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

In the Matter of	)	
	)	
Broadcast Localism	)	MB Docket No. 04-233
	)	
	)	

To the Commission:

Comments from Nickolaus E. Leggett

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

Disappointing Result

I think that the Commission's actions in this docket are probably too incremental by themselves to provide a secure future for local broadcasting in the United States.

Spectrum "Territory" for Local Broadcasting

It is necessary to stake out a specific "territory" for local broadcasting operations. This should include the following items:

1. The Commission should open a filing window for LP-10 low power FM (LPFM) radio broadcasting stations. The regulatory structure already exists for this step. LP-10 stations are especially low power stations (10 Watts) that can be fit into the spectrum where LP-100 (100 Watt) stations cannot be accommodated.
2. The Commission should seriously consider allocating additional radio spectrum for the exclusive use of local independent broadcasters. The physics of the radio spectrum provides a huge capacity for broadcasting in the millimeter wave part of the spectrum. (This option is discussed in detail in these comments.)
3. The Commission should issue a Notice of Proposed Rulemaking (NPRM) proposing the establishment of a low power AM (LPAM) radio broadcasting service. This service would provide additional broadcasting opportunities to residents of underprivileged areas of the Nation. Refer to Docket **RM-11287** for detailed discussion of this proposed new service.

A protected territory is needed for local broadcasting to prevent it from

being overrun by the large commercial and public broadcasting interests. Without this firmly protected space, local broadcasting will be displaced over time.

If the small operator and the local community are always displaced by huge national corporations, the future of our Nation will be quite limited and unpleasant. Over time, people will see broadcasting as a foreign presence that is unconnected to their own lives and needs. The 80,000 plus comments in this docket is a small event compared to the millions of angry citizens that will eventually face off against a highly concentrated broadcast system. The political shifts carried out by Mr. Chavez and Mr. Morales in South America can happen here if the needs and aspirations of our citizens are consistently blocked over time by corporate power. America is based on the basic concept of shared opportunities and shared resources. Our Nation and our spectrum do not just belong to the largest corporations. Any sustainable broadcasting system must provide opportunities and outlets for individual citizens, small organizations, and small communities as well as giant communications companies.

The Commission would be wise to try to accommodate the numerous citizens who are calling for sustainable local broadcasting. Or you can wait for President Obama or President Hillary Clinton to force such a change.

Commercial broadcasting interests should embrace my suggestion that some (not all) local broadcasting could be accommodated in the millimeter

wave region of the radio spectrum. This move would reduce the pressure on big broadcasting to deliver the goods on local broadcasting.

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 light-house protocol that would overcome this situation. Refer to Appendix A for a description of this protocol.

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.

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

Requested Actions

Establish a sustainable territory for local broadcasting. This should include:

1. Open a filing window for LP10 (10 Watt) Low Power FM radio broadcast stations.
2. Rulemaking for local broadcasting in the millimeter-wave portion of the radio spectrum.
3. Rulemaking for the establishment of a low power AM (LPAM) radio broadcasting service.

We must remember that America exists for all of its citizens, not just for the largest and richest corporations.

Respectfully submitted,

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January 28, 2008

Appendix A – Using the Lighthouse Protocol for Local Broadcasting on the Millimeter Waves

Physical Aspects of Millimeter Wave Broadcasting

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.