the owner since the grantee acquires a deeded interest in the real property itself. The grant of a license or fee, on the other hand, will be terminable upon the expiration of the lease or license term. Given the greater limitation on the owner's future use of a property subject to a perpetual easement, the grant of an easement generally commands a much greater premium than the grant of a terminable license or term lease.[14]

According to Steel in the Air, an easement for a cell tower could affect the sale of a property in the following manner:

> It could have a fairly significant impact on the property or none at all. Any buyer of the property will be taking the property subject to the easement and, depending upon the location of the tower or cell site, may or may not care. **If the tower is in a location that would impede future development (or redevelopment) of the property, the easement would have a severe impact on the willingness of a potential buyer to by the property.**[15]

The most significant risk of cell tower site leases is that of termination. The trend by tower companies and carriers – through third party agents- to try to reduce their rent payments is not going away, in fact they have become even more demanding in asking for additional concessions from cell site landlords.[16] Also, if and when the Federal Reserve stops printing money, interest rates will rise (note the 10 year Treasury increased significantly in the past few months). When that happens, the price for wireless lease assets will likely decline precipitously as return requirements of the sponsor equity of the aggregation firms will have to adjust.

LITERATURE REVIEW

MEDICAL STUDIES

Though cell technology has been in existence since the late 1980s, the first study of populations near cell tower base stations was only conducted by Santini, et al in 2002. It was

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[14] http://apiexchange.com/index_main.php?id+8&idz=244, "Cell Easements are Just Easements (#145)."
[15] http://www.steelintheair.com/faq.html
[16] http://www.wirelesscapital.com/what-we-do-cellular-leases/questions/

prompted in part by complaints of adverse effects experienced by residents living near cell base station throughout the world and increased activism by citizens and doctors.

Medical studies regarding the adverse health effects of exposure to radio frequency (RF) emissions, such as those which emanate cell towers, in the United States have been eclipsed by those from foreign countries. One conclusion reached by scientists who have conducted such studies, is that there is a causal link between RF emissions and cancer, and more specifically leukemia in children.

In a 2004 German Study entitled, "The Influence of Being Physically Near to a Cell Phone Transmission Mast on the Incidence of Cancer," the authors summarized several well-known studies:

> A series of studies available before this investigation provided evidence of health risk and increased cancer risk associated with physical proximity to radio transmission masts....In many studies an increased risk of developing leukemia has been found; in children living near transmitter antennas for Radio and Television in Hawaii; increase cancer cases and general mortality in the area of Radio and Television transmitters in Australia; and in England, 9 times more leukemia cases were diagnosed in people who live in a nearby area to transmitter antennas. In a second study, concentrating on 20 transmitters in England, a significant increase in Leukemia was found. The Cherry Study indicates an association between an increase in cancer and living in proximity to a transmitter station. According to a study of the transmitter station of Radio Vatican, there were 2.2 times more leukemia cases in children within a radius of 6 km and adult mortality from leukemia increased.

The 2004 German study conducted by Horst Eger, Klaus Uwe Hagen, Birgitt Lucas, Peter Vogel and Helmut Voit, from 1994-2004, revealed that **living within 400 meters (1,312 feet) of a cell tower increased the risk of developing cancer by thee-hundred percent (300%).**

A 2004 Israeli study, "Increased Incidence of Cancer near a Cell-Phone Transmitter Station (a cell tower)," indicated an association between increased incidence of cancer and living in proximity to a Cell Tower. Those living near a cell tower are 4.15 times more likely to develop cancer. The authors are Ronni Wolf, MD and Danny Wolf, MD.

The 1996 the Poland Military studied, "Cancer morbidity in subjects occupationally exposed to high frequency (radiofrequency and microwave) electromagnetic radiation." The Military Center for Radiation Safety studied the cancer death rates for all career military personnel (approx. 128,000 persons each year), for the 14 year period of 1971-1985. The study revealed that persons occupationally exposed to RF emissions were nearly twice as likely to develop brain tumors, 13.9 times more likely to develop chronic myeocylic leukemia, 8.62 times more likely to develop acute myeoblastic leukemia and 5.82 times more likely to develop non-hodgkin lymphomas. The study was conducted by the Department of Biological Effect of NON-Ionizing Radiation, Center for Radiology and Radiation Safety at the Military Institute of Hygiene and Epidemiology, Warsaw, Poland.

The 1996 Australia Study, "Cancer Incidence and Mortality and Proximity to RF Emissions from TV Towers," an 18 year study of residents of 9 municipalities, from 1972-1990, revealed increase rates of childhood leukemia and death for children subjected to RF emissions from TV antennas. The authors include Bruce Hocking, Ian Gordon, Heather L. Grain and Gifford E. Hartfield.

In a subsequent 2003 study, "Decreased Rate of Survival for Childhood Leukemia in Proximity to Television Towers," Bruce Hocking and Ian Gordon documented that survival rates of children with leukemia dropped, the closer they lived to RF emitting TV antenna. The study is found in *Archives of Environmental Health*, September 2003.

