

Name \_\_\_\_\_

# Spectrum Management Sheet

Today you and your group are going to investigate the companies that use the electromagnetic spectrum to broadcast in your area. Please go to the following web page.

<https://www.radioreference.com/apps/db/>

Once you go to the address above you need to click on your state. Then click on your county. If you cannot identify your county on the map ask your teacher for assistance. Once you click on the correct county a page will come up that contains the county spectrum users as well as links to private users in the county.

Start with the county users, just scroll down the page and you will see them listed. To find out more about an entry either click on the license or the system name depending on the table. This will provide you with more information that you can use to fill in the table below.

Once you are finished with the county users scroll to the top of the page and look for the county quick jumps menu (to the right of the map). Under the heading “Other Agencies” you will see a list. You will have to click on each category one at a time to find all the spectrum users. As you go through the categories be sure to gather information to fill in the table below.

If you run out of rows in the table below you can create an additional table on notebook paper.

Agency	Use	# of frequencies




--	--	--

The above local users are licensed by the federal government to broadcast in your county. However, there are other users not on this table. Some of them are licensed to broadcast in a larger area than your county, others are not required to have licenses. Read the handout – **Additional users of the Spectrum** – and then list each user below being sure to indicate if that use is licensed or unlicensed.

Now, that you have identified all the users of the spectrum you need to decide which users are most important. In the table below the categories the federal government uses for allocation of the spectrum. Using the provided description decide how many of the local users from above belong in each of the categories. Then decide on a rank for each category (even the ones without local users) and provide a reason for your decision. Your ranking should reflect how important you think that use of the spectrum is and therefore how much of the spectrum they should be allowed to access.

Category	Description of included uses	# of Local Users	Ranking	Reason



Aeronautical mobile	Aircraft radios and emergency location transmitters			
Aeronautical radionavigation	Navigation, obstruction warning, instrument landing and measurement of altitude and range			
Amateur radio	Regular people communicating using radio frequencies. Often called Ham radio.			
Amateur satellite	Regular people launching satellites to collect data or for communications			
Broadcasting	Radio or tv broadcast from antennas on Earth			
Broadcasting satellite	Broadcasts radio and tv from space			
Earth exploration satellite	Used for measuring soil temperatures and moisture which is useful for farming, use for communication with radio tags on wildlife, to measure the size of forests and other land features, takes images used for urban planning			
Earth Sensing	Scientific apparatus that collect data. Example radio tracking collars on wildlife.			
Fixed satellite	Communication between two communication stations on Earth which requires the signal be sent from one Earth station to a satellite and then to the second Earth station.			
Inter-satellite	Communication between satellites			

Land mobile	A mobile communication that involves antennas located on Earth			
Maritime mobile	Ship to shore or ship to ship communication involving hardware on Earth			
Maritime radionavigation	Ship navigation systems			
Meteorological aids	Weather sensing from a ground station			
Meteorological satellite	Weather sensing from a satellite			
Mobile	Communication or data transfer using devices that can move			
Mobile satellite	Hand-held communication devices that make calls using a satellite. Usually referred to as a satellite phone.			
Radio astronomy	Using radio waves to study bodies in space			
Radiodetermination satellite	A different way to use satellites for communication. Can work for people with mobile devices on land or on ships			
Radiolocation	Using radio waves to determine the location of something using a land based system.			
Radionavigation	Using radio waves to plot a course using land-based hardware			
Radionavigation satellite	Using radio waves to plot a course using satellites			
Space operation	Radio frequencies dedicated to the communication necessary to launch a			

	spacecraft and for continued communication between the land and the craft when in space			
Space research	Radio frequencies dedicated to scientific data collection in space			
Standard date and time communication	Radio frequencies to broadcast the current time and date			

