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May 12, 2006

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MAY 12 2006

Federal Communications Commission  
Office of Secretary

**VIA COURIER**

Marlene H. Dortch, Esq.  
Secretary  
Federal Communications Commission  
Office of the Secretary  
445 Twelfth Street, SW  
Washington, DC 20554

**Re: Ex Parte Presentation Notice: WT Docket No. 05-211 and AU Docket No. 06-30**

Dear Ms. Dortch:

On May 11, 2006, Steve C. Hillard, President and CEO, and George Laub, V.P. Managing Director, of Council Tree Communications, Inc., ("Council Tree") and S. Jenell Trigg and Dennis P. Corbett of Leventhal Senter & Lerman PLLC, met in four separate meetings with Commissioner Adelstein and the Commission personnel listed below. Council Tree is one of three Petitioners who filed both a "Motion for Expedited Stay Pending Reconsideration or Judicial Review" and a "Petition for Expedited Reconsideration" with respect to the above-referenced proceedings on May 5, 2006. The other Petitioners are Bethel Native Corporation and the Minority Media and Telecommunications Council ("MMTC").

Commissioner Jonathan Adelstein and Barry Ohlson, Legal Advisor, Office of  
Commissioner Jonathan Adelstein

Sam Feder, General Counsel, and Matthew Berry, Eric Miller, David Horowitz, Chris  
Killion, and Joel Kaufman, Office of General Counsel

Bruce Gottlieb, Legal Advisor, Office of Commissioner Michael J. Copps

Aaron Goldberger, Legal Advisor, Office of Commissioner Deborah Taylor Tate

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Ms. Marlene Dortch  
May 12, 2006  
Page -2-

The policy, legal and technical issues discussed during these meetings are summarized in the attached chart and supporting documents supplied by technical, financial and industry experts.

Please contact the undersigned if you have questions or comments.

Sincerely,

S. Jerrell Trigg

*Counsel to Council Tree Communications, Inc.*

cc: Commissioner Jonathan Adelstein  
Commissioner Michael J. Copps  
Commissioner Deborah Taylor Tate  
Barry Ohlson  
Barry Gottlieb  
Aaron Goldberger  
Samuel Feder  
Matthew Berry  
Eric Miller  
David E. Horowitz  
Christopher Killion  
Joel Kaufman

- We thank the Commission for its effort to reform the DE program – the audit and pre-auction qualification review programs help to address the Gabelli-type issues. Our primary issues are with two premature items: the “10-year hold” and the “wholesale/resale limitation”.
- Council Tree has always supported and worked as a partner with the Commission in auction litigation, diversity expansion efforts, and other matters (e.g., Congressional budget issues).
- We ask the Commission to consider whether the substantial risk of a possible stay and reversal of the auction (i.e., a new NextWave-type problem) is not best addressed by sending these two provisions back for full public comment.
- Our request for Reconsideration is based on two considerations: plain old fairness and legal risk.

EQUITABLE ISSUES	LEGAL ISSUES
<ul style="list-style-type: none"> <li>• <u>Two weeks</u> is insufficient time for DEs to adapt to radically different new rules and restrictions.</li> </ul>	<ul style="list-style-type: none"> <li>• <u>Inadequate Time</u> <ul style="list-style-type: none"> <li>○ Sec. 309(j)(E)(3) (<u>after</u> issuing bidding rules, FCC is required to give DEs “sufficient time to develop business plans, assess market conditions, and evaluate the availability of equipment for the relevant service”)</li> <li>○ Administrative Procedures Act, 5 U.S.C. Secs. 553(b), (c), and 706(2)(A)</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• The FCC did not provide fair notice of consideration of the “10-year hold” or the “wholesale/resale limitation”.</li> </ul>	<ul style="list-style-type: none"> <li>• <u>Inadequate Notice for Immediate Effective Date of Rules</u> <ul style="list-style-type: none"> <li>○ 5 U.S.C. Sec. 553(d)</li> </ul> </li> <li>• <u>Inadequate Notice for Opportunity for Public Comment</u> <ul style="list-style-type: none"> <li>○ Regulatory Flexibility Act, 5 U.S.C. Secs. 603, 604, 609</li> <li>○ 5 U.S.C. Sec. 553(c)</li> <li>○ See Declaration of David Honig re: MMTCC Comment cited by Commission</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• It is patently unfair to <u>retroactively change the rules</u> for DEs subject to prior auctions and prior DE deals.</li> </ul>	<ul style="list-style-type: none"> <li>• <u>Retroactivity (e.g., the “10-year hold”)</u> <ul style="list-style-type: none"> <li>○ 5 U.S.C. Sec. 706(2)(A)</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• The meaning of the undefined term “spectrum capacity”, cannot be reasonably or reliably defined when there is such an array of measures and variables used by the industry (e.g., bandwidth, data-throughput, time, pops served, geography, etc.) Additionally, the penalties are severe if a DE’s interpretation is wrong.</li> </ul>	<ul style="list-style-type: none"> <li>• <u>Incurable Ambiguities</u> <ul style="list-style-type: none"> <li>○ 5 U.S.C. Sec. 706(2)(A)</li> <li>○ Example: “Capacity” cannot be defined in a reasonable manner given industry use. (See attached letters from experts in the field)</li> </ul> </li> </ul>

EQUITABLE ISSUES	LEGAL ISSUES
<ul style="list-style-type: none"> <li>Banks and other investors will not commit to a 10-year hold in an industry that transforms itself every several years.</li> </ul>	<ul style="list-style-type: none"> <li><u>"10-Year Hold" Imposes Restrictions Inconsistent with Market Reality</u> <ul style="list-style-type: none"> <li>Sec. 309 (j) ("promoting economic opportunity" and "disseminating licenses among a wide variety of applicants")</li> <li>5 U.S.C. Sec. 706(2)(A)</li> </ul> </li> </ul>
<p><b>SUMMARY:</b></p> <ul style="list-style-type: none"> <li>The genuine risk of a delayed, stayed and/or reversed auction should be weighed against the simple solution of removing the "10-year hold" and the "wholesale/resale limitation" rules at this time and allowing fair public comment in a future proceeding.</li> </ul>	

Suggested Compromise Solution:

- Remove the objectionable rules and place the concepts in the Second FNPRM for consideration after full public review.
- Reset the Short Form Filing date for 30 days from date of removal of rules, and adjust the auction start date accordingly.
- Proceed with a clean and timely auction.

