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November 16, 2001

Magalie Roman Salas, Secretary  
Federal Communications Commission  
445 12<sup>th</sup> Street, S.W., Room TW-B204  
Washington, D.C. 20554

**Re: *Ex Parte Presentation***  
*Ultra-Wideband Transmission Systems – ET Docket No. 98-153*

Dear Ms. Salas:

This letter serves as notification that on November 15, 2001, Luisa Lancetti and Carl Coppage (representing Sprint PCS), Brian Fontes and Jim Bugel (representing Cingular), David Wye (representing AT&T Wireless) and Dean Brenner (representing Qualcomm), met with Bruce Franca, Karen Rackley, Ron Chase and John Reed (of the Office of Engineering and Technology) to discuss the above-captioned proceeding. The parties discussed their filings in this proceeding. Copies of presentation material distributed by Sprint PCS and Cingular at the meeting are attached hereto.

Pursuant to Section 1.1206(a), an original and one copy of this letter are being filed with your office. Please associate this letter with the files in the above-captioned proceeding.

Please contact us if you have questions regarding this submission.

Sincerely,



Luisa L. Lancetti

Attachments

cc: Bruce Franca  
Karen Rackley  
Ron Chase  
John Reed  
Brain Fontes  
Jim Bugel  
David Wye  
Dean Brenner

Sprint PCS operates a 2G CDMA network (IS-95) and is now deploying Phase I of its 3G network (cdma2000). The analysis below applies to these CDMA air interfaces, as well as to the WCDMA 3G solution that GSM operators intend to implement. (We note that Cingular Wireless, which operates AMPS, TDMA and GSM networks, has expressed concern that UWB devices will also cause harmful interference to its air interfaces as well.)

### ***Summary and Recommendations***

UWB proponents have not met their burden of demonstrating that their devices will not cause harmful interference to PCS licensees. In fact, one major UWB developer, Multispectral Solutions, Inc. (MSSI) recommends that the FCC not approve UWB use below 3.1 GHz because of "significant" harmful interference.

Sprint PCS is not opposed to UWB ground penetrating radar below 1 GHz, nor to unlicensed UWB use in bands above 3.1 GHz – including communications uses. However, Sprint PCS agrees with MSSI that commercial UWB products in the PCS band should not be authorized until significant, real-world test data confirm that UWB will pose no harmful interference.

### ***Sprint PCS/Time Domain Tests and Telcordia Modeling confirm that UWB devices will cause harmful interference to PCS CDMA networks***

Sprint PCS and Time Domain conducted last year joint tests with the independent research firm, Telcordia, to determine the impact that UWB may have on PCS networks. Telcordia also prepared an interference model that Time Domain has said is "an excellent theoretical analysis." TD Reply at 39 (Oct. 27, 2000). (Time Domain has now disavowed joint testing, and Telcordia modeling results.) The model determined that at the -53 dBm emissions level discussed in the NPRM, UWB would harm Sprint PCS in two ways:

1. Loss of existing network capacity. In a medium-sized city, Sprint PCS would serve 250 to 1,000 fewer customers during the busy hour; and
2. Increased call blocking if PCS handset is too close to UWB device, with blockage rates increasing 1.2% to 7.9% depending upon distance.

According to the Telcordia model, FCC would have to establish a -70 dBm emissions level (vs. the proposals of -41 dBm and -53 dBm) before UWB devices would no longer cause harmful interference.

The actual interference would be much worse if, as NTIA and others believe, the cumulative interference impact will be greater if several UWB devices are located in the same area. (Time Domain only made one UWB device available for testing, so the parties could not test the cumulative effect of multiple devices.)

The CDMA patent holder, Qualcomm, has independently confirmed the conclusions reached from the Sprint PCS/Time Domain tests and Telcordia model: "UWB devices would cause harmful interference to wireless phones containing the gpsOne technology." Qualcomm FCC Letter (Sept. 26, 2001).

### ***UWB Developer Response to UWB/PCS interference***

MSSI: UWB devices should not operate in the PCS bands because the “interference effects of UWB transmissions to existing spectrum users has been well documented.” MSSI Reply at 4 (July 31, 2001).

Time Domain: Sprint PCS should install more cell sites to serve the same number customers in order to minimize the new UWB interference. However, TD concedes that additional sites will not eliminate UWB interference, and it does not offer to pay for this significant new non-revenue-generating expense.

XtremeSpectrum: Limit UWB devices to indoor use. But PCS is an “anywhere” service, and people expect the service will work regardless of their location, with a growing number of customers using PCS as their only phone. In addition, if PCS service no longer works, people will assume the problem is a Sprint PCS problem, not a problem with a UWB technology that they do not understand, and may not even be aware of the presence of devices. Further, even if the user was able to make and receive calls on his/her PCS phone, the serving base station would serve fewer other customers (because additional power is needed to overcome the UWB interference).