The federal government allocates spectrum to licensed users based on a complicated system of rules. Read the handout – **How Spectrum is Allotted** – to learn more. However, by analyzing the spectrum chart you can determine which uses the government is prioritizing based on the amount of spectrum allotted. Go to <https://www.ntia.doc.gov/page/2011/united-states-frequency-allocation-chart> and download the PDF version of the chart. While the writing appears very small at first, remember you can increase the size of the document to make it easier to read. All of the categories from above are represented on this table and they are color coded. For each category you need to estimate the total percentage of the spectrum that is allocated to that use. Ask your teacher if you need some help with making this estimation. It is important to remember that this technique is intended to give you an idea how much spectrum is allocated to each use, not an exact measure. Once you have determined the percentage for each category (Hint: your percentages should add up to 100) then give each category a rank. The one with the highest percentage is #1, representing the category the government thinks is most important.

Category	Description of included uses	%	Ranking
Aeronautical mobile	Aircraft radios and emergency location transmitters		
Aeronautical radionavigation	Navigation, obstruction warning, instrument landing and measurement of altitude and range		

Amateur radio	Regular people communicating using radio frequencies. Often called Ham radio.		
Amateur satellite	Regular people launching satellites to collect data or for communications		
Broadcasting	Radio or tv broadcast from antennas on Earth		
Broadcasting satellite	Broadcasts radio and tv from space		
Earth exploration satellite	Used for measuring soil temperatures and moisture which is useful for farming, use for communication with radio tags on wildlife, to measure the size of forests and other land features, takes images used for urban planning		
Earth Sensing	Scientific apparatus that collect data. Example radio tracking collars on wildlife.		
Fixed satellite	Communication between two communication stations on Earth which requires the signal be sent from one Earth station to a satellite and then to the second Earth station.		
Inter-satellite	Communication between satellites		
Land mobile	A mobile communication that involves antennas located on Earth		
Maritime mobile	Ship to shore or ship to ship communication involving hardware on Earth		

Maritime radionavigation	Ship navigation systems		
Meteorological aids	Weather sensing from a ground station		
Meteorological satellite	Weather sensing from a satellite		
Mobile	Communication or data transfer using devices that can move		
Mobile satellite	Hand-held communication devices that make calls using a satellite. Usually referred to as a satellite phone.		
Radio astronomy	Using radio waves to study bodies in space		
Radiodetermination satellite	A different way to use satellites for communication. Can work for people with mobile devices on land or on ships		
Radiolocation	Using radio waves to determine the location of something using a land based system.		
Radionavigation	Using radio waves to plot a course using land-based hardware		
Radionavigation satellite	Using radio waves to plot a course using satellites		
Space operation	Radio frequencies dedicated to the communication necessary to launch a spacecraft and for continued communication between the land and the craft when in space		
Space research	Radio frequencies dedicated to scientific data collection in space		



Standard date and time communication	Radio frequencies to broadcast the current time and date		

Please note: If you look on the chart you will see a color assigned to Fixed which refers to the location of the hardware used for that service. For a fixed service the hardware is on Earth. This is not a category of it's own but rather a description of other categories.

Mobile – a base station is on a vehicle that moves. This could be on a plane, ship, etc. This is not a type of user but rather a description of a user.

### Conclusions

Compare your rankings to the rankings created from the government table to answer the following questions.

1. Where there any similarities between your rankings and the government's?
  
2. What differences existed between the two rankings?



3. Why do you think these differences exist?
  
  
  
  
  
  
  
  
  
  
4. Which use do you think the federal government should allot more spectrum to? Why?
  
  
  
  
  
  
  
  
  
  
5. Which use do you think the federal government should allot less spectrum to? Why?
  
  
  
  
  
  
  
  
  
  
6. The government sells the right to use certain frequencies to cell phone companies. In areas with large populations many companies show interest in purchasing those frequencies because it is likely they will get a lot of customers. Conversely, because there are so many cell phone companies in the area the competition for customers is fierce and the prices remain low. However, in areas with low populations there are fewer cell phone companies that are willing to purchase the right to use the frequencies. Therefore, there is less competition and the prices are typically higher than in an area with a larger population. How do you think the government could entice companies to provide service in those low population areas? Are there any additional consequences from that governmental action?