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January 17, 2002

**VIA ELECTRONIC FILING**

Ms. Magalie R. Salas  
Federal Communications Commission  
445 12<sup>th</sup> Street, S.W.  
Washington, DC 20554

**Re: Written Ex Parte Presentation**  
**ET Docket No. 98-153**

Dear Ms. Salas:

The attached written ex parte presentation from AT&T Wireless, Cingular Wireless, QUALCOMM, Sprint PCS, and Verizon Wireless should be filed in the above-referenced docket.

Respectfully submitted,

/s/ Dean R. Brenner

Dean R. Brenner

**AT&T Wireless  
Cingular Wireless  
QUALCOMM  
Sprint PCS  
Verizon Wireless**  
January 17, 2002

Honorable Donald L. Evans  
Secretary of Commerce  
U.S. Department of Commerce  
14<sup>th</sup> & Constitution Ave., N.W.  
Washington, D.C. 20230

Honorable Michael Powell  
Chairman  
Federal Communications Commission  
445 12<sup>th</sup> Street, S.W.  
Washington, D.C. 20554

Re: Ultra Wideband Devices; FCC Docket No. 98-153

Dear Secretary Evans and Chairman Powell:

We are writing to update our December 4, 2001 letter to you (the “December 4 Letter”) in which we expressed our concern over the significant harmful interference that ultra wideband (“UWB”) devices could cause to commercial mobile wireless systems and other radio systems, including those operated by Federal agencies. We noted that in a November 2001 letter to Secretary Evans, Deputy Secretary of Defense Paul Wolfowitz had asked that the FCC delay any decision on UWB until the Defense Department (“DoD”) conducted a full review of the FCC’s draft rules in light of DoD’s conclusion that UWB devices “have significant potential for causing harmful interference to the Global Positioning System (“GPS”) and other critical DoD systems.” Given the test results in the FCC’s record, including the tests conducted by Sprint PCS/Time Domain/Telcordia, we stated our agreement with those who propose to exclude UWB devices from below 6 GHz until additional testing can be conducted that clearly demonstrates that UWB devices can operate without causing harmful interference.

Since the December 4 Letter, there have been two significant developments:

**1. DOD Letter to NTIA.**

On January 11, 2002, Assistant Secretary of Defense John P. Stenbit sent a letter to Michael D. Gallagher, Deputy Assistant Secretary of Commerce for Communications and Information (the “January 11 Stenbit Letter”) stating that DoD has completed its technical studies of UWB emissions. As a result of these studies, DoD has concluded

that “to protect vital DoD systems to ensure our national security,” there should be no intentional UWB emissions below 4.2 GHz with the limited exception of imaging systems.<sup>1</sup> DoD also expressed its concern that the lack of any limits on the aggregation of UWB devices in the FCC’s draft order “may pose a threat to vital national security systems and operations.”<sup>2</sup>

We wholeheartedly agree with the January 11 Stenbit Letter that the FCC should not permit UWB communications devices to operate below 4.2 GHz and that the FCC should limit the aggregation of UWB devices in light of their harmful interference to vital national security systems and operations. The harmful interference from UWB devices to commercial mobile wireless systems and other radio systems, including those operated by other Federal agencies, further supports these conclusions. The tests in the FCC’s record which were conducted by Sprint PCS/Time Domain/Telcordia and QUALCOMM confirm that whether measured in terms of disruption of normal operations, loss of network capacity, or degradation in reception quality, UWB devices will cause considerable harmful interference to wireless systems.

The January 11 Stenbit Letter acknowledges that other executive branch organizations use restricted bands above 4.2 GHz, notably for critical aviation safety systems, and that these organizations may also wish to protect their systems from interference. In light of such concerns expressed by the U.S. Department of Transportation and the National Aeronautics and Space Administration, we continue to agree with those who propose that UWB emissions be prohibited below 6 GHz.

## **2. Further Testing By QUALCOMM on UWB Interference to E911 Service.**

Since the December 4 Letter, QUALCOMM has submitted to the FCC the results of a series of tests measuring harmful interference from UWB emissions on QUALCOMM’s E911 technology, known as gpsOne.<sup>3</sup> Several major carriers, including Sprint PCS and Verizon Wireless, are in the midst of deploying gpsOne to meet the FCC’s E911 requirements. These tests proved that gpsOne technology incorporated into wireless phones to provide E911 service will not operate reliably or accurately in the face of UWB emissions.

