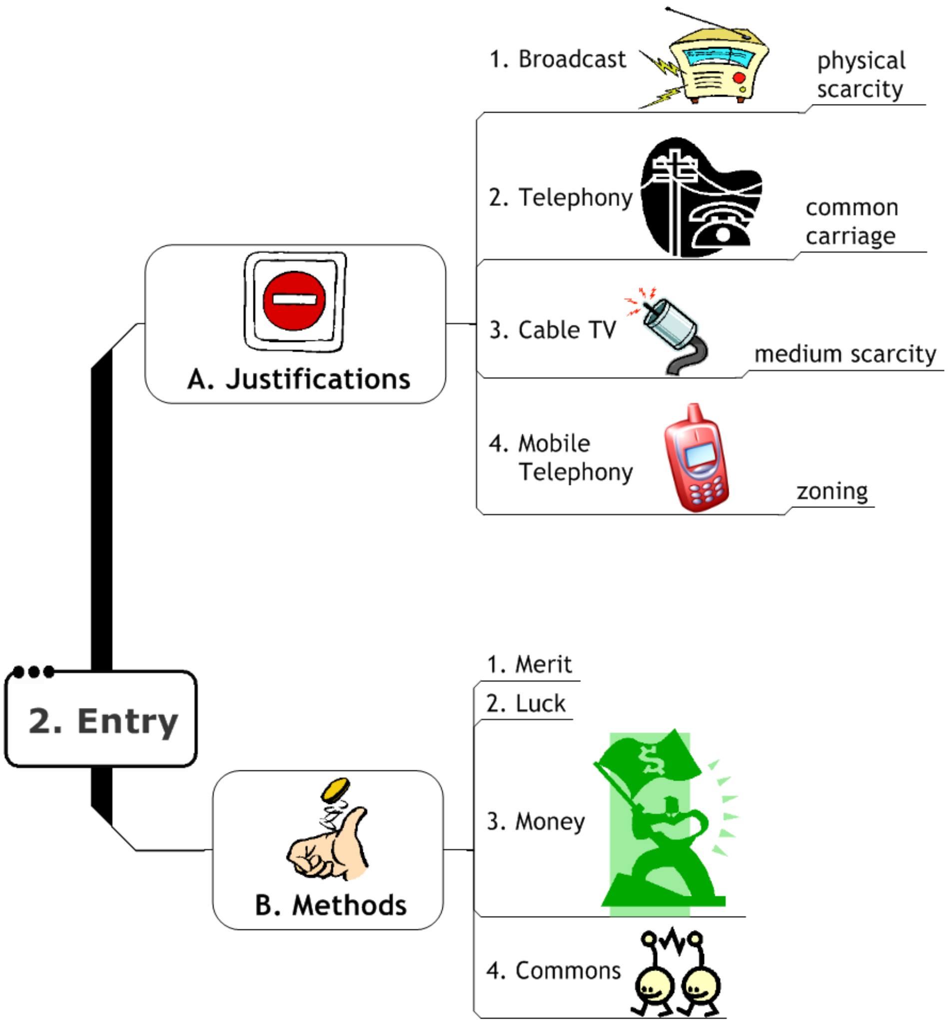
CHAPTER 2

Entry



Consider the profession that you are training to *enter*. After graduating from law school, could you simply put out a shingle and provide legal services? The answer (perhaps regrettably) is no. To practice as an attorney, you must first receive "permission" from the state in the form of a license. This is not true of all professions. For instance, if you wanted to be a portrait painter, you would not need to get prior permission from the government before you started your business. Why the difference?

Imagine now that you are an entrepreneur ready to exploit some new communications technology. This could be radio broadcasting in the 1910s or the Internet in the 1990s. Your technology allows people to communicate in novel and amazing ways, and you want to enter this new line of business. Your decision to enter this field will, of course, be a function of basic business and technological calculations, such as: Does the technology work? Also, will the public buy it at a price that allows an adequate return on investment?

But in addition to answering these questions, you need to determine if entry also is a matter of law—of obtaining government approval. Entry into many communication services is regulated by the government. In this chapter, we focus on the broadcast, cable television, and telephony industries (wireline and wireless) as case studies. In our examination, a few basic questions repeatedly arise. Why should the government regulate entry? How should the government regulate entry? Is entry regulation consistent with the First Amendment?

A. Justifications for Regulating Entry

1. Broadcast

a. Technology

The term "broadcast" refers to both over-the-air radio (audio) and over-the-air television (video). From a technological perspective, radio and television broadcasting operate similarly. Some message, whether audio or video, is converted into an e-m signal, then encoded onto a carrier wave that is radiated out from a transmitting antenna. These e-m waves propagate (wirelessly), at a particular frequency, using the spectrum as the channel. When those e-m signals arrive at a receiving antenna such as the "rabbit ears" on an old television set, they are decoded back into the audio or video message.

Since communications law is filled with both technological and legal terms-of-art, it's always helpful to look for concrete definitions. One place to start is 47 U.S.C. § 153, which is in Title I of the Communications Act. It lists some 50 definitions. For example:

> **47 U.S.C. § 153. Definitions**
>
> (5) Broadcast station. The term "broadcast station", "broadcasting station", or "radio broadcast station" means a radio station equipped to engage in broadcasting. . . .