Attachments in Support of Petition for Reconsideration:

- Letter from Dr. Philip A. Whiting (Bell Laboratories)**  
*"In my professional opinion as an expert in wireless communications the term spectrum capacity used by the FCC in the above document is far too vague and inspecific to be reasonably applicable in any legal proceeding pertaining to wireless network commerce."*
- Letter from Dr. Timothy X. Brown (University of Colorado)**  
*"This term [spectrum capacity] does not have a single technical precise definition and could be interpreted through one of at least seven different and possible contradictory definitions."*
- Letter from Dr. Hui Lui, (University of Washington)**  
*"Without the above parameters, it is not scientifically possible to determine the spectrum capacity of a wireless network."*
- Declaration of Dr. Ronald J. Rizutto (Daniels College of Business, University of Denver)**  
*"[Net effect of new 10 year rule] is to create an almost prohibitive barrier to capital for Designated Entities."*
- Letter from Catalyst Investors**  
*"[B]oth the equity and the debt markets will not be comfortable with the '10 year hold rule'...."*
- Declaration of David Honig (Minority Media and Telecommunications Council)**  
*"MMTC certainly was not urging the Commission to throw out its five-year unjust enrichment schedule here without consideration of its impact on designated entities and with virtually no time for the parties to adjust to the change."*

Dr. Phil Whiting,  
174, Union Avenue,  
New Providence,  
NJ 07974,  
USA.

May 8th 2006

The Honorable Kevin J. Martin,  
Chairman  
Federal Communications Commission,  
445 Twelfth Street, S.W.  
Washington, DC 20554

Re: WT Docket No. 05-211  
AU Docket No. 06-30  
Written Ex Parte Presentation

Dear Chairman Martin:

By this letter,

I am Dr. Phil Whiting, currently attached to Bell Laboratories Murray Hill and have had 19 years experience with wireless systems in industry, as a consultant and in academia. I have published over 40 academic papers on various aspects of wireless networks, including Information Theory, Coding, Resource Allocation, Scheduling and Object Tracking and Location published in leading journals and conferences. I have also lectured at universities and institutions both in the US and overseas. These include: Stanford, MIT, Winlab (Rutgers University), Princeton, Columbia University (NY), University of Texas Austin etc. and overseas: University of Melbourne where I was a visiting scholar, Swinburne University, University of Southern Australia, Vrije University (Amsterdam) visiting scholar, University of Essex, Cambridge University etc. My most recent talks were at the University of San Diego (February 2006) and Yale (April 2006). I also served as an adjunct Professor at Columbia 2004- 2005. In addition I have had granted several patents in connection with the planning and operation of wireless networks and have several others pending. Amongst my current problems, I am collaborating with researchers at MIT to determine performance bounds and efficient methods for throughput scheduling of broadcast MISO (Multiple transmit antennas, single receive antennas) over a range of wireless channels. I have also had papers recently accepted on Hybrid ARQ schemes for wireless and trapping sets which occur in connection with the de-

termination of error floors for Low Density Parity Check Codes (LDPC codes also have wireless applications). Mv CV is attached.

This letter is written at the request of Council Tree Communications who requested my professional opinion on an extract taken from FCC 06-52, which is entitled SECOND REPORT AND ORDER AND SECOND FURTHER NOTICE OF PROPOSED RULE MAKING.

The extract is as follows "Specifically, except as grandfathered below, an applicant or licensee has "impermissible material relationships" when it has agreements with one or more other entities for the lease (under either spectrum manager or de facto transfer leasing arrangements) or resale (including under a wholesale arrangement) of, on a cumulative basis, more than 50 percent of its spectrum capacity of any individual license. Such "impermissible material relationships" render the applicant or licensee (i) ineligible for the award of designated entity benefits, and (ii) subject to unjust enrichment on a license-by-license basis. Furthermore, except as grandfathered below, an applicant or licensee has an "attributable material relationship" when it has one or more agreements with any individual entity, including entities and individuals attributable to that entity, for the lease (under either spectrum manager or de facto transfer leasing arrangements) or resale (including under a wholesale arrangement) of, on a cumulative basis, more than 25 percent of the spectrum capacity of any individual license that is held by the applicant or licensee. The "attributable material relationship" with that entity will be attributed to the applicant or licensee for the purposes of determining the applicant's or licensee's (i) eligibility for designated entity benefits, and (ii) liability for unjust enrichment on a license-by-license basis."

In my professional opinion as an expert in wireless communications the term spectrum capacity used by the FCC in the above document is far too vague and inspecific to be reasonably applicable in any legal proceeding pertaining to wireless network commerce. (It should be noted that this opinion pertains only to myself and not to any employer of myself past or present, or any other organization involved in wireless communications with which I am or have been associated.)