Chairman Powell has stated that he regards encouraging the deployment of E911 as part of the FCC’s goal of enhancing homeland security. However, QUALCOMM’s tests showed that the presence of UWB emissions within the GPS spectrum significantly raises the noise floor of the GPS sensor to the extent that it will render the GPS device in a wireless phone with gpsOne useless in reporting location information to 911 call centers. Consequently, allowing UWB communications devices below 4.2 GHz would jeopardize the FCC’s effort to facilitate the provision of E911 services that will identify the location of wireless callers, just as wireless carriers are deploying E911 technology.

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<sup>1</sup> See January 11 Stenbit Letter (copy attached) at Pg. 1.

<sup>2</sup> *Id.* at Pg. 2.

<sup>3</sup> See QUALCOMM Written Ex Parte (filed January 11, 2002).

The QUALCOMM GPS testing provides additional evidence as to the harmful interference commercial mobile wireless systems and other existing radio systems would suffer from UWB operations below 6 GHz. As we indicated in our December 4 Letter and our other recent filings with the FCC, the FCC's record already includes the results of other testing conducted by QUALCOMM and Sprint PCS/Time Domain that showed that UWB devices will cause harmful interference to PCS systems, both in terms of reduced network capacity and diminished call quality. Despite this evidence and the absence of any tests in the record proving that this harmful interference will not occur, Intel, IBM, Texas Instruments, Sharp, and Siemens recently asked Chairman Powell for a prompt ruling from the FCC on this matter, apparently to obtain authorization for UWB communications devices.<sup>4</sup>

We emphasize that we do not seek delay, and as we noted in our December 4 Letter, we are not opposed to the operation of UWB devices. However, in light of the test results in the FCC's record showing harmful interference, including the most recent QUALCOMM testing, there is no basis to authorize UWB communications devices below 6 GHz.

In support of its request, the Intel Letter makes the following statement:

UWB proponents have filed detailed technical analyses showing that operation of their devices will not cause harmful interference to other users of the spectrum, both government and non-government. These analyses also explain why studies that purport to show harmful interference gave incorrect results.

That statement is incorrect. In truth, although the Intel Letter does not specify the "detailed technical analyses" on which it relies, the tests in the FCC's record show that UWB devices will cause significant harmful interference to PCS and GPS systems.<sup>5</sup>

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<sup>4</sup> See December 19, 2001 Letter to Chairman Powell from Intel, IBM, Texas Instruments, Sharp, and Siemens (the "Intel Letter"). We understand that the same companies have recently sent a similar letter to Secretary Evans.

<sup>5</sup> Two weeks after the filing of the Intel Letter, XtremeSpectrum made an ex parte filing containing arguments as to why the Commission should disregard the tests in the record. See XtremeSpectrum Written Ex Parte (filed January 3, 2002). XtremeSpectrum's bare arguments are not a "detailed technical analysis" and, in any event, are based on their own misstatements about the tests. The Wireless Companies will be filing a separate reply to point out these misstatements. But, even XtremeSpectrum acknowledges that UWB devices will cause harmful interference to existing wireless services. For that reason, XtremeSpectrum has proposed an emission mask for UWB devices as low as 35 dB below Part 15 Class B levels, although protection of that magnitude was limited to the GPS bands. See XtremeSpectrum Ex Parte (filed September 10, 2001).

QUALCOMM conducted tests last year showing that UWB devices would cause harmful interference to wireless phones even when operating as far away as 150 feet, and that it would take an increase of 15-20% in base stations to mitigate a 1 dB degradation in the receiver noise figure caused by the UWB devices.<sup>6</sup> PCS carriers should not have to build additional base stations in an attempt to cure harmful interference from UWB devices. Moreover, because the proponents of UWB are proposing mobile devices, PCS carriers will not even know where the added base stations may be needed. Thus, there could not be any assurance that adding such sites would in fact mitigate the interference, and in any event, this result would turn Part 15 on its head. The device causing the interference should be responsible for curing it. PCS carriers should not have to incur considerable costs and efforts in what will likely be a futile attempt to mitigate interference caused by UWB devices.

