BEFORE THE
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20554

In the Matter of		
Unlicensed Operation in the TV Broadcast Bands	)	ET Docket No. 04-186
	)	
Additional Spectrum for Unlicensed Devices	)	ET Docket No. 02-380

To: The Secretary

METROPOLITAN AREA NETWORKS, INC.

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SUMMARY

Metropolitan Area Networks, Inc. ("MAN") is neither a broadcaster nor a manufacturer or user of wireless devices. Rather, it is a firm involved in wireless technologies, including those that would be useful in ensuring that licensed and unlicensed users can coexist in spectrum authorized to them. As such, MAN has not approached this proceeding with any pre-existing notions or interests, but as a party with a well-developed knowledge of wireless communications.

From that perspective, MAN urges the Commission, should it decide to permit unlicensed devices to make use of spectrum currently authorized to television broadcasters, to do so only with technological safeguards that will allow unlicensed devices to operate without causing harm to broadcasters and the public safety community that now operate in the spectrum set aside for broadcast television. MAN submits that this can be accomplished through the use of a Common Signaling Mode ("CSM").

As described herein, the use of a CSM involves a wireless interface. This interface, implemented through beacon transmissions, provides a spectrum etiquette that alerts unlicensed devices as to what spectrum is usable and what must be avoided. In this manner, the unlicensed devices are directed into that part of the spectrum where interference will not occur. Further, CSM usage will not only be beneficial for the operation of unlicensed devices, but can also assist with the Emergency Alert System, government usage, and other new technologies.

The Commission's proposal can result in optimized spectrum usage provided that the Commission requires the use of technologies, such as CSM, that will protect current broadcast television transmissions. MAN urges the Commission to give CSM full consideration.

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COMMENTS

Metropolitan Area Networks, Inc. ("MAN"), a corporation involved in wireless technology, by its attorneys and pursuant to Sections 1.415 and 1.419 of the Commission's Rules, hereby submits its Comments in the above-referenced proceeding dealing with proposed changes to Part 15 of the Commission's rules that would permit unlicensed devices to operate in the broadcast spectrum currently authorized exclusively to broadcast television.[1] MAN has been involved with the technology that would be necessary for unlicensed devices to be accommodated in the broadcast spectrum and offers these Comments to assist the Commission should it determine that licensed and unlicensed services can operate together without causing interference to broadcasters and their service to the public. In support thereof, MAN states as follows.

INTRODUCTION

On May 25, 2004, the Federal Communications Commission released its *Notice of Proposed Rulemaking* ("NPRM") dealing with the subject of the operation of unlicensed devices

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[1] The comment period has been extended to November 30, 2004. *Order Granting Extension of Time*, DA 04-2655, released August 24, 2004.

in the licensed broadcast spectrum[2]. MAN. commends the FCC for undertaking the consideration of regulations that would permit continued growth in unlicensed spectrum usage while maintaining a focus on ensuring non-interference to licensed spectrum users. The NPRM represents the latest proposal by the Commission seeking the increase in spectrum utilization within the United States. Within the NPRM, the Commission proposes a number of regulatory changes that would be needed to permit usage of the currently under-utilized TV broadcast spectrum within and seeks comments on these changes as well as proposals to open up the TV broadcast spectrum to unlicensed use while ensuring that licensed spectrum holders are not detrimentally impacted. One possible method for meeting the Commission's goals of ensuring that incumbent license holders are not detrimentally impacted by unlicensed users is to require the implementation of a TV Band Common Signaling Mode ("CSM") in all permitted unlicensed devices. MAN supports the usage of CSM as the means for achieving the results sought by the Commission.

WHAT IS A CSM

A CSM is a means by which disparate wireless technologies and devices may communicate with each other over a wireless interface. Ideally, it is a simple, robust and reliable "Lowest Common Denominator" wireless mode understandable to all air interfaces utilizing the TV broadcast spectrum, regardless of the technical implementations used by the unlicensed system involved. It is a mandated feature of any unlicensed device and includes both a network protocol as well as beacon information format utilized by all devices wishing to transmit in the TV broadcast spectrum. The CSM for TV broadcast bands consists of two major components. One is a spectrum access protocol and the other is a common network information protocol.

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[2] *Notice of Proposed Rulemaking* in ET Docket Nos. 02-380 and 04-186, 19 FCC Rcd 10018 (2004) .

