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

In the Matter of	**)**	
	)	
Examination of the Future of Media and Information Needs of Communities in a Digital Age	**)**	**GN Docket No. 10-25**

To the Commission:

Comments from Nickolaus E. Leggett

On January 21, 2010, the Supreme Court of the United States ruled that corporations, unions, and other groups have a right to purchase political campaign advertisements. This case is Citizens United vs. Federal Election Commission.

Many people expect that this ruling will lead to a flood of corporate political advertisements and programs that will overwhelm the efforts of individuals and small organizations to express themselves. The Commission needs to examine this major new factor in the future of the media and the future of American democracy itself.

I am one of the original petitioners for the establishment of the Low Power FM (LPFM) radio broadcasting service (RM-9208 July 7, 1997 subsequently included in MM Docket 99-25). I am also a certified electronics technician (ISCET and iNARTE) and an Extra Class amateur radio operator (call sign N3NL). I hold an FCC General Radiotelephone Operator License with a Ship Radar Endorsement. I am an inventor holding three U.S. Patents. My latest patent is a wireless bus for digital devices and computers (U.S. Patent # 6,771,935). I have a Master of Arts degree in Political Science from the Johns Hopkins University. I am also one of the petitioners in the docket to

establish a low power radio service on the AM broadcast band (RM-11287).

Low Power FM (LPFM) Radio Broadcasting

The Commission established the LPFM radio service so that community non-profit organizations could broadcast to their communities. This service will perform an important function of presenting alternatives to the new corporate political advertising as well as being an alternative to an already highly consolidated broadcast media.

In this docket, the Commission asks if the "technical interference requirements [of LPFM should be] adjusted to allow licensing of additional LPFM stations?" (Item 26 on Page 7). My answer is certainly yes, since the LPFM stations provide a very useful local broadcasting service.

The most direct way of doing this, would be to license 10-Watt LPFM radio stations. To date, only the 100-Watt LPFM radio stations have been licensed. Adding the 10-Watt stations would allow additional LPFM stations to be accommodated on the FM broadcast band.

The radio regulations already provide for 10-Watt LPFM radio broadcast stations which are identified as LP10 stations. The Commission has the freedom to establish these stations.

LP10 Broadcasting Regulations

The Commission's LPFM rules include provisions for the operation of LPFM broadcasting stations running approximately 10 Watts of power (LP10 stations). The rules (47CFR73.811 LPFM Power and antenna height requirements) specify the maximum facilities of these stations as follows:

"*Maximum Facilities.* LP10 stations will be authorized to operate with maximum

facilities of 10 watts ERP at 30 meters HAAT. An LP10 station with a HAAT that exceeds 30 meters will not be permitted to operate with an ERP greater than that which would result in a 60 dBu contour of 3.2 kilometers. In no event will an ERP less than one watt be authorized. No facility will be authorized in excess of one watt ERP at 100 meters HAAT."

LP10 Operation in Emergencies

These very low power broadcasting stations could easily be operated from emergency sources of power such as lantern batteries, automobile batteries, small backup generators, solar cell arrays, or even hand-cranked generators.

In an intense emergency, LP10 broadcast stations could be used to organize local community responses to the emergency. In these situations, both the LP10 broadcast stations and numerous FM broadcast radio receivers would be powered by batteries. Also, the LP10 broadcast stations are small enough that, if need be, they can be carried to higher ground or to an intact building in order to continue operation.

The little LP10 stations can easily provide service to the local community while the larger broadcast stations have been disabled. After the big radio stations have been restored, the LP10 stations can continue providing service and coordination that is focused on the individual local neighborhoods.

A Second Alternative for Local Broadcasting

This alternative is provided by the huge spectrum of the millimeter waves that allows a tremendous number of broadcast stations to be established in each city of the nation. In comments submitted in the localism dockets, I proposed a specific approach for millimeter wave broadcasting to neighborhoods. The Commission should take a

second look at this option.

