Monday, May 10, 2004

To Whom It May Concern:

WISPA, is a coalition of nearly 250 Wireless Internet Service Providers (WISPs) in the process of forming the industry's first WISP owned and controlled trade group. WISPA is dedicated to the fostering of expansion and cooperation throughout the WISP industry.

We applaud the commission for this NPRM. We believe that it's time for radios to take advantage of the computing power that's available today. We think that every effort should be made to encourage innovation in ways that will allow the maximum possible usage of spectrum. Radio systems with the flexibility and potential of today's PC should be a major goal of the commission.

The idea that radio systems can be made to automatically locate free spaces within the spectrum, configure themselves to use this otherwise fallow public resource, is the epitome of responsible public stewardship. Radios could be made in such a way as to vacate spectrum when it's needed by the primary user. We could split up transmission over the white spaces in broadcast spectrum. Systems can be made, even with today's technology, that will move within a designated band when faced with a competitive need for open space. Units could share spectrum based on time slots etc. Just think of how much free space there could be if broadcast systems had a time element using digital transmitters!

We agree with the idea of sub-leasing spectrum but think that mechanisms used to enable secondary devices to transmit should be left up to industry. There has been much talk about some form of beacon being used to enable a secondary device. As a rule, we believe this to be a bad idea. If the beacon stops transmitting for any reason the secondary device would go off line.

The beacon idea should be abandoned, or at least, left up to the individuals acting as lesser and lessee to determine. We believe that any system that has a designed in *single point of failure* should be avoided where possible. Certainly a requirement for such a system would be bad for national security, disaster recovery and network reliability. Unlicensed operations are difficult already, especially as secondary or tertiary users. Designing the ability for unscrupulous competitors, terrorists, enemies of state or any other group to shut down entire networks by taking out one central system (beacon transmitters, GPS signals etc.) needs to be avoided.

Due to the massive scope and size of this proceeding items will be covered primarily by paragraph number.

11: We have not yet seen this in wide spread use. But on paper, at least, we like the spectrum sharing mechanism built into the 5.4 GHz band.

13: We whole heartedly agree with the SPTF (spectrum policy task force) on the issue of cognitive radio opportunistically or otherwise using the current white spaces in spectrum.

16: While we are not familiar with the details of the DARPA (Defense Advanced Research Projects Agency) neXt Generation (XG) Communications program we believe that their efforts to enable a 10x increase in spectrum usage should be supported.

20: The ability to use cognitive radio capabilities to tie differing transmission systems together into one functional mechanism seems like a good idea. To allow one AP to function as wifi, wimax, proprietary etc. would be an amazing thing.

22: All future rules changes should encourage efficient use of spectrum. Cognitive radios and SDR (software defined radio) devices should be open to opportunistic use of spectrum. We oppose a requirement for a third party mechanism or geo-location requirement in order to use otherwise open spectrum. The radios should have a built in mechanism that detects existing spectrum usage and be able to re-configure themselves as needed based on thresholds set into the device on a per spectrum basis. These thresholds should be "tunable" via software upgrades.

23: We agree with the premise of this section. We'd like the commission to encourage the devices to accomplish this on a per transmission basis. In this way customers with x interference in an easterly direction could be serviced differently than customers with y interference in an east by northeast direction.

24: While we agree with the idea that the devices should sense their environment and configure themselves accordingly, we're concerned about any mechanism that won't take into account the incredibly fast changing conditions that today's deployments are likely to find themselves in. For a radio to self-sense its location is fine, as long as it's not on a north facing wall or hill. And once it does know where it's at what happens if that environment changes faster than any database available to the radio? And if there's a beacon or central data base, this would make a relatively attractive target for espionage, terrorism, vandalism etc. In the past, the HAMs have performed emergency communications during such events. The hardware typically used to do this will not live up to the massive amounts of data people and agencies need to move around quickly. We believe that the WISP community will likely augment the role that the HAMs have traditionally filled, and therefore care should be taken to make sure that mechanisms aren't designed with a "single point of failure" vulnerability.

26: We believe that systems should be allowed to use non contiguous gaps in spectrum for their transmissions. As the need for bandwidth and reliability continues to grow it's important that the WISP market have as many options available to it as is practical. Freeing up the creativity of the manufacturers is a huge first step in that process and will help the WISPs to continue to offer relatively low cost services in areas that other technologies can't or won't go.

28: Again, we oppose any mechanism that requires communication to a centralized database.

29: We support the flexibility that comes from this idea. Anything that allows WISPs to utilize additional spectrum will aid in the development of the third rail of broadband.