Although I have come across the term Spectrum Capacity in a number of connections, I know of no commonly agreed definition for this term. In fact in my experience, not even distinct subgroups of professionals in this field have an agreed upon definition. These subgroups include designers of wireless systems both military and commercial, as well as operators of wireless networks and academic theorists. Nevertheless the term is significant as it is often used to reflect the capabilities of a particular system or even multiple access scheme. For example the capacity of CDMA (Code Division Multiple Access) cellular wireless networks and those of TDMA (Time Division Multiple Access) both for voice service were widely compared in the late 1990s.

Actually to make the definition clear, the context of the situation for which

it is being applied must always be carefully specified. One cannot mention the words spectrum capacity and expect to be immediately understood without this context being established.

The following two examples should make this clear. The unit of spectrum capacity used for comparing cellular networks is often taken to be

$$\text{Spectrum Capacity} = \text{Voice users/Unit Area/MHz.}$$

To make such a comparison meaningful all factors including the following must be specified

Factor

1. Rate of Voice Codec
2. Bandwidth Available
3. Wireless Propagation
4. Density of base station infra-structure
5. Distribution of users
6. Antenna sectorization plan

Since nearly all wireless systems operate in Frequency Division Duplex mode (one band for base to mobile and a separate band for mobile to base) these figures are usually applied to each of these links separately so that there is a Mobile to Base Capacity as well as a Base to Mobile Capacity.

On the other hand in the case of cellular data systems, for example the recently deployed Evolution-Data only EV-DO system, spectrum capacity is often defined as

$$\text{Spectrum Capacity} = \text{Throughput (bits/sec)/Unit Area/MHz}$$

As before additional factors have to be taken into account, including in this case, all factors except 1. above.

The previous two examples should make it clear that to have any meaning the context for the term spectrum capacity must be stated. The actual achieved figures always depend on the actual equipment deployed. For example Base to Mobile capacity for the first IS-95 standard is strongly affected by its use of slow (small number of power updates per second) as opposed to the alternative fast (hundreds of power updates per second) which was used on the opposite link. Newer designs use fast power control.

It should also be emphasised that there is no one for one trade between spectrum itself and capacity. Halving the spectrum available does not mean that the capacity available is also halved. In the first place systems must always set aside resources needed for operation which must include sufficient for system overheads such as signalling and control. Secondly larger systems can always be

operated at greater efficiency than smaller systems. Dividing spectrum in two may result in a very significant or even complete loss of spectrum capacity.

As an alternative definition of spectrum capacity to the one earlier stated an EV-DO operator, operator A may measure his capacity by simply counting the timeslots themselves.

*Spectrum capacity = No. of slots available per unit time*

He may then agree to reserve half of the slots over the day on his entire network to carry the traffic of another service provider, provider B. Such an allocation of half capacity covers the commercially advantageous busy periods when there is high traffic volume. Let us suppose the total busy period duration is 5 hours.

Provider B supports Internet service. If the system throughput is on average 0.5 Mbit/s/sector for B's traffic and a typical web page is 100 kbits. Then in the busy period alone provider B supported

$$(0.5/0.1) \times 5 \times 3600 = 90,000 \text{ Webpage downloads/day/sector}$$

In an alternate agreement the operator may agree to provider C using his entire network for 12 out of the 24 hours of the day. Since half the slots are allocated this is again half the spectrum capacity according to the previous definition. Provider C may also offer Internet service. Let us suppose that the average throughput of C's traffic is 50 kbits/s/sector with the same average Web page size as provider B. Then provider C supports

$$12 \times 3600 \times (0.05/0.1) = 21,600 \text{ Webpage downloads/day/sector}$$

This is less than 1/4 the traffic supported by provider B. Both providers were given half the spectrum capacity and yet the commercial value in terms of service provided differs by a factor of at least 4. Hence if operator A restricts himself to 49 % of the slots in the transaction with provider B he will not be seen as using over 50 % of his spectrum capacity as will be the case if provider C is actually allocated the slots for 13 hours instead of 12, according to the stated definition.

Instead of dividing his slots according to time, operator A could just as well divide his slots spatially, allowing service provider D to use one half of the total number of base stations in his network and hence once again half of the slots. As before the commercial value of this arrangement depends on the spatial usage pattern associated with As network.

It may be thought that using the results of Information Theory a fundamental limit can be determined for "spectrum capacity" which therefore might be applied in legal matters in connection with wireless commerce. There are several difficulties with this. First, except for one to one communications, there is no single spectrum capacity figure as such. Rather there is a capacity region defining which combinations of rates (bits/channel use) for each user can be

achieved. (One cannot divide the maximum possible total sum rate between users arbitrarily.) Second as in the earlier cases the rates achievable depend on the channel itself (fading, Gaussian etc.) as well as any constraints such as those on peak and average power, in addition to the spectrum itself. Moreover the channel is affected by the number of receive and transmit antennas being utilised. (For example in the above MISO systems capacity increases according to the number of antennas, spectrum fixed.) Thirdly the rates which are indicated as achievable are often far in excess of current technology only attainable using highly complex coding schemes and other sophisticated mechanisms. Finally even when the channel and constraints are fully specified the actual capacity region is often not known (in the case of MISO broadcast, as above, this was only determined in 2004 and is yet to be published.)

To summarise, one there is no agreed on definition of spectrum capacity, any definition makes sense only when the context has been carefully defined. Second the operational (eg supported bit rates numbers of users) and/or commercial value of spectrum capacity cannot be taken as being in proportion to the fraction allocated. Third, fundamental definitions of spectrum capacity based on Information Theory, actually also require a precise channel definition and often work with capacity regions. Finally the results of Information theory show that capacity may be extended very significantly in fixed spectrum by adding additional antennas and through other techniques (eg relaying).