The 2008 Belgium study, "Genetic Damage in Subjects Exposed to Radiofrequency Radiation," consists of a highly technical examination of 16 expert cytogenic monitoring studies performed around the world. The study confirmed that 13 of the 16 independent studies performed worldwide evidenced that RF exposed individuals suffered genetic damage. "A significant increase in chromosome breaks…was reported in all individuals." The author is Luc Verschaeve of the Scientific Institute of Public Health, Brussels, Belgium.

A 2009 India Study, "Biological Effects of Cell Tower Radiation on the Human Body," indicates that radiation from cell towers has been associated with an increase of brain

tumors due to damage in the blood-brain barrier. Where cell antennas are mounted on rooftops, the distance to the top floor is short so the radiation levels in the top 2 floors remains very high. The author is Prof. Girish Kumar of the Electrical Engineering Department of ITT, Bombay.

A 2002 French study, "Study of the Health of People Living in the Vicinity of Mobile Phone Base Stations (Cell Towers)," examined adverse health impacts of people living in proximity to cell towers and any disparity of such impact on females as compared to males. **Based on upon adverse effects reported, the conclusion was that cell towers should not be constructed less than 300 meters (984 feet) from populations.** Disorders reported by people living within 300 meters of cell antennas included "fatigue, sleep disturbances, headaches, feeling of discomfort, difficulty concentrating, depression, memory loss, visual disruptions, irritability, hearing disruptions, skin problems, cardiovascular disorders and dizziness." The authors include R. Santini, P. Santini, J.M. Danze, P. Le Ruz and M. Seige of the National Institute of Applied Science.

In a 2007 Swedish study, "Cognitive Impairment in Rats after Long Term Exposure to GSM-900 Mobile Phone Radiation," five scientists from the Rausing Laboratory and University Hospital conducted a study within which they determined that rats exposed to RF emissions for 55 weeks suffered "impaired memory functions."

In a 2002 California study, "Executive Study of the California EMF Risk Evaluation for Policymakers and the Public," three scientists who worked for the California Department of Health Sciences were directed to study whether EMFs were associated with health problems. The three scientists unanimously concluded that the likelihood of a causal relationship between EMFs and childhood leukemia is ninety five percent (95%).

The objective of one of the most recent US studies was to review 56 studies of people living or working near cellular infrastructure that could apply to long-term low-level

radiofrequency radiation (RFR) exposures. Among the conclusions from the study is the following:[17]

> Citizens and municipalities often ask for firm setbacks from towers to guarantee from towers to guarantee safety. There are many variables involved with safer tower siting—such as how many providers are co-located, at what frequencies they operate, the towers height, surrounding topographical characteristics, the presence of metal objects and others. Hard and fast setbacks are difficult to recommend in all circumstances. Deployment of base stations should be kept as efficient as possible to avoid exposure of the public to unnecessary levels of RFR. **As a general guideline, cell base stations should not be located less than 1,500 feet (~ 500 m) from the population, and at a height of about 150 feet (~ 50 m).** Several of the papers previously cited indicate that symptoms lessen at that distance, despite the many variables involved. However, with new technologies being added to cell towers such as Wi-Max networks, which add significantly more power density to the environment, setback recommendations can be very unpredictable reassurance at best. New technology should be developed to reduce the energy required for effective wireless communication.
>
> In addition, **regular RFR monitoring of base stations should be considered.**

Among the most recent studies is a 2013 study published in the British Medical Journal. The study authored by Professor Enrique A. Navarro, documented that cell phone towers alter brain function causing a lack of concentration, irritability, difficulty sleeping and lack of appetite. It concluded that the severity of symptoms directly correlated to cell tower exposure levels regardless of race, income levels and other demographics.[18]

According to Navarro, "the term electromagnetic hypersensitivity has been recently introduced in discussions attributing symptoms to exposure to EMFs. A review of this topic in 2010 found that 8 of the 10 studies evaluated through PubMed had reported **increased prevalence of adverse neurobehavioral symptoms or cancer in populations living at distances < 500 m (1,640 feet) from cell phone towers." (People who live fewer than 500 meters from cell phone towers appear to be especially at risk of electromagnetic**

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[17] Levitt, B Blake and Henry Lai, "Biological Effects from Exposure to Electromagnetic Radiation Emitted by Cell Tower Base Stations and Other Antenna Arrays," www.nrcresearchpress.com, November 5, 2010.
[18] http://www.bmjopen.com/contents/3/12/e003836.

interference with brain function. Because electro-pollution strength is determined by the inverse square of the distance, a person who moves twice as close to a cell tower experiences four times the radiation).[19]

The studies cited represent a sampling of studies throughout the world. A more comprehensive listing is represented by the Marin Project which contains a list of 600 studies about specific illnesses caused by RF emissions or EMFs.

