, TITLE 47, SECTION 503).

Validate Save Clear Menu

At this point you should be done with Section VI, "Tech Box"!!! See, that wasn't so complicated.

NOTES

NOTES

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