30: This seems like a bad idea. Manufacturers come and go. Product lines come and go. Network connectivity could easily be lost during times of most critical need for local communications.

31: Extensive testing should be done on this issue, or at least, some trial installations in various areas. The commission's goal should be rules sets that encourage manufacturers to develop radios that are intelligent enough to set themselves according to their current physical environmental parameters. Clients should monitor what they see and report that info to ap's who also monitor the current conditions and then assign operating parameters to individual client radios. If spectrum isn't in use then it should be available to opportunistic devices. The devices have to be able to determine spectrum availability with a high enough degree of accuracy though.

33: Rural should be defined in terms of structures per square mile per reasonable system coverage zone. An example today would be a 15 mile cell, this is the maximum really stable WIFI coverage range for an outdoor network. And the average WIFI network can support approximately 300 average users. Assuming that a national average of 20% broadband coverage exists in rural areas as well, we could expect a good wifi network to operate effectively with a structure density of roughly 1500 structures in a 750 square mile zone or 2 households/businesses per square mile. This means that in order to be truly rural one must be at least 15 miles from the EDGE of a large community. This formula is only to be used as an example. It would likely need to be adjusted from time to time based on currently common equipment that's actually being deployed in significant numbers.

34: We concur whole heartedly with this!

36: Care should be taken that "underserved by spectrum based services" doesn't end up being other unlicensed devices.

38: We question why you list only FHSS gear here. We believe that DSSS and OFDM transmission techniques should also be allowed to take advantage of any increases in power. We do not consider a frequency agile system to be the same thing as a frequency hopping system.

39: We'd like to correct the notion that ISM devices are not susceptible to interference from other devices. They are. It seems to us that one of the major tenents of cognitive devices would be their ability to vacate bands that are being used by incumbent operators during the time that they are in use. We believe that cognitive radio, if designed and implemented correctly should be able to avoid harmful interference to primary users of any band let alone the unlicensed bands.
We also believe that the greater public good should be kept in mind when formulating rules. To this end, we believe that unlicensed operations should be assigned primary status in today's bands. Unlicensed devices are doing more good for more people than are experimental

operations in those bands. We do NOT want to see experimentation stopped or choked out so we'd not be in favor of totally eliminating those services. Avoiding new rules that will empower the unlicensed community to offer even more services at ever lower rates and increasing levels of reliability would be good for the consumer.

40: We are not in favor of exempting devices from DFS. A radio moving to a new channel of it's own accord would be better than a break in the operations of that device. We are also not in favor of any regulatory move that would make it easier for one manufacturer to create devices that are designed to "shut down" all competing devices deliberately or via carelessness (Motorola Canopy is a good current example of such a system).

41: This section is, we believe, the most important question as this NPRM relates to WISPs. As you are aware, the WISP industry is often the only cost effective mechanism for delivering broadband and advanced services to rural Americans. WISPs often bring broadband at speeds above and costs below the urban options to rural users. In many areas there is intense competition for spectrum. In rural areas most towers are in or very near population centers. Schools, utility companies, cell phone companies, private enterprise and WISPs often compete for what has become a resource that's far more utilized than in urban zones. And while current unlicensed spectrum is in great demand AND use, much of the licensed bands are totally idle. We submit that cognitive devices should be able to detect a reasonable level of existing usage on a band and when that incumbent signal is below a set threshold (below the level needed for good quality reasonable reception by commonly used receivers) allow cognitive device operation. It seems to us that both client radios and AP's (access points or base stations) could monitor the bands and all data could be reported back to the AP which would then decide what band to occupy and at what power levels to use. We believe that cognitive radio would allow space and time to be used far more effectively than it currently is as the devices themselves would allow LOCAL control based on current and highly localized issues.

42:

43: This will likely be mostly a case of just how sensitive the receivers are. We believe that this will likely be a rare problem. And if the DOD devices can't deal with interference from WWAN or WLAN (wireless wide area or local area networks) then how hard will it be for our enemies to jam them? We believe that cognitive radios should be held to a standard high enough that they are unlikely to emit interference in the bands that they are transmitting in.

44: 30 dB is too high of a value for this. Many of the radio systems in use for data communications today are sensitive to within a few dB of the noise floor. Technologies moving forward need to do a better job of separating out the competing signals. With intelligent radios the need for 30dB fade margins is becoming less and less all the time and should no longer be the industry standard. 5dB of fade margin with automatic power control that will raise the power as needed would be a much better solution. We agree that devices should monitor spectrum before beginning transmissions, however, we believe that the device should only have to look at spectrum equal to the channel width it will occupy rather than an entire band. We do believe that 30 dB above the thermal noise floor is too high of a value but we are unsure of what a realistic level would be. Probably the difference between the radios lowest sensitivity at

maximum designed range plus a 2x margin of error. Or some other formula that will allow the flexibility for the rules to change as technology improves. Any measurements that the device takes of the spectrum issues in the immediate area should be made via the antenna that the device is going to use for its transmissions. We also believe that client radios and base station radios should both be looking at the airways and coordinate according to what they both see.