> (6) Broadcasting. The term "broadcasting" means the dissemination of radio communications intended to be received by the public, directly or by . . . relay stations.
>
> (35) Radio station. The term "radio station" or "station" means a station equipped to engage in radio communication or radio transmission of energy.

You already know that there are two bands of radio stations, AM (amplitude modulation) and FM (frequency modulation), which have historically been analog services. This is an appropriate point to study *modulation*, a basic concept relevant to all forms of e-m signal processing. Modulation simply means that some e-m carrier wave is being changed (i.e., modulated) in accordance with the message to be transmitted.

Amplitude modulation. In amplitude modulation (AM), the amplitude of some carrier wave is altered in accordance with the amplitude of the message signal. Recall that amplitude is one of the three basic properties of an e-m wave (the "height" in the typical diagram). The process looks like this.

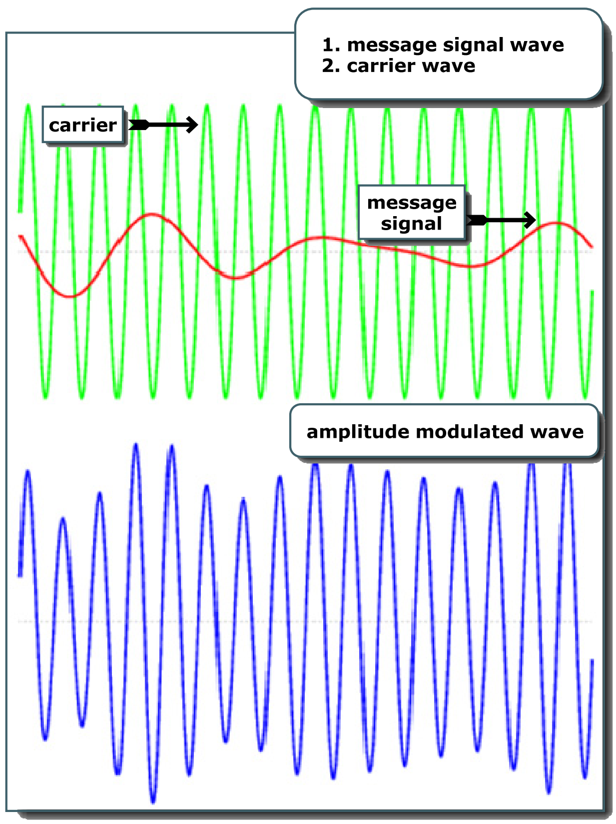


Figure 2.1: Amplitude Modulation

The carrier wave's frequency (i.e., the number of times per second the wave starts at zero, runs up to the crest, down to the trough, and back to zero) never changes. However, the wave's amplitude changes as a function of the message signal. If the message signal's height is high at one point, the carrier signal's amplitude increases; conversely, if the message signal's height is low at one point, the carrier signal's amplitude decreases. Once this modulated e-m signal is received, the process can be reversed—the carrier signal is removed from the modulated signal—to reproduce the original message signal.

As noted in CHAPTER 1: POWER, the FCC has allocated the AM radio service to carrier waves that operate between 535 and 1705 kHz. Each station is licensed by the Federal Communications Commission (FCC) a bandwidth of 10 kHz, which is why your AM radio tunes in 10 kHz steps. Each step represents a potential carrier wave for a broadcast station.

If you were curious to find legal definitions and looked in volume 47 of the United States Code (where federal statutes regarding communications are codified), you wouldn't find anything as specific as "AM station." But another place worth looking is volume 47 of the Code of Federal Regulations, where the regulations that the FCC has enacted are compiled. For example:

> **47 C.F.R. § 73.14 AM broadcast definitions.**
>
> *AM broadcast band.* The band of frequencies extending from 535 to 1705 kHz.
>
> *AM broadcast channel.* The band of frequencies occupied by the carrier and the upper and lower sidebands of an AM broadcast signal with the carrier frequency at the center. Channels are designated by their assigned carrier frequencies. The 117 carrier frequencies assigned to AM broadcast stations begin at 540 kHz and progress in 10 kHz steps to 1700 kHz. (See § 73.21 for the classification of AM broadcast channels).

One major problem with AM transmissions is noise. As the e-m waves travel through the spectrum channel, ambient e-m waves in the environment alter the amplitude of the transmitted waves, thus affecting the received signal. Because broadcast radio has historically been analog, any difference in amplitude is decoded to mean some difference in the actual message to be conveyed. Noise thus corrupts the received signal and message.

Frequency modulation. Frequency modulation (FM) uses the amplitude of the message signal to change the *frequency* of some carrier wave rather than its amplitude. Audio information is transduced into a message signal whose frequency ranges from 0 to 150 kHz. Each FM station is granted 200 kHz of bandwidth by law, which affords some padding to avoid interference with adjacent signals. These message signals are frequency-modulated onto carrier waves that operate between 88 and 108 MHz. Upon reception, the carrier wave is removed, leaving the original message signal, which is transduced back into audio.

As noted above, ambient noise tends to alter amplitude but not frequency. FM transmissions therefore resist noise better than AM signals, which is one reason why FM radio sounds better than AM radio. Another reason is that FM stations are granted far more bandwidth: an FM message signal carries frequency ranges up to 150 kHz, whereas AM message signals are clipped at a maximum of 10 kHz. Because music often uses frequencies higher than 10 kHz, FM message signals have greater audio fidelity. It makes sense that talk radio formats appear