SPECTRUM ACCESS PROTOCOL

The first major component of the TV band CSM is the spectrum access protocol. In order to ensure that incumbent spectrum holders are not impacted by unlicensed use, it is necessary to ensure that unlicensed devices access the spectrum in a cognitive mode while observing rules of spectrum etiquette in accessing the TV broadcast band. Spectrum etiquette has been defined as "a set of rules defining when, where, and how devices may transmit."[3] Requiring spectrum etiquette in unlicensed devices will help to ensure that incumbent spectrum holders do not have their operations detrimentally impacted by unlicensed device users. Any spectrum etiquette adopted by the Commission for the TV broadcast band should embody the following general concepts as a minimum:

1. A device must not access the spectrum unless it is sure that the spectrum is vacant and access is permitted.
2. A device must evaluate its spectrum access at some time periodicity.
3. A device must defer spectrum access to emergency services.
4. A device must listen for beacon channels, both local and regional
5. A device must be able to interpret the beacon channels and to use the information provided appropriately.

In the above listed concepts, beacon channels are conceptually information sources through which unlicensed devices learn which TV channels in the local area are usable. A regional beacon is a broadcast which is transmitted either as part of an FM radio broadcast or as part of a digital TV channel broadcast and which contains information on what TV channels are unused in the area covered by the broadcast. The information typically contained in such a

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[3] "Performance Of Unlicensed Devices With A Spectrum Etiquette", Satapathy, Durga P. and Peha, Jon M., Nov. 1997, Proceedings of IEEE Globecom, vol. 1, pp. 414-418.

transmission will encompass at a minimum information such as what channels are available, current time, and the location of the transmitter. A local beacon is one that is transmitted by an unlicensed device that has been authorized to transmit. The information contained in the local beacon will be the same contained in the regional beacon with additional data specific to the operation of the unlicensed device.

The above-listed general spectrum etiquette concepts are the minimum needed for any device that will access the spectrum of the TV broadcast band. A notional algorithm which utilizes these concepts is illustrated in Figures 1 and 2 below. This algorithm, or a similar one, will need to be implemented in any unlicensed device access the TV broadcast spectrum to ensure that incumbent users are not impacted by unlicensed operations.

COMMON NETWORK INFORMATION PROTOCOL

The second major component of the CSM is a common network information protocol. While the specifics of this component of the CSM, i.e. synch pre-amble, frame size, frame format, number of bits, etc., should be set by industry trade groups, the information of the common network information protocol should contain the following at a minimum:

1. Station Identifier
2. Time stamp
3. Station Location
4. Area served.
5. Available TV channels in service area
6. Specific channels to avoid.

This minimum information should be sufficient for any unlicensed device to determine what bands may be utilized. When combined with the spectrum access protocol listed above, this

information will help to ensure that unlicensed devices do not impact licensed operations within any given area of interest.

EMERGENCY ACCESS TO SPECTRUM

A priority scheme should also be implemented within local networks communicating within the TV broadcast bands. Emergency services communication devices should be given priority access to the spectrum within the local geographical region. One usage scenario is for emergency devices to log on to the in-place infrastructure at a priority level that will guarantee access to the spectrum. The access point will allocate time to the emergency devices over the non-emergency devices. In this scenario, as the access point allocates time resources to emergency users, it may migrate non-emergency users to another available frequency band. The non-emergency user in this scenario should be allowed 100 milliseconds to move. In the event that no available channel exists for the non-emergency user the device may continue to listen to the CSM beacon signal and resume communications when allowed back on the network by the access point.

In a scenario where a mobile local emergency network controller is set up to manage emergency communications, the emergency network controller may beacon which channel it takes for emergency communications. Non-emergency devices receiving such beacon should be allowed 100 milliseconds to vacate the channel.

HOW WILL THE CSM ANSWER THE QUESTIONS POSED IN THE NPRM

Unlicensed Operation in the TV Bands

In Paragraph 15 of the NPRM, the Commission states: "We believe that with appropriate safeguards it would be possible to allow unlicensed operation in the TV bands without causing new harmful interference to television services, disrupting the DTV transition, or adversely

affecting other services that use this spectrum" and in Paragraph 16 the Commission goes on to request comments on these conclusions. The CSM as outlined above would be one "appropriate safeguard" that the would help insure that unlicensed devices operating in the TV broadcast band would not cause new harmful interference to existing spectrum incumbents.

Unlicensed Devices Spectrum Capabilities

In Paragraph 17 of the NPRM, the Commission states the need for unlicensed devices to "...have capabilities to avoid causing harmful interference to licensed services in the TV band. Specifically, an unlicensed device would need the ability to determine whether a TV channel or frequency band is unused before it could transmit." The CSM as outlined above is just such a capability. By requiring every unlicensed device to listen to beacons transmitting spectrum access information, and ensuring that no unlicensed device may access the spectrum in the absence of authorization to do so, the CSM will perform with just such a capability.

