The Technology Behind Satellite Radio

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Any song you hear on satellite radio stars as a recording in a specific format on different recording mediums. In most cases, the recording quality has to be maintained fairly high, usually around 384kb/s, while also being reasonably small enough to be transported on CDs and DVDs.
The music tracks used in satellite radio are cataloged using a similar system to the MP3 cataloging criteria, the ID3 tags. The choice for the music tracks that will be played is made by each channel individually. The DJ selecting the tracks usually chooses about 20-30 minutes worth of music. The DJ has to listen to the tracks to make sure they are in proper condition and then simply lets the computer decode the original file. The same thing is repeated once the initial 20-30 minutes are exhausted and the music playing cycle repeats itself. Sound encoding in satellite radioEncoding is one of the key elements of digital radio. Each channel is handled by a different encoder. The encoder basically takes the analog file and turns it into a digital one. The digitalization process is made in real time and the music files are transformed into 1's and 0's. This process is carried out by powerful computers that analyze sound waves and frequency and break them into binary code. The encoding process is carried out at 128kb/s, 44.1Kh which is actually CD quality. After the song is encoded, it is transmitted to a multiplexer where other channels are also present – the multiplexer basically takes all the channels of the satellite radio provider and combines them into a single broadcast transmission. The data is then sent to a satellite modem device which modulates the data and sends it to the broadcaster’s satellites, using unique transmission frequencies. What happens above the EarthHere is where the satellites are located. They receive the transmission and transmit it to the receivers we have in our homes and cars. The satellites are located at 23,000 miles above us – both Sirius and XM Radio use satellites located at this distance from the Earth. The satellites are located in geo-sync, which means that hey orbit above the location they are designated to service at all times. When the satellite receives the transmission encoded at 128kb/s, 44.1 khz it rebroadcasts it to the geographical area it covers. Both Sirius and XM Radio use satellites that cover certain areas of the United states – mostly the East and West coasts. For example, one of XM Radio’s satellites covers the western part of USA, probably an area located roughly from Seattle to San Diego on the West and Minneapolis to Houston on the east. The increased sound quality is possible because the broadcasted data (music tracks, news, sports transmission) don’t get sliced up too many times in the decoding process. The antennaThe antenna connected to your satellite radio receiver picks up the transmission on L-Band. The recent technological advances have allowed digital radio broadcasters to create receivers small enough to fit mobile locations. In the early days of satellite radio, a large parabolic dish would have to be mounted on the car in order to receive signal. Also, before the more compact receivers were created, the early satellite radio receivers needed electronic movements that directed the dish towards the satellite line of sight. Modern flat panel receivers have eliminated all the problems of their predecessors and can be fitted almost anywhere without taking up too much space. The receiver and the outputThe receiver is the device that decodes the data, basically doing the exact opposite of what the encoding process was like. After receiving the signal from the antenna it amplifies it and converts it to usable sound. The car or home audio system is then able to play the selected satellite radio channel. The rest of the process is exactly like analog broadcasts would work, with an amplifier and speakers outputting the sound.