Prof. Girish Kumar, of the department of electrical engineering, IIT Bombay, submitted a report recently on cell tower radiation documenting that towers within 160 feet of a residence emit radiation equivalent to a microwave 24 hours a day.[20]

According to the World Health Organization's International Agency or Research on Cancer (IARC), radiation emitted from mobile phones and towers are considered carcinogenic to humans and are responsible for causing glioma, which is a type of brain cancer. Towers emit radiation at higher level 24 hours a day, which makes them even more damaging than cell phones. In 2009, an inter-ministerial committee of experts on electromagnetic radiation exposure from cell phone towers states, **"it is the base stations and their antennas that are more of concern. This is because they constantly emit radio frequency."**

DECREASED REAL ESTATE VALUE: CELL TOWER STUDIES

Compared to damage studies relating to dis-amenities such as landfills, confined animal feeding operations, underground storage tanks, high voltage transmission towers, etc., a minimal number of empirical studies have been conducted on the effect of cell towers on real estate. In fact, the only three studies that exist were written solely for in part by Sandy Bond. In fact, she was one of the editors of a recently published book, *Tower, Turbines and*

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[19] http://www.naturalnews.com/z044464

[20] http://www.phonescausebraincancer.com/living-near-cell-hone-towers-puts-you-in-grave-danger

Transmission Lines: Impacts on Property Value.[21] The chapter on cell towers includes two of the three studies authored by Bond.

The first is a 2002 New Zealand Case Study to determine residents' perceptions of living near cell towers in Christchurch, NZ and to quantify these effects in monetary terms according to an increasing or decreasing percentage of property values.[22] The study combined market sales analysis in tandem with opinion survey studies to measure the impact of environmental hazards on residential property values. The methods used for this study included a public opinion survey and a hedonic house price approach.

The survey results were mixed, with responses from residents ranging from having no concerns to being very concerned about proximity to a cell tower with those living close to a cell tower perceiving the sites less negatively than those who live farther away.

The second part of the study involved an econometric analysis of Christchurch property transaction data from 1992 to 2002. This research looked specifically at the impact of proximity to a cell tower on residential house prices. **"The results of the hedonic study indicate that property prices decrease, on average by around 15% after a cell tower is built. This effect generally reduces with distance from the tower and is almost negligible after c. 300m (984 ft).**[23]

This study as described in the 2013 book was also published in *The Appraisal Journal* in 2005.[24] In this article the conclusions were described as follows:

> The issue of greatest concern for survey respondents in both the case study and control areas is the impact of proximity to CPBSs on future property values. **Overall, respondents would pay from 10%-19% less to over 20% less for a property if it were in close proximity to a CPBS.**

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[21] Bond, op. cit., vii.

[22] This study was presented at the Ninth Pacific-Rim Rea; Estate Society Conference, Brisbane, Australia, January 19-22, 2003. The paper was entitled, "The Impact of Cellular Phone Base Station Towers on Property Values."

[23] Bond, op. cit.,: 160.

[24] Bond, Sandy, PhD, and Ko-Kang Wang, "The Impact of Cell Phone Towers on House Prices in Residential Neighborhoods," *The Appraisal Journal* (Summer 2005): 256.

> The opinion survey results were generally confirmed by the market sales analysis using a hedonic house price approach. **The result of the sales analysis show prices of properties were reduced by around 21% after a CPBS was built in the neighborhood.**

Sandy Bond also authored a study from the United States (which is included in the 2013 book previous cited). The study also appeared as a 2007 article in *The Appraisal Journal,* entitled "The effect of Distance to Cell Phone Towers on House Prices in Florida."

The study involved an analysis of residential property sales transaction data from 1990 and 2000. Both GIS and multiple regression analysis in hedonic framework were used to determine the effect of linear distance of homes to tower on residential property prices. **"The results of the research show that prices of properties decreased by just over 2%, on average, after a tower was built.** This effect generally diminished with distance from the tower and was almost negligible after about 656 feet."[25] The author surmised that the difference between this study and the previous study could be attributed to the fact that "it is possible U.S. residents simply have become accustomed to these features (HVTL, cell towers, billboards) and so notice them less."[26]

CELL TOWER STUDIES CORRELATED TO HIGH VOLTAGE TRANSMISSION LINE STUDIES

A third cell tower study by Sally Sims was included in the recently published 2013 book. This study involved cell phone towers in the United Kingdom. Because of the UK's decision to site cell towers in areas where dis-amenities already exist, it is impossible to isolate any negative effects from cell towers. Consequently, there is virtually no research being conducted on cell towers in the UK.

This study used public opinion of high voltage overhead transmission lines (HVOTLs) as a benchmark to find some indication of the likely value impacts from cell

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[25] Bond, Sandy, "The Effect of Distance to Cell Phone Towers on House Prices in Florida," *The Appraisal Journal,* (Fall 2007): 362.
[26] Ibid., 368.