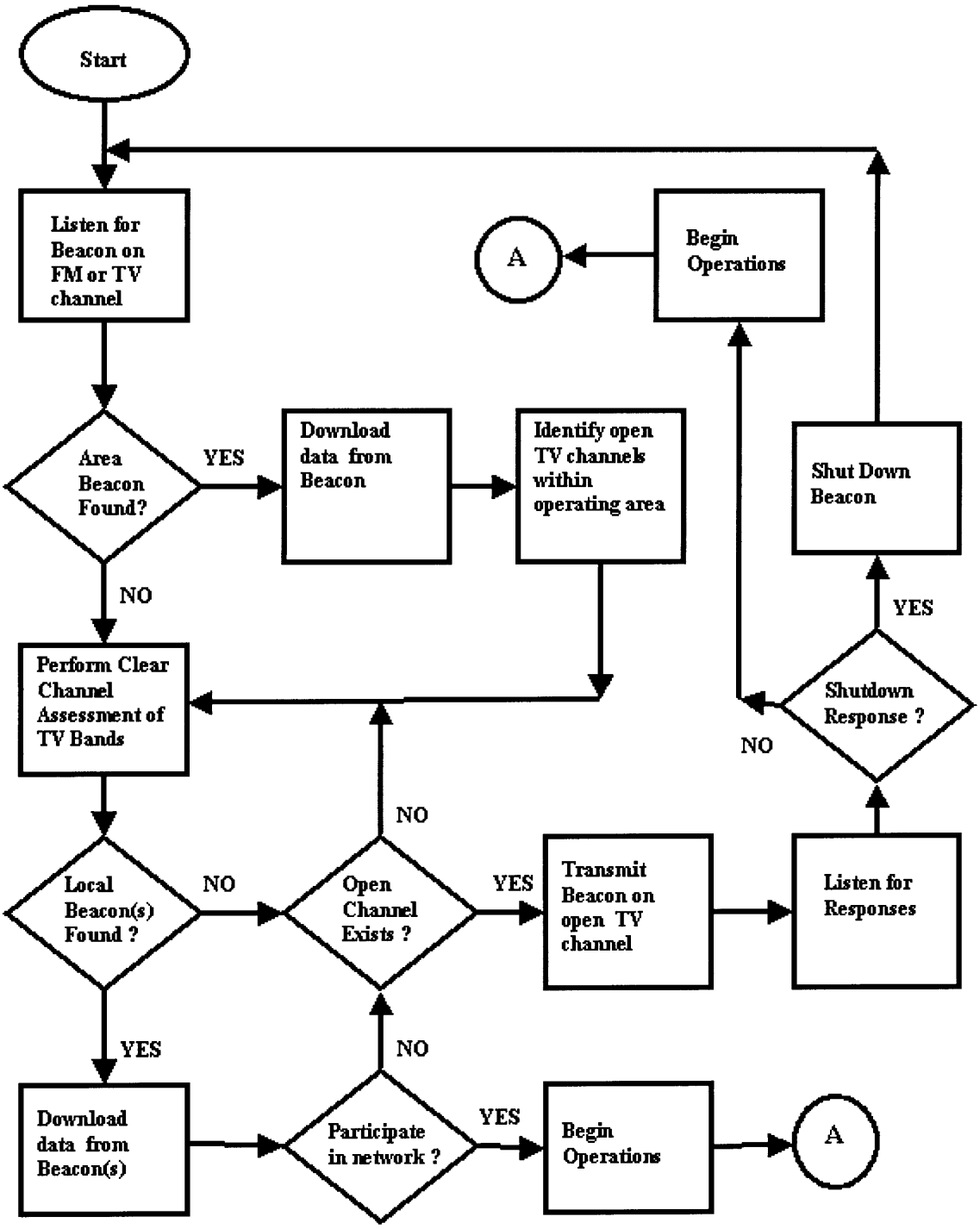
Start
Listen for Beacon on FM or TV channel
Area Beacon Found?
YES
Download data from Beacon
Identify open TV channels within operating area
NO
Perform Clear Channel Assessment of TV Bands
Local Beacon(s) Found ?
NO
Open Channel Exists ?
NO
YES
Transmit Beacon on open TV channel
Listen for Responses
Shutdown Response ?
YES
NO
Shut Down Beacon
Begin Operations
A
YES
Download data from Beacon(s)
NO
Participate in network ?
YES
Begin Operations
A