Respectfully submitted,

*P. A. Whiting*

Philip A. Whiting  
Ph. D.

cc: The Honorable Jonathan S. Adelstein  
The Honorable Michael J. Copps  
The Honorable Deborah Taylor Tate,  
Fred Campbell,  
Barry Ohlson,  
John Giusti,  
Aarong Goldberger

Prof. Timothy X Brown  
Interdisciplinary Telecommunications  
Electrical and Computer Engineering  
University of Colorado, Boulder  
80309-0530

May 8, 2006

Federal Communication Commission  
Washington, D.C. 20554

The FCC is adopting new rules to define who may enjoy designated entity (DE) benefits in FCC auctions.<sup>1</sup> In these rules a key factor is the percentage of "spectrum capacity" controlled by different parties.<sup>2</sup> The meaning of "spectrum capacity" is never defined in the document. This term does not have a single precise technical definition and could be interpreted through one of at least seven different and possibly contradictory definitions. The source of the ambiguity appears because the different parties may use their portion of the spectrum with different technologies, different purposes, or different levels of deployment. Further, the DE and other parties may choose different geographic boundaries for their control or different operational divisions in the use of the spectrum. The following definitions illustrate these ambiguities and the potential for very different outcomes when arbitrating whether a percentage threshold on the spectrum capacity has been exceeded. They also illustrate that simple definitions may significantly constrain the optimal use of the spectrum.

**Definition 1 (Simple Aggregate):** The percentage of spectrum capacity is the total bandwidth in Hertz controlled compared to the total bandwidth in the DE license.

Example: A party that controls a sub-band of 10MHz out of a total license for 20MHz would have 50% of the spectrum capacity.

Discussion: The party may not control the sub-band over the entire region, or, it may control different sub-bands in different sub-regions. The different sub-bands may be less than some threshold percentage of a sub-regions' licensed bandwidth. However, the total bandwidth covered across multiple sub-regions could be more than this threshold.

**Definition 2 (Weighted by Area):** The percentage of spectrum capacity is the total bandwidth in Hertz controlled compared to the total bandwidth in the DE license weighted by the geographic area covered by the bandwidth. For this calculation the area covered by the

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<sup>1</sup> In the Matter of Implementation of the Commercial Spectrum Enhancement Act and Modernization of the Commission's Competitive Bidding Rules and Procedures, WT Docket No. 05-211 *Second Report and Order and Second Further Notice of Proposed Rule Making*, FCC 06-54, April 25, 2006 ("Second Report and Order")

<sup>2</sup> e.g. *Second Report and Order* ¶ 15: "Specifically, except as grandfathered below, an applicant or licensee has "impermissible material relationships" when it has agreements with one or more other entities for the lease (under either spectrum manager or de facto transfer leasing arrangements) or resale (including under a wholesale arrangement) of, on a cumulative basis, more than 50 percent of its spectrum capacity of any individual license."

license may be divided into sub-regions and the percentage of capacity computed in each region individually. Each sub-region is weighted by its area relative to the total area covered by the license and then summed.

Example: The licensed area is divided into two equal size sub-regions. In the first region a party controls 40% of the bandwidth. In the other the party controls 10% of the bandwidth. The weight for each region is 0.50. The percentage of spectrum capacity is  $0.50 \times 40\% + 0.50 \times 10\% = 25\%$ .

Discussion: Under Definition 1, this example would be considered anywhere from 40% to 50% depending on whether the bandwidths in the sub-regions overlap or not. The regions in this example might cover different population sizes. One region may cover the vast majority of the population and have a much greater potential for carrying customers and generating revenue.

**Definition 3 (Weighted by Population):** The percentage of spectrum capacity is the total bandwidth in Hertz controlled compared to the total bandwidth in the DE license weighted by the population served by the bandwidth. For this calculation the area covered by the license may be divided into sub-regions and the percentage of capacity computed in each region individually. Each sub-region is weighted by its population size relative to the total population size in the area covered by the license and then summed.

Example: The licensed area is divided into two equal size sub-regions. In the first region a party controls 40% of the bandwidth. In the other the party controls 10% of the bandwidth. The first region has 10% of the population, the other 90%. The percentage of spectrum capacity is  $0.10 \times 40\% + 0.90 \times 10\% = 13\%$ .

Discussion: These first three definitions come to widely different values for the spectrum capacity controlled by a party in the above example: 50%, 25%, or 13%. However, once chosen they can provide a consistent measure assuming that control is defined in terms of bandwidths over regions. This does not necessarily have to be the case. Spectrum can be time multiplexed such as the Instructional Television Fixed Service (ITFS) where it provided education service for a minimum of five hours a week and wireless cable service otherwise.

**Definition 4 (Weighted by Time):** The percentage of spectrum capacity can be defined according to one of the other definitions and modified so that it is weighted according to the fraction of time that a party has control.

Example: A party leases 60% of the bandwidth for the hours of midnight to 6am in order to make backups. The fraction of time is 25%. So the spectrum capacity controlled by the party is  $0.25 \times 60\% = 15\%$ .

Discussion: Although for some time a party may control the majority of the bandwidth, it may only be a small fraction of the spectrum capacity if the time is short enough. This time can be clearly defined blocks. However, in some services such as for a shared push-to-talk radio

service or a trunked radio service, there may be no simple way to account for relative times of the different parties.

**Definition 5 (Weighted by Technology):** The percentage of spectrum capacity can be defined according to one of the other definitions and modified so that it is weighted according to the spectrum efficiency of the technology used by the parties.

