

Background

The proposed experiment will use links operating between two fixed sites. We will construct two transceiver stations, which we plan to move among three locations over the duration of our campaign for a total of three test link geometries.

The three fixed locations are SRI's headquarters in Menlo Park, California, the Hat Creek Radio Observatory near Burney, California (managed by SRI), and a rural site near Mancos, Colorado (private property).

This exhibit describes the antenna pointing angles for the Menlo Park site.

Antenna Type

To accommodate the desired tuning range for our experiment, we have selected a log periodic antenna, model no. 30-70LP7 from M² Antenna Systems, with a nominal boresight gain of 6.0 dBi and a front-to-back ratio of 15 dB. When mounted for horizontal polarization, this antenna has an azimuth beamwidth of 70° and an elevation beamwidth of 138°.

Antenna Pointing Information

Menlo Park Antenna

When used in a link between Menlo Park and the Mancos, Colorado, site, the boresight of the main beam of our log periodic antenna will be pointed at 94° azimuth (relative to true north) and 6° elevation.

When used in a link to the Hat Creek Radio Observatory, the beam will be pointed at 9° azimuth and 24° elevation.

Hat Creek Observatory Antenna

When used in a link between the Hat Creek Radio Observatory and the Menlo Park, California, site, the beam will be pointed at 189° azimuth and 24° elevation.

When used in a link to Mancos, Colorado, the beam will be pointed at 112° azimuth and 6° elevation.

Mancos Antenna

When used in a link between Mancos and the Menlo Park, California, site, the beam will be pointed at 274° azimuth and 6° elevation.

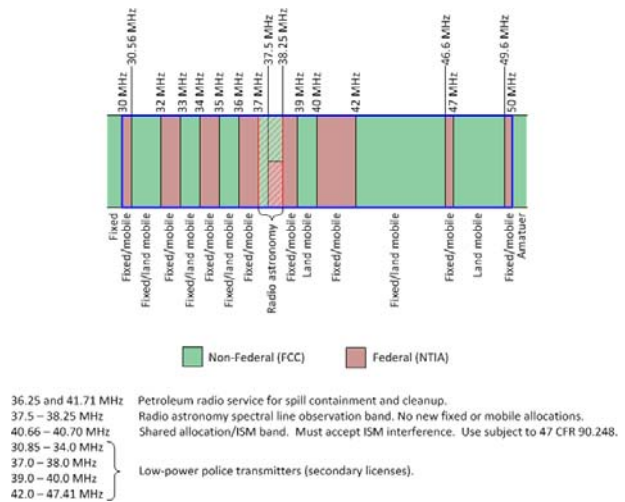
When used in a link to the Hat Creek Radio Observatory, the beam will be pointed at 292° azimuth and 6° elevation.

Frequency Use

The planned experiment will include testing on different center frequencies to assess how the sensitivity of performance to frequency tuning. In addition, we will perform site surveys at each location before starting operations to determine local use of spectrum so that we may avoid interfering with other band users.

We have selected a set of subbands for potential operation after consulting the Code of Federal Regulations, Title 47, §90.248. We are avoiding the use of spectrum managed by the National Telecommunications and Information Administration. Also, we are not requesting the use of the radio astronomy bands between 37.0 MHz and 38.25 MHz.

We have planned our tests for flexibility, so we would be happy to adjust our plans to address any concerns, if needed.



Emission Information

During our tests, the transceiver at one end of the link (the primary site) will be responsible for establishing the link and performing the time synchronization operation. The secondary transceiver at the other site will send acknowledgement packets containing information allowing the primary transceiver to measure the round-trip propagation delay and to calculate and send a suitable correction. This operation may be viewed as packet data transmission using a custom protocol on a half-duplex channel.

The primary will probe for the presence of a usable meteor trail by emitting 100 μ s pulses at a 10 Hz rate (i.e., at a duty cycle of 10^{-3} .) When a usable meteor trail is present with a suitable geometry (expected once every few minutes) the secondary will send an acknowledgement packet of a smaller duration at a fixed turnaround delay. The primary will then send another 100 μ s packet containing the appropriate correction factor.

Pulses transmitted by both transceivers will include both a digital data portion, in which data and a spreading sequence will be phase-modulated onto the carrier, and a portion with a set of unmodulated analog subcarriers (i.e., a frequency comb). The digital portion will be modulated with a bandwidth of less than 1 MHz. The analog portion will include two tones at a time with a frequency spacing of up to 10 MHz (to be chosen from a table of discrete values). Frequency spacings will be selected in coordination with the frequency tuning of the main carrier to ensure that the tones fall within the allowed spectral subbands (see preceding section).

Based on the above description, the system emission designator will be 1M00Q9BAT, signifying a 1 MHz modulation bandwidth (during the modulated portion), phase-modulated pulses containing digital information (no subcarrier) followed by unmodulated tone pairs (which may be viewed as subcarriers). The digital information will vary in content (that is, ACKs will be shorter), and the channel will be shared using time-division multiplexing. (In addition, the two transceivers need not transmit on the same frequency.)