Figure 1

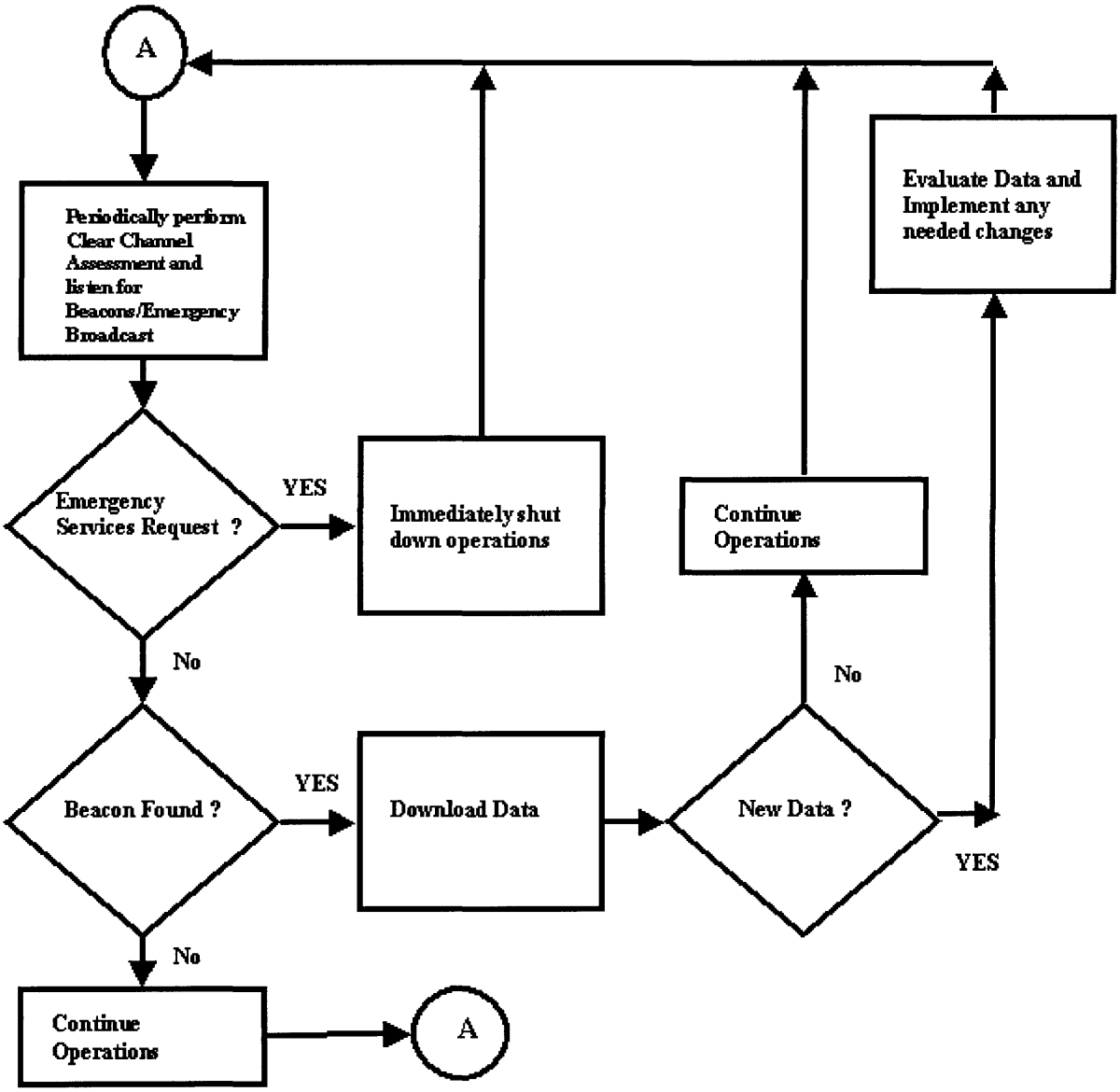
A
Periodically perform Clear Channel Assessment and listen for Beacons/Emergency Broadcast
Emergency Services Request ?
YES
Immediately shut down operations
No
Beacon Found ?
YES
Download Data
New Data ?
YES
No
Continue Operations
Continue Operations
No
Evaluate Data and Implement any needed changes
A

Figure 2

Determining if the Spectrum is Free For Utilization

In Paragraph 20 of the NPRM, the Commission states that there are: "at least three methods that could be used to determine whether a portion of the TV band is unused at a specific time and/or location." These three methods are: (1) determining an unlicensed device's position and comparing that to a list of available spectrum; (2) receiving information on available spectrum from an outside source; and (3) performing a clear channel assessment of the local spectrum. The CSM has the ability to facilitate all three of these methods. For method one, it would be possible for an unlicensed device to determine its position based upon receiving CSM signals from three or more beacons in a simplified time difference of arrival method of position location. For method two, the CSM would be broadcasting the information needed by the unlicensed device. Finally, for method three, the CSM implements a clear channel assessment in its spectrum access protocol.