Example: CDMA can carry 20 times more customers for a given number of base stations and bandwidth. A party uses 5MHz of bandwidth for a CDMA cellular service. The other party uses 15MHz of bandwidth for an AMPS cellular service. The technology weighted percentage of spectrum capacity for the CDMA user is  $20 \times 5\text{MHz} / (20 \times 5\text{MHz} + 1 \times 15\text{MHz}) = 87\%$ .

Discussion: The CDMA-based party has 25% of the bandwidth but has 87% of the potential capacity. This model would require technology weights that are appropriate for the services allowed by the license. Similar services are the best candidates for the weighting by technology. The previous measures allow the spectrum percentage to be computed for a party independent of the other parties. This measure and the next two measures couple parties so that an action by one party can change the percentage of spectrum capacity of other parties. In this definition, a change in technologies by one party will change the percentage of spectrum capacity held by it and other parties.

**Definition 6 (Customer-Based):** The percentage of spectrum capacity is the fraction of total customers served by a party compared to the total number of customers served by a license.

Example: A party has 10,000 customers and the license serves a total 40,000 customers. The percentage of spectrum capacity is  $10,000/40,000 = 25\%$ .

Discussion: Weighting by technology adjusts for potential in capacity. The number of customers carried is a direct measure of spectrum capacity. In some cases, such as a broadcasting application, the number of customers can not be measured directly. In this definition, one party's percentage of spectrum capacity will depend on the rise and fall in the number of other parties' customers.

**Definition 7 (Revenue-Based):** The percentage of spectrum capacity is the fraction of total annual revenue earned by a party compared to the total annual revenue earned through a license.

Example: A party earns \$1M per year with a wireless hot spot service that uses low-power transmitters that opportunistically use channels located throughout the licensed band. A total of \$5M per year is earned by all parties involved in the license. The percentage of spectrum capacity is  $\$1\text{M}/\$5\text{M} = 20\%$ .

Discussion: The revenue per annum allows parties offering different services; parties with services that lack a well-defined customer base; parties that might not cleanly divide up the spectrum resources; or parties that have different operational roles in providing a service to be evaluated. As an example A cellular telephone service could be compared with: a video

messaging service (incomparable technologies); a broadcast audio service (number of customers not well defined); or an underlay wireless broadband hot spot (spectrum boundaries not well defined). Parties may choose different operational roles to offer a single service over a band. For instance, in the offering of cellular service, one party may build the cellular infrastructure, another will operate and maintain the infrastructure, and a third provides the customer interface (marketing, customer billing, and customer service). Revenue is one way in such a case to define each party's relative control over spectrum capacity. Changes in revenue will change each party's percentage of spectrum capacity.

The preceding definitions illustrate that the simplest definition of aggregate spectrum is unlikely to be appropriate. By ignoring any of the geographic, demographic, time, technological, customer, and revenue factors such a simple rule will inhibit the flexible use of the spectrum to provide the greatest societal value. Therefore rule makers should consider carefully their definition of spectrum capacity so as to provide the greatest benefits. These benefits will likely be best realized through definitions that are specific to each auction's goals.

The different rules produce significantly different values for the percentage of spectrum capacity. In the worst case, the definition will be subject to interpretation and the different parties will choose definitions to suite their own purposes. The proposed rulemaking's ability to achieve its goals will be weakened. A clear definition must be defined up front so that rational bidding can take place and the goals of the proposed rulemaking are met.

Sincerely,

Timothy X Brown

Timothy X Brown is a professor in the Department of Electrical and Computer Engineering at the University of Colorado with a joint appointment in the Department of Computer Science and the Interdisciplinary Telecommunications Program. He has taught classes on wireless technology and policy to over 700 students. His research is in the areas of wireless systems, networking, and spectrum policy. He was awarded the NSF CAREER award in 1995 and the Global Wireless Education Consortium's wireless educator of the year award in 2003.

May 10, 2006

Dr. Hui Liu  
Associate Professor,  
Department of Electrical Engineering  
Box 352500, University of Washington  
Seattle, WA 98195-2500

The Honorable Kevin J. Martin  
Chairman  
Federal Communications Commission  
445 Twelfth Street, S.W.  
Washington, DC 20554

Re: WT Docket No. 05-211  
AU Docket No. 06-30  
Written Ex Parte Presentation

Dear Chairman Martin:

By this letter, I write to provide my opinion on the recently promulgated SECOND REPORT AND ORDER AND SECOND FURTHER NOTICE OF PROPOSED RULE MAKING (FCC-06-52), and specifically on the matter related to "spectrum capacity."

My qualifications include over 12 years of R&D experiences in the field of wireless communications. I have published two books, one on CDMA (3G) and the other on OFDM (e.g., WiFi and WiMAX), as well as over 100 research articles and 15 patents. In addition, I have personally designed two major wireless systems (3G TD-SCDMA and pre-WiMAX OFDMA). I was recognized by the IEEE magazine (September 2005) as the "Pioneer in WiMAX."

Technically, the spectrum capacity of a wireless system relates the traffic capacity to frequency unit and surface element (*Mobile Radio Networks* – by Bernhard Walke):

$$SC = \text{bit/second}/(\text{Hz} \times \text{square-mile})$$

The SC value depends on a number of network parameters, including but not limited to:

- The technology (e.g., 1xEV-DO, 802.16e, etc.) and the total bandwidth
- The service areas (city, suburban, rural)
- The applications (voice, fixed access, mobile Internet, etc.)
- The network configurations and interference groups

Without the above parameters, it is not scientifically possible to determine the spectrum capacity of a wireless network. I would like to point out that even with all these parameters clearly defined, the spectrum capacity itself is a moving target due to technological advances (e.g., MIMO). Over the past decade, we have witnessed the evolution of cellular industry from GSM, to EDGE, to EV-DO and HSDPA, and now mobile WiMAX and 3G-LTE. Each upgrade offers 1-3 folds of capacity enhancement. As a result, a GSM system with 100% spectrum capacity is only equivalent to an EV-DO system with <20% spectrum capacity.