Disappearing Shortage of Radio Broadcasting Frequencies

Advances in the state of the art of radio technology have made the concept of a shortage obsolete.

As radio technology has developed, it has opened up more and more of the higher frequencies in the electromagnetic spectrum for practical communications uses. As you go higher in frequency, there is more and more spectrum space available. Think of the spectrum as an inverted pyramid with the low frequencies at the pointed "bottom" of the pyramid and the millimeter, sub-millimeter waves, and higher frequencies are the broad "top" of the pyramid. There is not much space for communications in the low frequency ranges, while there is a lot of room at the highest frequencies.

For example, if you establish a neighborhood broadcasting service at the vicinity of 60 GHz you can accommodate a large number of broadcasting stations in a single community. If each station has a 100 kHz channel for audio broadcasting and you allocate 1000 such channels for each community, the resulting frequency range of 60 GHz to 60.1 GHz would accommodate your robust set of 1000 local broadcasters in a single community. Here you have a delightfully large set of local broadcasters and yet you have hardly made a dent on the millimeter wave spectrum of 30 GHz to 300 GHz. In addition, you have even more frequencies about 300 GHz which you can use for the same purpose. Even infrared and light waves could be used for this type of broadcasting.

Does this sound like a shortage? It is only because our current broadcasting allocations are near to the crowded bottom of the inverted pyramid that we tend to think of shortages. The 1000 community channels would not fit in the entire high frequency

(HF) frequency range (2 MHz to 30 MHz), while they fit easily in the millimeter wave part of the spectrum. So if we keep moving upward in frequency, we can accommodate every local group and individual who wants their own broadcast station.

Aspects of Broadcasting on the Millimeter Waves

Broadcasting on the millimeter waves is a different experience than broadcasting on the AM or FM bands. Millimeter wave transmitters currently in use tend to be low power fed to very high gain antennas. This is not a natural match to the omni directional transmissions used by broadcasters. I have proposed a lighthouse protocol that would overcome this situation.

A millimeter wave installation is typically engaged in point-to-point communication using a narrow beam formed by very high gain antennas. This communication is often referred to as "pencil beam" communication.

Clearly, a fixed pencil beam is the opposite of the broad coverage desired for broadcasting service.

However, a pencil beam can be converted into an omni-directional broadcasting system by using a rotating beam. The high-gain transmitting antenna is mounted so that it can be continuously rotated in a similar manner to a plan position indicator (PPI) radar antenna. The transmitting millimeter wave beam would "paint" the surrounding geographic area like an electronic lighthouse.

Lighthouse Protocol for Broadcasting

The neighborhood broadcasting station would transmit packets of digital program material to the broadcast receivers. Each receiver would store the packets and play the

program material to the listener.

The station would use a protocol where the same set of packets would be repeated for each beam width around the points of the compass. For example, if the transmitter has a 10-degree beam width, it would transmit 36 repetitions of the packet set. Each repetition would be at a different compass direction to cover a full 360 degrees.

The radio receivers would put the packets together and play them out to the listeners. This would result in the program material being delayed somewhat from real time, but this would not be a major problem for most neighborhood broadcasting applications.

Millimeter wave transmissions are very much a line-of-sight process like light wave transmission. Leaves of trees can absorb the signals. As a result, outdoor receiving antennas above the roof line would be desirable for this radio service. This could conflict with the widespread prohibitions of external antennas by homeowner associations and condominiums. Any docket on millimeter wave broadcasting would have to address these private regulations and their negative impact on this new broadcasting opportunity.

Urban Neighborhood Broadcasting Using Millimeter Waves

A frequency range in the vicinity of 60 GHz is very desirable because the atmosphere strongly absorbs these transmitted signals. This will limit each broadcaster to a single neighborhood or modest sized community. The same channels can then be reused in a near by community with no problem of interference. This absorption of the signals is strong enough that you could have several reuses of the 1000-channel set within a single metropolitan area such as the New York City area. Here at last you have a

neighborhood broadcasting system that can be used in dense urban areas. This is a contrast to the existing low power FM (LPFM) broadcasting service that has been limited to largely rural areas by spectrum crowding concerns.