CSM as a Control Signal

In paragraph 21 of the NPRM, the Commission proposes: "to allow personal/portable unlicensed broadband devices to transmit only after they receive a 'control' signal that positively identifies which TV channels are vacant and therefore available for use. Without reception of this 'control' signal, no transmissions would be permitted." If implemented, the network information protocol portion of the CSM could function as this control signal. Combined with the spectrum access protocol of the CSM, the unlicensed device would not be permitted to access the spectrum until it determined if access was allowed and appropriate. Because the CSM would be an integral part of the operation of any unlicensed device, the opportunity to receive a CSM broadcast would be greatly improved as the number of devices increased because any device that would be allowed to transmit would be required to periodically transmit a CSM beacon signal.

CSM as Periodic Identifier

In Paragraph 21 of the NPRM, the Commission seeks comment on: "... how often the control signal information should be transmitted and updated to take into account changes in TV station operations that arise due to the transition to DTV and the commencement of new stations." The Commission also proposes that these transmissions "should be at a minimum current on a daily basis." In Paragraph 22 of the NPRM, the Commission proposes: "to require that such devices automatically and periodically transmit a unique identification signal." If implemented, the regional CSM beacon would notionally be continuously transmitting and would be acquired by unlicensed devices before they would be permitted to transmit. It would function as a broadcast timing beacon, an information source for unlicensed devices, and a supplement to the Emergency Alert System. If properly automated, the information contained in the regional CSM beacon could be updated as soon as new information was obtained. Additionally, the local CSM beacon transmitted by every device would be part of normal operations for any unlicensed device prior to transmitting in the TV Bands and would be transmitted on a highly frequent basis, as is the beacon in an 802.11 type network. The information contained in the network information protocol portion of the CSM would be updated as soon as new information was obtained. Only devices that transmitted in the TV Broadcast bands would be required to transmit the CSM. Devices that were designed to be received only would not need to transmit as they would have no potential to interfere in the bands.

Transmit power levels for portable unlicensed device operation.

In Paragraph 22 the Commission proposes to limit the maximum transmit power of personal/portable broadband devices to 100 milliwatts. Additionally the Commission proposes to require permanently attached integral antennas with a maximum gain of 6 dBi for both

transmit and receive antennas.[4] MAN proposes that the limit for devices employing a CSM be set to a maximum of 1-watt average with the allowance of 6dBi gain for transmission. Additionally, MAN proposes that there be no limitations on received gain antennas. Since the receive antenna gain does not impact the potential for harmful interference to licensed services, there should be no restriction placed on received gain. This transmission power should ensure the transmission of the local CSM is robust and can be received by all devices throughout the local geographical area. The one-watt power level for portable devices will promote broadband communications in rural America where transmission distances can be significant. The one-watt limit in personal/portable devices will mitigate any "hidden node" problems that may arise where a device may be able to receive communications from a fixed access point but because of its more limited transmission power may not be able to communicate back to that point.

Summary of Responses to the NPRM

In summary, if implemented in unlicensed devices the CSM could help to answer a number of the questions the Commission has asked in its NPRM on the use of TV broadcast spectrum by unlicensed devices. The CSM could enable unlicensed devices to operate in the spectrum without impacting current incumbent spectrum licensees. The CSM could also function as a periodic information source for any unlicensed device wishing to operate in the TV broadcast band, essentially functioning as the control signal for those unlicensed devices. Finally, the CSM would enable unlicensed devices to determine if the local TV spectrum was unoccupied and available for use.

BENEFITS OF THE CSM

The CSM could offer a wide spectrum of functional capabilities. It has the potential to provide a variety of benefits to a user. These include:

[4] NPRM page 11

- A Beacon Timing Channel.
- A Beacon Ranging Channel.
- A power conservation functionality for mobile devices.
- Network status/health/control information.
- A low-bandwidth Over-the-Air-Reprogramming link.
- A low-bandwidth Over-the-Air-Rekeying.
- CSM could be used to support the FCC's Cognitive Radio Initiative.
- The CSM could be used to support the FCC's Interference Temperature Initiative.
- The CSM could also enable an emergency services protocol.
- The CSM could act as part of the Emergency Alert System
- The CSM could support priority access for governmental services

A primary use of the CSM would be to provide a method for bandwidth coordination between different wireless technologies, systems, or devices. The CSM, if properly designed, has the potential to provide a CSM user a number of capabilities and services.