I read through the FCC document but could not find a precise definition of spectrum capacity. The "50% spectrum capacity" rule is thus confusing as any calculation method could fall on either side of the line.

In conclusion, I found the FCC language of "50% spectrum capacity" to be so vague that it does not allow a person with knowledge of wireless systems a reasonable opportunity to know what precisely is prohibited and that it fails to provide explicit standards for those who apply the law.

Respectfully submitted,

*Hui Liu*

Hui Liu  
Associate Professor, Univ of Washington

cc: The Honorable Jonathan S. Adelstein  
The Honorable Michael J. Copps  
The Honorable Deborah Taylor Tate  
Fred Campbell  
Barry Ohlson  
John Giusti  
Aaron Goldberger

**Before the  
Federal Communications Commission  
Washington, D.C. 20554**

In the Matter of	)	
	)	
Implementation of the Commercial Spectrum Enhancement Act and Modernization of the Commission's Competitive Bidding Rules and Procedures	)	WT Docket No. 05-211
	)	
Auction of Advanced Wireless Services Licenses Scheduled for June 29, 2006	)	AU Docket No. 06-30
	)	

**DECLARATION OF DR. RONALD J. RIZZUTO**

1. I, Dr. Ronald J. Rizzuto, am a Professor in the Department of Finance at the Daniels College of Business at the University of Denver. My finance specialty areas include capital expenditure analysis, corporate financial planning and M&A. I have a B.S. in finance from the University of Colorado and my M.B.A. and Ph.D. are in finance and economics from New York University. I have served as consultant to US West, Time Warner Cable, Showtime, TCI and Chevron. I have also served as a featured speaker at Inc. Magazine's annual business conference.

2. In the Second Report and Order and Second Further Notice of Proposed Rule Making (FCC 06-52) in WT Docket 05-211, the Commission amended Section 1.2111(d)(2) of its Rules to extend the unjust enrichment schedule to ten years from the current five years. Correspondingly, changes to the bid credit repayment terms are as follows:

	<u>Previous</u>	<u>Now</u>
1-2 years	100% + interest	100% + interest
3 years	75% + interest	100% + interest
4 years	50% + interest	100% + interest
5 years	25% + interest	100% + interest
6 years	0%	75% + interest
7 years	0%	75% + interest
8-9 years	0%	50% + interest
10 years	0%	25% + interest
> 10 years	0%	0%

The Commission also instituted a provision requiring full repayment of any bid credit where the construction requirements applicable at the end of the license term has not been met.

3. These changes will have substantial, apparently unintended, consequences for Designated Entities. They will make it, if not impossible, extremely difficult and substantially more expensive for them to obtain both debt and equity financing. These changes will, in my opinion, significantly exacerbate the problems of access to capital and capital cost that I understand have been identified by the Commission as a critical barrier to the entry for small, rural, and minority and women-owned businesses. For example, William Bradford has previously identified this problem for Minority and Women-Owned Firms.<sup>1</sup>

4. Limiting Access to Debt Capital. Designated Entities, many of which are likely to be start-ups, have inherently limited access to debt capital to begin with. The new rules will greatly diminish that limited availability. The primary reason that these changes will so negatively impact Designated Entities' already high cost and

<sup>1</sup> William D. Bradford, "Discrimination in Capital Markets, Broadcast/Wireless Spectrum Service Providers and Auction Outcomes", December 5, 2000, available at [http://www.fcc.gov/opportunity/meb\\_study](http://www.fcc.gov/opportunity/meb_study).

already limited access to debt capital is because the net effect of these changes is to significantly increase the risk to the lender. These changes increase the risk to the lender in the following three ways:

- i. they reduce the collateral value of the Designated Entities' assets,
- ii. they reduce the liquidation value of assets in the event of a need to foreclose; and
- iii. they delay the lender's access to the proceeds in a liquidation situation.

The illustration further below will demonstrate the negative impact of the new Unjust Enrichment schedule to lenders on their collateral package, driving lenders to cut-off capital to Designated Entities.

5. Limiting Access to Equity Capital. Since most Designated Entities are start-ups, they do not have access to the public equity markets. As a consequence, they will need to rely on private equity sources (venture capital funds and private equity funds ) for equity capital. Investors who are asked to back a new entrant with little or no history of performance simply will not commit to provide capital unless the designated entity has a clear exit path if the business is not going well. Likewise, the investors in these private equity sources (e.g. individuals, pension funds, government, organizations and institutions) generally have a shorter investment horizon than ten years. The typical venture capital firm looks to exit an investment in five years.

Lenders and investors who are asked to back a new entrant with little or no history of performance simply will not commit to provide capital unless the designated entity has a clear exit path if the business is not going well. A designated entity, its lenders,

and investors also cannot base a business plan on potential refinancing in 5 years to provide liquidity to investors because prospects for business problems remain unknown and the Unjust Enrichment obligations will continue for five more years.

6. Given this investment profile for private equity sources, the new Unjust Enrichment Schedule will not only make the transaction structure unattractive, but will significantly increase the risk to the equity investor for the same reasons as noted above. Of course the risk to the equity investor is even greater than the risk to the lender, since the lender has the first right to any proceeds in a liquidation. Furthermore in the unlikely scenario that a Designated Entity is able to access debt capital as discussed above, a designated entity will be required to sell more equity to finance its venture, which has additional burden of diluting the return to the pool of equity investors. The cumulative effect is to make a designated entity investment unattractive to equity investors.