The State of the Art in Millimeter Wave Transmission

Current electronics technology includes equipment for transmission in the millimeter wave portion of the radio spectrum. FCC allocations and regulations are established for operations in this spectrum, and yet there is a lot of available room for innovations such as local radio broadcasting. Amateur radio operators have conducted two-way communications in this spectrum with transmissions up to frequencies over 400 GHz. There is an existing technology that can be adapted for neighborhood radio broadcasting that is available for the many urban areas where accommodating standard LPFM is difficult.

A Third Alternative for Local Broadcasting

There is also a petition to the Commission for the establishment of a low power AM (LPAM) radio broadcasting service that could serve neighborhoods with simple low power amplitude modulation (AM) radio transmitters. This is in FCC docket RM-11287. This petition was never acted on by the Commission.

Low power AM transmitters are a very simple radio technology that can be easily serviced by the station staff members. If the technical regulations are reasonable, these transmitters are quite low in cost and could be used for community broadcasting by the residents of urban neighborhoods.

Network Neutrality

The Internet can also provide an outlet for individual and community

broadcasting under an approach of network neutrality. However, another court is providing a problem for the Commission. The press has reported that the U.S. Court of Appeals for the District of Columbia Circuit was skeptical of the FCC's arguments for its authority to regulate network neutrality.

Requested Action

Since the Supreme Court has propelled the Nation to an era where the large corporations will have immense access to the political process and the media, the Commission should examine what it can do to facilitate the operation of effective broadcast media by individual citizens, small community organizations, and minority organizations. Alternative media such as LPFM, LPAM, millimeter wave broadcasting, and open Internet access must be considered and encouraged.

We do not want a future where America and American media is completely a domain for rich and giant organizations and the regular citizens' voices are shut out.

Respectfully submitted,

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January 22, 2010

Appendix A - LPFM Power and Antenna Height Requirements

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[Code of Federal Regulations]
[Title 47, Volume 4]
[Revised as of October 1, 2004]
From the U.S. Government Printing Office via GPO Access
[CITE: 47CFR73.811]
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TITLE 47--TELECOMMUNICATION

CHAPTER I--FEDERAL COMMUNICATIONS COMMISSION (CONTINUED)

PART 73_RADIO BROADCAST SERVICES--Table of Contents

Subpart G_Low Power FM Broadcast Stations (LPFM)

Sec. 73.811 LPFM power and antenna height requirements.

(a) LP100 stations: (1) Maximum facilities. LP100 stations will be authorized to operate with maximum facilities of 100 watts effective radiated power (ERP) at 30 meters antenna height above average terrain (HAAT). An LP100 station with a HAAT that exceeds 30 meters will not be permitted to operate with an ERP greater than that which would result in a 60 dBu contour of 5.6 kilometers. In no event will an ERP less than one watt be authorized. No facility will be authorized in excess of one watt ERP at 450 meters HAAT.

(2) Minimum facilities. LP100 stations may not operate with facilities less than 50 watts ERP at 30 meters HAAT or the equivalent necessary to produce a 60 dBu contour that extends at least 4.7 kilometers.

(b) LP10 stations: (1) Maximum Facilities. LP10 stations will be authorized to operate with maximum facilities of 10 watts ERP at 30 meters HAAT. An LP10 station with a HAAT that exceeds 30 meters will not be permitted to operate with an ERP greater than that which would result in a 60 dBu contour of 3.2 kilometers. In no event will an ERP less than one watt be authorized. No facility will be authorized in excess of one watt ERP at 100 meters HAAT.

(2) Minimum Facilities. LP10 stations may not operate with less than one watt ERP.