CSM could provide Beacon Timing Channel

By functioning as a beacon channel that all unlicensed wireless systems accessing the TV broadcast spectrum are capable of using, the CSM could provide for time precision across these wireless networks. The concept of beacon signals is not new, they have been used in several different applications. For example, IS-95 uses the concept a Pilot Channel[5] in a manner similar to the concept of a beacon. In IS-95, the Pilot Channel is the beacon by which mobile units identify the base station. Part of the CSM packet structure could be designed to support the concepts of a timing beacon and the sharing of time information across wireless networks. By

[5] "TIA/EIA/IS-95-A: Mobile Station-Base Station Compatibility Standard for Dual-Mode Wideband Spread Spectrum Cellular System", Telecommunications Industry Association, February 27, 1996.

sharing time estimations between wireless devices, it becomes possible to generate highly precise time estimates across the network. Higher time accuracy across the network has the potential to provide for increased capacity, especially in Time Division Multiple Access (TDMA) networks by allowing higher time precision TDMA protocols to be utilized.

CSM could provide Beacon Ranging Channel

With a proper design, the CSM could permit an access point to function as a wireless positioning beacon. By allowing an access point to function as a beacon node, positioning applications would become more easily implemented. The concept of a beacon ranging channel is not a new one. It has been used in the Global Positioning System where each satellite acts as a beacon ranging channel. If devices capable of functioning as access points were required to transmit the CSM and a time mark on a repetitive basis, then mobile devices would potentially be able to utilize the access points as ranging beacons.

CSM could provide power conservation functionality for mobile devices

Because it would be functioning as a timing beacon, the CSM could enable power conservation in mobile or battery-limited devices. For example, by utilizing the CSM as a timing channel, a mobile device is able to know the times it needs to schedule its communications with its access point. At other times, the device may enter a low-power mode to improve its power conservation, thereby ensuring longer operation.

CSM could provide network status/health/control information

One of the key functions of the CSM would be to provide information on the local network. The CSM would provide key information needed by an unlicensed device to access the available spectrum. This information would be data such as the available TV Broadcast

spectrum or channels in the local area. Additionally, network status, health and control information could be readily provided the CSM.

CSM could provide a low-bandwidth Over-the-Air-Reprogramming link

Functioning as a low-bandwidth communications link, the CSM could enable on-the-fly software definable radios in which the CSM link was used to pass new communications algorithms to the target receiver to enable new waveforms in near real-time. By being able to reprogram a radio over a low-bandwidth communications channel wireless devices could be altered to improve their transmission characteristics or to improve their capacity. As regulations change with respect to software definable radios and other cognitive radios, the CSM may be used to update software and firmware to conform to the new regulations. This over-the-air reprogramming will allow devices to comply with a changing regulatory environment, thereby reducing the cost of redesign and replacement of wireless devices to designers, manufacturers, and consumers alike.

CSM could provide a low-bandwidth Over-the-Air-Rekeying

Functioning as a low-bandwidth communications link, the CSM could enable key distribution for secure networks thereby enabling over-the-air-rekeying of encryption devices. Security is a major concern in wireless architectures, as well as in communications in general. Encryption is one means of securing a communications link, be it wired or wireless. Secure encryption typically uses encryption keys that need to be changed on a dynamic basis. By creating a low-bandwidth communications channel, the CSM could enable the wireless rekeying of devices using encryption.

CSM could be used to support the concept of Cognitive Radios

The IEEE has defined the cognitive radio as "a radio frequency transmitter/receiver that is designed to intelligently detect whether a particular segment of the radio spectrum is currently in use, and to jump into (and out of, as necessary) the temporarily unused spectrum very rapidly, without interfering with the transmissions of other authorized users."[6] The FCC has defined cognitive radio technologies as those that "make possible more intensive and efficient spectrum use by licensees within their own networks, and by spectrum users sharing spectrum access on a negotiated or an opportunistic basis. These technologies include, among other things, the ability of devices to determine their location, sense spectrum use by neighboring devices, change frequency, adjust output power, and even alter transmission parameters and characteristics."[7] The Commission believes that cognitive radio technologies have the "potential to overcome some of the incompatibilities that exist between various communications services both domestically and worldwide."[8] The CSM could provide a cognitive radio the means by which spectrum negotiations could take place between dissimilar transmitters.

CSM could be used to support the concept of Interference Temperature

Another Commission initiative is the concept of interference temperature. The Commission's ET Docket No. 03-237 seeks comments on the concept of a new model for quantifying and managing interference, called interference temperature. The Commission hopes this new concept could shift the current method for assessing interference, which is based on transmitter operations, to an approach that is based on the actual RF environment seen by a receiver while simultaneously taking into account the interactions between transmitters and

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6 "Improving Spectrum Usage Through Cognitive Radio Technology", IEEE Position Paper, 13 Nov. 2003, http://www.ieeeusa.org/forum/POSITIONS/cognitiveradio.html.