46: This item brings up a very interesting question. On the one hand WISP wouldn't want a service level interruption. On the other hand we need to make sure that all systems that use unlicensed bands are capable of functioning. It would not be in the public's interest to have a legacy Wi-Fi network shut down in the face of a new high power Wi-Max system. We believe that a yes or no choice is limited beyond necessity. Systems should move if they are likely to interfere with others. We also believe that high powered systems should have the added responsibility of designing systems to work around legacy systems to some degree. Certainly we don't see the need to pretend that all interference can (or should be) eliminated. But now that so many commercial systems use unlicensed systems it seems prudent to phase in drastic rules changes over a period of years (3 to 5) vs. days or months. As for resampling the airways, we think that should be done anyway. Devices with cognitive capabilities should already be scanning the airways for places to move to in case they detect interference from another device.

47: Devices should not be dependant upon network access in order to function. It should be the responsibility of the operator to determine if his system will be based in a rural area or not. This helps to minimize the impact of any sort of natural or man made disaster on the network. We believe that population per square mile should be the basis for determining rural vs. urban or suburban. For enforcement we believe that operators causing interference to others due to illegal network power levels and/or designs should be dealt with to the degree that's needed to make the bands as useful for as many users as practical.

48: We like this idea. We believe that any mechanism put in place should put out a beacon preventing use by a lessee rather than a beacon allowing use. Again, this is primarily aimed at single point of failure issues. We also believe that unused spectrum should be allowed to be put to use by unlicensed devices until such time as a beacon (or sufficient carrier signal) is detected preventing the use of that channel or band.

49: We believe that the market would be the proper entity to determine methodologies and functionality.

50: Low power use for unlicensed operators running in a non interfering basis. Higher power for subleased spectrum. Unlicensed use should be allowed on an opportunistic basis.

53: We think this is a good idea.

54 – 67: WISPA believes that this should generally be left to the market place to sort out. As a rule we believe that any method that places one system in a position of dependence on any other system should be avoided. We also believe that "listen before talk" will work fine out in the real world. If a device can't hear the primary user's signal at a level sufficient to cause the back-off

mechanism to kick in, we don't believe that the primary user will hear the secondary user's system either.

68: All RF devices should migrate to digital services to make co-location and spectral efficiency better. We believe this will also aid in the utilization of white spaces.

71: We believe this should be structured as an option but leave it to the market to determine the methodology.

74: All radios should use digital identifiers rather than spectral identifiers.

77 – 80: The FCC should improve on OTARD to insure that mesh radios fall under the rule. Other than that we believe this to be an industry issue.

88: If a device can be reprogrammed someone will figure out a way to reprogram it. If that programming is to be done via local or remote means is a manufacturer issue. A software key, custom programming etc. will add to the cost of the devices and, in all likelihood, not really do that much to prevent unauthorized software upgrades. Perhaps an upgrade could somehow be keyed to a hard coded (mac address?) id on each device. One that would not normally be known to those not responsible for the device.

89: This sounds reasonable.

90: Why should hams be exempt any more so than ISM (Industrial, *Scientific*, Medical) equipment would be?

92: We believe that any controls put in place should be placed on output signal.

94: The offender should be held accountable. Software should clearly identify what's about to be done but should not presume to know what the rules are for the location its installed. There may be a local emergency and something non-standard needs to be done as a stop gap measure. Or maybe the rules change and an otherwise old device may be able to be deployed to a small, otherwise unprofitable market.

95 – 97: In the devices the WISPs use today, they are told what country's system they'll be operating in (FCC, ETSI, etc.). We believe that firmware could keep SDR radios from broadcasting into bands or at power levels that are not allowed in specific regions. If an operator sets a device in such a way that it functions in the wrong he should be held accountable. The FCC should make every effort to allow reasonable cost saving measures for the manufactures though.

103: This should be based on the carrier signal not a special beacon. But mostly it should be up to the market.

106: Anything GPS based is a bad idea. As an option, sure. As a requirement, no. In time of war the GPS system will be one of the very first things to be attacked by any real enemy. And in times of war we dang sure need to make sure the information systems will stay on line.

Thank you for your time,
The Members of WISPA
www.wispa.org

Submitted by

Marlon K. Schafer
Founding Board Member
Chairman, FCC Committee