7. Overall Effect. The net effect of the capital structure necessitated by the new Unjust Enrichment schedule is to create an almost prohibitive barrier to capital for Designated Entities. It will eliminate market based sources of debt and equity for Designated Entities. Hence, where the intent of these rule changes was to reduce the likelihood of Unjust Enrichment, the reality for Designated Entities is the overall elimination of sources of capital.

8. Numerical Illustration. The following numerical example illustrates the impact of the old and the new Unjust Enrichment Schedule on lenders and their collateral package. In this illustration, we assume a 2.5 million POP market where a

bidder acquires 20 MHz of spectrum in the auction. If the Per MHz POP bid price is \$1.67, then the Designed Entity will bid \$83.5 million. Given a 25% Bid Discount, the Designated Entity will need to raise \$62.6 million to purchase the wireless license. We further illustrate a lender providing 50% of the net bid price or \$31.3 million in the form of a loan. Since start-up wireless ventures have negative cash flow in the first few years, lenders will accrue interest on the initial loan. In the example below, we assume an interest rate of 14%. Consequently, the loan will increase by 14% per year, so that by year 6 the amount owed under the Designated Entity's loan will be \$68.7 million.

9. Under the old Unjust Enrichment Rules, if the lender had to foreclose on the Designed Entity after three years with an associated assignment of the Designated Entity's licenses to a non-designated entity, assuming the liquidation value of the Designated Entity was equal to the original cost of the license, the lender would have sufficient funds to pay the 75% Unjust Enrichment Bid Penalty and the 5.25% Unjust Enrichment Interest for the three years and get substantially all their loan (\$46.4 million) back. If the lender foreclosed in the fifth year, they would receive substantially all of their funds back with the 25% Unjust Enrichment Bid Penalty and Interest included.

10. However, under the new Unjust Enrichment Rules the lender would suffer a significant loss if they had to foreclose. If they foreclosed in three years, they would lose \$7.5 million. If the foreclose took place in year 5, the loss would increase to \$23.9 million. Likewise if the loss took place in the sixth year, the loss would jump to

\$26.8 million. The corresponding loan write-off percentages would be 16%, 40% and 39%, respectively. The substantial increase in lender risk is likely to eliminate debt capital availability.

**Wireless Designated Entity  
2.5 Million POP Market Illustration  
Impact on Lenders  
(\$ in millions)**

Population (millions)	2.5
MHz	20
Per MHz Pop Price	\$1.67
Gross Bid Price	\$83.5
Bid Discount	25%
Bid Discount Per MHz Pop Price	\$1.25
Net Bid Price	\$62.6
Bid Discount	\$20.9
U.S. Treasury 10 year rate for Unjust Enrichment Interest	5.25%
Loan to License Cost	50%
Loan Amount	\$31.3
Interest Rate on Loan	14%
Terms	10 years; Term
Loan Value in 3 years	\$46.4
Loan Value in 5 years	60.3
Loan Value in 6 years	68.7

**Scenario:**

Company declares bankruptcy 1 day into the 3rd and 5th year  
Lender forecloses on the stock of the Designated Entity  
Stock of the Designated Entity worth cost of license

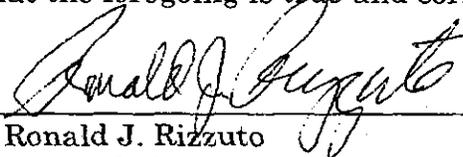
Old Unjust Enrichment Rules	Year 3	Year 5
Proceeds from Lender Foreclosing	\$62.6	\$62.6
Less: Unjust Enrichment Bid Penalty	(15.7)	(5.2)
Less: Unjust Enrichment Interest	(2.1)	(1.4)
Net Proceeds	\$44.8	\$56.1
Loan Value	46.4	60.3
Loan Write-Off	(\$1.6)	(\$4.2)
Unjust Enrichment Penalty	75.0%	25.0%
<b>Loan Write-Off %</b>	<b>3.4%</b>	<b>7.0%</b>

New Unjust Enrichment Rules	Year 3	Year 5	Year 6
Proceeds from Lender Foreclosing	\$62.6	\$62.6	\$62.6
Less: Unjust Enrichment Bid Penalty	(20.9)	(20.9)	(15.7)
Less: Unjust Enrichment Interest	(2.8)	(5.4)	(5.1)
Net Proceeds	\$38.9	\$36.3	\$41.9
Loan Value	46.4	60.3	68.7
Loan Write-Off	(\$7.5)	(\$23.9)	(\$26.8)
Unjust Enrichment Penalty	100.0%	100.0%	75.0%
<b>Loan Write-Off %</b>	<b>16.1%</b>	<b>39.7%</b>	<b>39.1%</b>

11. Conclusion. The changes in the Unjust Enrichment Schedule will have substantial unintended consequences for Designated Entities that will eliminate access to capital, and make any capital that is available more expensive for Designated Entities. Rather than serve to strengthen the Designated Entity

program, the new Unjust Enrichment Schedule will undercut the program by choking Designated Entity capital availability.

I declare under penalty of perjury that the foregoing is true and correct.