7 ET Docket No. 03-108, Facilitating Opportunities for Flexible, Efficient, and Reliable Spectrum Use Employing Cognitive Radio Technologies, FCC 03-322, released December 30, 2003.

8 Id.

receivers. The interference temperature model represents a fundamental paradigm shift in the Commission's approach to spectrum management by specifying a potentially more accurate measure of interference that takes into account the cumulative effects of all undesired RF energy, from both transmitters and potential noise sources, that is present at a receiver at any instant of time. Utilizing this new measure, the interference temperature limit for the band would serve as an upper bound on the potential RF energy that could be introduced into the band. By changing the current paradigm, the Commission hopes to increase the efficient use of spectrum and ensure coexistence of different wireless systems and technologies. A CSM would support the Commission's concept by creating a signaling channel that could be used by transceivers to communicate information on the local interference temperature. This would allow transceivers to dynamically adjust transmit power based upon the target receiver, thereby ensuring the local interference temperature limit was not exceeded.

The CSM could enable an Emergency Services Access Protocol

Some concerns expressed in the NPRM relate to the use of some of the TV broadcast spectrum by emergency services and other first responders. In some locations within the country, emergency services and first responders utilize wireless systems that share some of the TV broadcast spectrum with licensed broadcasters. If implemented, the CSM would ensure that these important services were not impacted by unlicensed operations. In fact, use of the CSM could increase the potential use of the TV broadcast band by emergency services. In the event of an emergency, shutdown signals may be transmitted across the beacon to devices within selected frequency bands. When a device receives a shutdown signal, it must vacate the frequency band within a nominal time period. The device may move to a vacant frequency band on a "make

before break" basis only if it can be accomplished within the nominal time. The device should continue to listen to the beacon and determine when routine operation may resume.

The CSM could also act as part of the Emergency Alert System

Because all unlicensed devices operating in the TV broadcast band would understand the CSM, it represents an excellent opportunity for functioning as part of the Emergency Alert System. If every CSM-enabled unlicensed device were listening to either a regional or local beacon signal, it would be a relatively simple matter to forward EAS alerts. Simple receivers could be developed that were designed to only listen to CSM broadcasts and could interpret and announce EAS alerts to users. In general, information dissemination of EAS alerts would be significantly enhanced by the CSM.

Priority Access to TV Broadcast Band for Government Access

In addition to serving as a supplement to the Emergency Alert System, the CSM could function as a method to grant federal agencies priority access to the TV band spectrum on an as-needed basis to supplement and support operations for homeland security. New spectrum allocation in the TV broadcast band provides opportunities for the development of new systems to supplement and support homeland security operations. By implementing the CSM in all unlicensed devices, it would be possible to guarantee federal agencies access to spectrum on an as-needed, ad-hoc basis within most of the United States.

A REQUIREMENT FOR A COMMON SIGNALING MODE IN LICENSED TV BROADCSAT SPECTRUM WIRELESS COMMUNICATIONS DEVICES FURTHERS A NUMBER OF SPECTRUM POLICY MANAGEMENT GOALS

In addition to ensuring peaceful coexistence between licensed incumbents and unlicensed devices, a CSM furthers a number of spectrum management objectives. By requiring a CSM for TV broadcast spectrum wireless communications devices, the wireless community would be

encouraging the highest and best use of spectrum domestically in order to encourage the growth and rapid deployment of innovative and efficient communications technologies and services, as required by 47 U.S.C. §§ 301 and 303(g).

Advance Spectrum Reform by Developing and Implementing Market-Oriented Allocation and Assignment Reform Policies.

Flexibility of use promotes a market-oriented allocation system. "In a market allocation of spectrum, markets, not central authorities, determine spectrum uses and users. An ideal market allocation should impose no restrictions on spectrum uses and users beyond those necessary to limit interference, to prevent anti-competitive concentration, and to comply with international agreements. Spectrum should not be set aside for federal users or for specific non-federal users such as public safety providers, and public users should be allowed both to sell spectrum and buy spectrum from the private sector. For example, police and fire departments should be able to sell some of their spectrum and use the proceeds to buy new spectrum-conserving radios that could provide greater capacity and interoperability."[9]

In support of this concept, a CSM could be used to broadcast information on available spectrum licenses, pricing, and contact information, thereby providing spectrum owners the opportunity to sell spectrum on an as-needed basis. Utilizing a CSM to broadcast information from license holders wishing to lease their spectrum allocation would further this key Commission goal.

