DEFINITIVE FACTORS

FOR SELECTING AND VALUING MOUNTAINTOP TELECOMMUNICATION SITES

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What makes mountaintops more or less suitable and valuable for telecommunications uses? The answer to this question cannot be easily answered by conventional real estate location analysis or appraisal methods. Frequently, real estate appraisers working for public agencies are faced with a problem of trying to decipher the scrambled signals of radio frequency engineering data, to no avail. Likewise, antenna site rental or sale data may often appear random or based on business or use values rather than market values rather than attributes of the real estate itself.

Based on this authors interviews with both public and private telecommunications sites users and antenna site developers, the following notable factors were found to affect the selection of communications sites in the following rough order of their importance.

Ownership Status.
The most important factor by far in the selection of telecommunications sites is whether the site is under private or public ownership. This factor is so critical, especially under the current build-out of wireless infrastructure, that most antenna site developers or users reported that it made all the other factors relatively unimportant. There are several factors that make privately owned sites more attractive to the commercial telecommunications business. First, a lessee can sign a long-term lease for a privately held site, but a U.S. Forest Service Use Permit, for instance, provides for only a 10-year maximum term, which is terminable upon notice. The less permanent the duration of a lease the more risk to the lessee. As a general rule, the more risk there is to a lessee translates into less rental return for the property owner. This isn't to deny that many public agencies often realize full market rents for antenna sites regardless of the terms and conditions in the lease. Nonetheless, such rents usually reflect non-market consideration because the rent along with the terms and conditions of the lease are imposed by one-side to the transaction in a "take-it-or-leave it" manner. It goes without saying this does not meet the legal criteria of "fair market value" as reflected by willing and knowledgeable parties, neither taking advantage of the other.

The problem of delay is another reason that many telecommunications operators shun public or government owned sites. In order for new communications businesses to be competitive in the current environment of the build-out of the national wireless infrastructure, they often must act quickly in locating and securing telecommunications sites. For example, the permit processing time on U.S. Forest Service land is reported to range from two months to two years with an average of one year. Other levels of government often have permit processes that are similarly complicated and time-consuming. Because of this, site developers and users will often shun more desirable

sites for sites which are more readily developable or usable even in extra costs are sustained to engineer the antenna system. The rule for siting telecommunications sites is not the conventional "location, location, location," but "timing, timing, timing."

Competition.
For commercial telecommunications sites located on hilltop or mountaintop locations, the presence or absence of nearby competitive antenna tower facilities may be critical to its suitability and economic feasibility. Conversely, competition is usually not a factor in proprietary public safety or two-way radio systems. If the rack space on an antenna tower is already filled-up, however, then there may be sufficient demand to make a competitive site feasible for development into a new communications site. Another invisible factor is that there may be no additional antenna rack space available on a tower at the required elevation or separation needed to make the site suitable to a new user. A market analysis must often be conducted to determine proximity to competitive telecommunications facilities for commercial applications.

Because of the usual availability of sites, small land area required for antenna facilities, and the capability of engineering different properties into suitable telecommunications sites, the market for telecommunications sites is mainly a "buyer's market." It is rare to find a site that is technically irreplaceable, not considering avoided costs.

Area Coverage.
The amount of area that a telecommunications site offers for transmitter coverage is all-critical to many users. Elevation is a necessary, but not sufficient, precondition for radio frequency signal propagation. The base transmitter height per se is not always the most important variable in a given service area in affecting signal coverage unless the gain in elevation leads to less interference or avoidance of signal blockage.

Paradoxically, some sites with radio wave "shadows" (i.e., uncovered areas) may actually be desirable in those infrequent situations where sending a non-interfering signal is sought. Non-peak mountain tops or ridgelines with extensive signal blockage in one direction are usually avoided for location of commercial telecommunications sites. An exception is where the user requires signal blockage in one direction to avoid interference with other systems or where only uni-directional signal transmission is sought, such as in the case in many radar systems. In general, however, remote mountain peak sites have a good radio, television, and microwave transmission and reception potential because of their high elevation, few interfering natural barriers, and often low surrounding foliage.

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Interference/Co-Location.
Even the highest mountain peak, tallest building, or tower on which to put a telecommunications antenna may not be optimum due to strong interfering signals from miles away or its own signals bounced-back in what is called multi-path signals or "ghosting" problems. Radio waves at similar frequencies, or higher energy output radio waves such as from radar, can present a significant interference to other telecommunications systems. Radar waves for example can present interference to other telecommunications facilities within a 600 feet radius. Interference can seriously degrade the operation of nearby communications systems. There are several measures that can be taken to mitigate or eliminate interference:

(i) eliminate one of the interfering systems,
(ii) use a unidirectional antenna,
(iii) alter the height of the interfering base station's antenna,
(iv) installing a tone squelch system,
(v) move the frequency away from the interfering signal, also called "frequency frogging,"
(vi) install a filter on the antenna, (vii) separate telecommunications systems by a minimum of 600 feet, and
(vii) Select a site that blocks the interfering signal from one direction.

Changing the frequency is cited as the most important measure to avoid interference. Frequency coordination is part of the licensing process regulated by the Federal Communications Commission (civilian), the Spectrum Analysis Center (military), the Associated Public Safety Communications Officers (local government), the Utilities Telecommunications Council (UTC), and the Federal Communications Commission