

Explanation of Experimentation, Need for Experimental License, and Additional
Technical Information

Overview: Raytheon Missile Systems is a US corporation that supplies missiles and other products and technologies to the US military and to other, approved, governments around the world. In the process of developing and testing its products, Raytheon Missile Systems needs to conduct tests and document the testing of its products.

Nature of testing: The testing that is being proposed here is missile testing. A test is set up at a location in the US, as approved by a Raytheon customer, and the parameters of the test are defined. Because of the nature of the product being tested, missiles, it is not safe for the personnel involved in the testing to be close to the actual test area. As a result, much of the testing is conducted by remote-control, using radios to trigger particular actions. This application is for the use of a radio that will trigger a camera shutter which will document various aspects of the testing. Because of the nature of cameras, the radio will be used to send a quick signal to the camera to trigger the shutter to take a picture. The cameras are set to automatic use. Once the camera receives a radio signal to start photographing, it will continue through a designated number of frames or for a specific time period at which point it will stop photographing the missile test.

Communication required: As noted, it is not safe for a photographer to operate the camera on site because of the dangerous nature of the missile testing. Therefore, the radio is used to send a signal to a camera which is ½ mile to 10 miles distant from the operator. The radio signal is not experimental, but the underlying activity is about experimentation and testing of technology and the radio use is necessary to conduct the underlying experimentation and testing.

No other technology is available: There is no technology other than radio which can be used for the remote triggering of the camera for this purpose. No wired technology could be installed and operated in the wide variety of settings and locations, and there is no port on the camera that could accept a telephone connection that would allow for the use of a landline telephone. Further, a wired technology would tether the camera to an existing landline installation, which may not exist at the test site. Thus, it is not technology that lends itself to this application.

We explored seeking a license from the FCC under the provisions of part 90 of the Commission's rules, but the frequency coordination bodies refused to undertake frequency coordination for the use required here, which is nationwide. They have no authority to coordinate the frequencies available in the radio for nationwide use, and so they suggested the filing of an application for an experimental license.

As a result, Raytheon is submitting this experimental license application to seek authorization for the sporadic, itinerant, and very brief radio communications needed for its missile testing. To provide a sense of the scope and scale of the radio use that would be conducted under this license, Raytheon conducts [50, 60, 100 tests per year?] those tests are conducted at an average of 17 locations each year. For each test, the camera triggering radio would be in use about 5 seconds per test. The application seeks authorization to use five distinct frequencies, but Raytheon would only use one of those frequencies at a time, the request for five allows Raytheon to switch between channels so that it will avoid causing or receiving interference from other users in a particular geographic area. After discussions with the program, any previous testing conducted under the authority of the DOD revealed that there was no need to shift frequencies any more than twice at a particular location to avoid interference problems. The application seeks 5 frequencies to provide for every eventuality.

Time of radio use: The total time of radio use would be about 500 seconds per year, divided across the 5 frequencies requested. The testing takes place across miles and miles of sparsely populated areas of the US and areas adjacent to military installations in a number of different regions of the country. This means that a frequency would only be in use at a single location for about 30 seconds per year, at most.

Technical antenna data: The antenna used to transmit the shutter trigger signal is a directionalized antenna. It's beamwidth is merely 60 degrees. The antenna is normally operated vertically. The signal is a narrow beam, sent precisely to the camera that is recording the testing.

Radius of Operations: Due to the nature of testing, the radio may be set up to transmit to a camera that is any where from ½ mile to 10 miles distant from the camera. The larger distances are needed in cases of tests of more robust products or where longer flight distances are required where the additional buffer distance for the personnel involved in the testing is needed for safety.

Conclusion: The testing proposed here requires the use of radio signals to trigger cameras that are photographing missile testing. Because it is dangerous to have personnel too close to the tests, radio transmissions are needed to operate the remote camera. No other communications technology is available for this testing, so Raytheon is requesting authorization under an experimental license to test using these radios for five years. The total time that the radios are expected to be in use is short, because the radio signal needed to trigger the camera shutter is a brief, and there are a limited number of tests conducted per year. Consequently, the prospect of this testing causing any harmful interference to another radio user is minimal. The tests are highly valuable because they allow the applicant to hone the development of products that are used in the defense of the country.

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