### ***FCC should not authorize UWB devices in the PCS band***

- UWB developers do not need the PCS band to offer their services, as such services can be provided in bands above 3.1 GHz. If use of PCS band is still considered important, UWB proponents must conduct testing to overcome showing made that harmful interference will result..
- E911 implementation is a major priority. Qualcomm has concluded that UWB will cause harmful interference to handsets containing gpsOne technology.
- FCC wants CMRS to compete with incumbent LEC services. This objective is undermined if blocking rates increase as a result of UWB.
- Wireless service quality is an important issue. FCC should not take steps that will deteriorate PCS service quality.
- 3G services will often use wider channels (3.75 or 5.0 GHz carriers) than 2G networks, increasing susceptibility to UWB interference. Council of Economic Advisors has estimated that public benefits from 3G services will be \$53-\$111 billion annually.
- PCS carriers received exclusive licenses for which the government received valuable consideration (\$3+ billion from Sprint PCS alone). Even if FCC can now modify the licenses to authorize additional use and interference in the PCS band, government may be found in breach of contract and liable for increased costs PCS licensees incur to overcome UWB interference.
- Finally, the need for UWB communications devices may be questionable given the availability of Bluetooth, IEEE 802.11, *etc.*

## **ULTRA-WIDEBAND (UWB)**

ET Docket 98-153

### **The Record Shows the Need for Caution regarding UWB**

- Cingular agrees that UWB technology holds promise; however, the Commission must not put at risk existing radio services which all Americans depend on for communications related to safety, personal convenience, and business, merely because of the potential benefits of a new and untried technology.
- The majority of studies to date have shown that there is an interference concern with UWB and that the effects of multiple UWB devices are additive. NTIA reported that “operations of UWB devices below 3.1 GHz will be quite challenging” (NTIA Special Publication 01-43). At least one of the UWB proponents has also agreed with this viewpoint.
- The promises of greater spectral efficiency have not yet been demonstrated. Is there a reason to promote UWB technologies for widespread deployment if there is not a clear gain over existing Part 15 technologies, such as Bluetooth, IEEE 802.11a/b, etc?

### **Cingular’s Concerns**

- Cingular is concerned about the impact of UWB devices:
  - UWB devices would potentially interfere with base station and handset receivers used in cellular/PCS systems having a negative impact on receiver performance. Effects could include cell shrinkage, coverage holes, degraded voice quality, and decreased throughput of wireless data. Even UWB devices that are limited to indoor use could potentially interfere with cellular/PCS/GPS receivers used indoors.
  - UWB will impact GPS for both location and network synchronization. Assisted-GPS systems would be even more susceptible to interference. Additional analysis is clearly warranted to protect these vital systems.
  - UWB could interfere with other radio systems including public safety communications systems, entertainment systems, mobile satellite services, military systems, etc.
  - UWB could also interfere with non-RF based systems including hearing aids, pacemakers, implanted defibrillators, and other hospital equipment. This is clearly a concern for UWB devices used indoors.

- Various UWB devices have signal characteristics that are very different from one another, not all of which have been studied or identified. The characteristics of all types of UWB devices must be considered and rules adopted accordingly. Similarly, if UWB devices used for wireless networking applications will be interoperable, a standard waveform and modulation must be defined and adopted by the industry.
- The additive nature of multiple types of transient waveforms needs to be examined in much greater detail, including additional measurements as well as detailed numerical simulations. Fundamentally, the signals emitted from multiple transmitters will have an additive effect, thus raising the noise floor in affected receivers. Regarding the additive nature of two, or more, noise sources located near a communications receiver: due to the random nature of the noise signals, the signals will add in a non-coherent manner (i.e. the total noise power will be the sum of the noise power from each individual noise source). For example, when two noise sources of equal value are present the total noise power is 2 times greater than either individual noise source. This effect is shown in Figure E.6 of Appendix E of the NTIA Report 01-383, The Temporal and Spectral Characteristics of Ultrawideband Signals, which is available on the NTIA website at: <http://www.its.bldrdoc.gov/pub/ntia-rpt/01-383/>

### **Recommendations**

- Limit UWB devices to spectrum above 6 GHz for most systems and below 1 GHz for ground penetrating radar systems, or other remote sensing applications.
- The operation of UWB devices should be licensed, or at least coordinated, so that any interference issues can be examined as additional UWB systems are deployed. Conventional licensees and other users of UWB technology need to be able to determine who is using UWB devices and where they are located. This will help UWB systems to avoid causing interference and will enable others to be able to track any interference that occurs.
- Identify specific categories of UWB devices and establish proposed rules for licensing these categories based on individual waveforms, power levels, and deployment scenarios. These proposed rules should be sent out for public comment.
- The OET should consider developing a standard, detailed, measurement procedure to be used for testing UWB systems. This should help to ensure that all UWB devices are evaluated in a consistent manner.
- Identify areas where further testing is needed, including the additive effects of multiple UWB devices and multiple types of UWB devices.