[9] "A Proposal for a Rapid Transition to Market Allocation of Spectrum", Evan Kewel, John Williams, November 2002, http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-228552A1.pdf

Vigorously Protect Against Harmful Interference and Enforce Public Safety-Related Rules.

As described above, a CSM enabled device may communicate important parameters to other devices as well as to pass Emergency Alert Services information. For example, a fixed access point may communicate to each mobile device the location of fixed transceivers and their known transmit powers and potentially their receiver sensitivity. A mobile device within the geographical coverage area of the known fixed transceiver may adjust its power level to prevent interference to other fixed services. Additionally, once a device calculates a local interference temperature it may communicate this information to other devices across a CSM as described above. When operating under a negotiated license within a public safety related frequency band, a CSM would allow the network to send an emergency services broadcast to the device if the network needs to reclaim the spectrum for emergency use.

Conduct Effective and Timely Licensing Activities that Encourage Efficient Use of the Spectrum.

Automated licensing in the secondary market will require a standard interaction between a network and a device wishing access to the spectrum. A CSM can provide the communications path for this automated interaction.

Provide Adequate Spectrum and Improve Interoperability for Better Public Safety and Commercial Purposes.

The CSM improves interoperability between all wireless communications devices. Additionally, it provides for automated bandwidth allocation between services. With the addition of interference temperature calculation by the devices and a CSM, public safety and commercial pursuits are better served because the potential for harmful interference to public safety wireless services is mitigated.

SEMI-LICENSED DEVICE OPERATION

The undersigned acknowledge that a CSM requirement would be a departure from the Commission's usual unlicensed regulatory scheme. With the adoption of the CSM unlicensed operation within the TV bands could be referred to as semi-licensed operations. Similarly, services operating within these bands could be referred to as semi-licensed devices with the implementation of CSM. This new terminology is intended to delineate between regulated and unregulated use of spectrum. With the proposed CSM devices operating within these bands would not fit the conventional unlicensed model, nor would they fit the licensed model. We believe this terminology more appropriately describes the proposed restrictions.

REGULATORY FLEXIBILITY ANALYSIS

In order to assist the commission in its required Regulatory Flexibility Analysis under the Regulatory Flexibility Act[10] the CSM as herein described meets a number of spectrum management goals, and provides benefits to consumers, while minimizing the economic impact on small entities. The CSM provides methods for access to otherwise under utilized spectrum while ensuring licensed services experience no harmful interference.

In the protocols herein described the entity transmitting the beacon, will not need to receive signals from devices using the spectrum. This reduces the cost and complexity of the equipment necessary to provide the beacon. The beaconing station needs to implement a transmitter, or modify their current transmitter, but no receiver for these bands. Devices operating within these bands will need an RF front end capable of communicating within the broadcast spectrum, and the ability to receive the beacon, potentially from the FM frequency bands. Some design consideration should be paid to these operations, most of which would be

[10] See 5 U.S.C. §§ 603 and 604.

required without a CSM. The CSM may be implemented as software further mitigating the cost to device manufacturers.

CONCLUSION

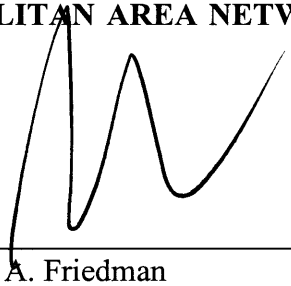
The world of wireless communication only continues to grow and expand, with new technologies continually being developed. The need for spectrum will only continue to grow as new services are conceived and as wireless technologies continue to be developed. The CSM is a potential method by which disparate wireless technologies could communicate with one another to insure operation in the TV Broadcast bands on an interference free basis. The CSM could be a critical factor in enabling broadband data access in rural areas by permitting unlicensed use of the TV broadcast band. By functioning as a "least common denominator" communications link between all wireless systems, the CSM could bring about the full capabilities of technologies such as cognitive radio and allow a harmonious use of spectrum between different and competing wireless technologies.

The FCC should require unlicensed wireless devices wishing to utilize the TV broadcast spectrum to implement a CSM. By adopting this requirement the FCC can help to ensure incumbent spectrum licensees are not impacted. Also, the use of the CSM will help the FCC meet its goals. Additionally, by requiring a CSM in wireless communications devices wishing to operate in the TV broadcast spectrum, the exciting new devices and services currently under

development can be brought to market without concerns of coexistence and harmful interference.

Respectfully Submitted

METROPOLITAN AREA NETWORKS, INC.



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