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May 4, 2006

# CATALYST

Investment Management

By electronic mail

May 05, 2006

Marlene H. Dortch  
Secretary  
Federal Communications Commission  
445 Twelfth Street, S.W., Room TW-B204  
Washington, DC 20554

Re: Implementation of the Commercial Spectrum Enhancement Act and  
Modernization of the Commission's Competitive Bidding Rules and Procedures –  
WT Docket No. 05-211

Dear Ms. Dortch:

By this letter, Catalyst Investors, LLC (“Catalyst”) comments on the dockets referenced above. Catalyst does not support the Commission’s new regulation which would impose (both retroactively and prospectively) the extension of the substantial unjust enrichment penalties on transfers of licenses by designated entities prior to the tenth anniversary of the license grant (hereinafter referred to as the “10 Year Hold Rule”).

Catalyst is a manager of private equity investment funds focused on small-and mid-sized companies in the telecommunications, media and related internet sectors. Catalyst’s principals have a particular expertise in wireless, having made significant early investments in such companies as: American Cellular, Rural Cellular, Sygnet Wireless, Telecorp PCS, Tritel, Triton Cellular Partners, Triton PCS, Western Wireless, Wireless One, and Aloha Partners. We have actively reviewed opportunities to invest in DEs and we will seek to provide capital to one or more DEs in connection with upcoming Advanced Wireless Services auctions.

The critical problem with the Commission’s new “10 Year Hold Rule” is that the rule leaves legitimate designated entities without access to capital. We can speak with confidence that both the equity and the debt markets will not be comfortable with the “10 Year Hold Rule”, as it is outside the normal hold periods for most sources of capital. Due to a lack of reasonable notice in the proceeding, the rule came as a surprise and was not the subject of any meaningful public input. Had such input been received, we strongly believe the Commission would have realized that the 10 year period is just too long. Moreover, in announcing these rules two weeks before the auction filing deadline there is clearly insufficient time for designated entities and their partners to react.

We believe that this rule change at the 11<sup>th</sup> hour has added uncertainty to the auction process. Further, it has diminished the ability of certain bidders to buy licenses and may

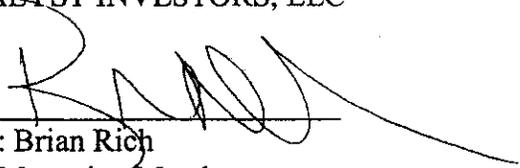
Marlene H. Dortch  
May 5, 2006  
Page 2

remove new entrants from the Auction entirely. The Auction will therefore be less competitive.

We ask the Commission to suspend the 10 Year Hold Rule for Auction 66 and invite further comment on it in a subsequent public proceeding.

Respectfully submitted,

CATALYST INVESTORS, LLC

By: 

Name: Brian Rich

Title: Managing Member

**Before the  
Federal Communications Commission  
Washington, D.C. 20554**

In the Matter of	)	
	)	
Implementation of the Commercial Spectrum Enhancement Act and Modernization of the Commission's Competitive Bidding Rules and Procedures	)	WT Docket No. 05-211
	)	
Auction of Advanced Wireless Services Licenses Scheduled for June 29, 2006	)	AU Docket No. 06-30
	)	

**DECLARATION OF DAVID HONIG**

I am the Executive Director of the Minority Media and Telecommunications Council (MMTC), a party in the above-referenced proceeding. Since the creation of the Designated Entity Program (with which we played a significant role), we have been a leading advocate for diversity and competition in telecommunications. Our membership includes a number of entrepreneurs who participate, or would like to participate, in the designated entity program.

In our Comments (filed February 24, 2006, pp. 14-15) we stated that "the first five years of the life of a license is when those that have exploited the DE program are most likely to shift control from the initial 'qualified' individual or entity to an entity that may not be qualified to benefit from discounted licenses." We added that

The Commission should consider initiating an inquiry to adjust its reimbursement obligations to require repayment of 100 percent of the value of the bidding credit. In addition, the Commission should consider expanding the unjust enrichment standard to encompass the entire license term and not just the first five years, as Council Tree recommends.

MMTC certainly was not urging the Commission to throw out its five-year unjust enrichment schedule here without consideration of its impact on designated entities and with virtually no

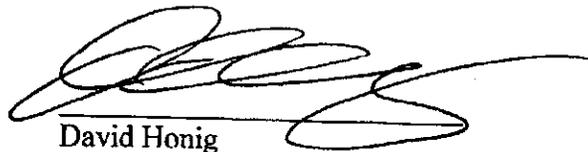
time for the parties to adjust to the change. A foreseeable exit period is critical to financing a wireless transaction. The exit period must be short enough to allow investors to avoid long-term losses in a business that does not go well, but long enough to preserve the public's expectation that designated entities will use the bidding advantages given them under the designated entity program to operate their wireless facilities for a significant period of time.

Traditionally, the exit period length that has balanced these objectives has been five years. As noted above, in our Comments we indicated that a change in the length of the exit period might be worthy of further consideration. However, independent of the possible results of such further consideration, neither MMTC nor any other party contemplated that the Commission would impose a dramatic change in the exit period with just two weeks to go before the AWS-1 auction. The unintended consequence of imposing this dramatic a rule change this close to the auction date would be to freeze out virtually all designated entities from participation in Auction 66.

The question of whether the exit period should be five years or a longer period is a fair one, but it is far too important to be resolved in haste with no record, and to be applied with no time for designated entities and other parties to revise their business plans and, in many or most cases, find new investors. Instead, the question of the length of the exit period should be considered as part of the further rulemaking the Commission intends to conduct after Auction 66 is concluded. Anything the Commission resolves to do there should apply only to new relationships entered after the new rules are effective; the Commission should not change the rules as they apply to existing relationships formed in good faith under existing rules.

I declare under penalty of perjury under the laws of the United States of America that the foregoing Declaration is true and correct.

Executed May 5, 2006.



David Honig  
Executive Director  
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Telecommunications Council  
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