QUALCOMM's tests also demonstrated that UWB devices are likely to degrade the quality of PCS calls, including emergency calls, as measured by a significant increase in the PCS system's frame error rate to unacceptably high levels.

Similarly, Sprint PCS showed based on its tests that at a -53.2 dBm/MHz emissions level and a fair signal level (-90 dBm RSSI), a PCS handset will require 8% more forward link power when exposed to a UWB device 2 meters away.<sup>7</sup> At a marginal signal level (-100 dBm RSSI), the PCS handset will require 50% more forward link power. Thus, there could be a significant forward link capacity loss if several PCS users are near active UWB devices, a scenario that is expected given the consumer applications the UWB proponents have touted.

To put this in vivid terms, by way of example, based on the Sprint/Time Domain and QUALCOMM tests, people in an office building trying to use their cell phones to report a fire or other emergency could well have their calls blocked if there are UWB devices operating on a nearby local area network (LAN). The UWB proponents rely on the average power levels of UWB devices (even though they have considerable peaks) and, based on the average power levels, liken them to laptops. In truth, however, the same tests show that the power density actually received by victim receivers from UWB devices will be substantial and will cause substantial harmful interference to existing services, including critical safety of life services.

There is no analysis in the record showing that the Sprint PCS/Time Domain and QUALCOMM studies gave incorrect results, contrary to the statement in the Intel Letter. Rather, these studies, and even a study submitted by Intel itself<sup>8</sup>, all show that UWB devices are harmful to communications and navigation systems that are essential to the safety and protection of life. In fact, UWB proponent XtremeSpectrum has proposed an

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<sup>6</sup>See QUALCOMM Written Ex Parte (filed March 5, 2001).

<sup>7</sup>See Sprint PCS Supplemental Comments (filed October 6, 2000).

<sup>8</sup>See Reply Comments of Intel Corp. (filed October 27, 2000).

emission mask as low as 35 dB below Part 15 Class B levels for the GPS bands. This proposal, although it would leave the PCS bands unprotected, does constitute an implicit admission that there is a harmful interference problem with UWB devices.<sup>9</sup> Similarly, Intel's October 27, 2000 reply comments found that with UWB transmit power at the levels specified in the Commission's Notice of Proposed Rule Making for frequencies above 2 GHz, there would be a degradation in the noise figure of a Bluetooth receiver of about 21 dB if a UWB device was operating within 2 meters (the Bluetooth receiver was assumed to have a 6 dB noise figure). Any victim receiver (such as a wireless phone) would behave similarly in the face of additive white noise from a UWB device.

UWB devices will cause harmful interference to wireless phones even if such devices operate with power considerably below current Part 15 levels. Consider the case of two UWB devices transmitting at a power 30 dB (one thousandth) below Part 15 Class B devices. Assume that the two devices are at equal distances from a communications device with an 8 dB noise figure (very typical for communications devices over incumbent services). The amount of excess noise power spectral density introduced when these devices are at a one meter separation distance is  $-166.3$  dBm/Hz<sup>10</sup>. This is equivalent to doubling the noise figure of the victim receiver. Increasing the noise figure is equivalent to making the victim receiver less sensitive to marginally strong desired signals. Theoretically, it is impossible to restore the victim receiver equivalent noise figure to its original value, unless the UWB devices are disabled. The designer of the communications device needs to decrease the original noise figure to 3 dB to restore the resultant noise figure to one dB higher than the original value. Designing a receiver with a 3 dB noise figure is impractical, and sometimes physically impossible because consumers demand small and lightweight devices. Thus, even if UWB devices are allowed to transmit such reduced power levels, it will be extraordinarily costly and difficult, if not impossible, to mitigate the interference from UWB emissions. Again, PCS carriers should not have to bear such costs and make such efforts -- nor are they required under the Part 15 rules to do so.

This example is realistic given the statements of the UWB proponents. Two UWB devices, if not many more, will be in the vicinity of a wireless phone in indoor environments if UWB devices are implemented in laptops, palm-type organizers, and personal gadgets such as wireless headsets, and MP3 players, as the UWB proponents have suggested. People around meeting tables exchanging files or business cards are usually within three meters or less of one another, and workers within cubicles are often separated by less than three meters. Travelers at airports, bus or train stations may be at three meters or less from others passengers with personal gadgets employing UWB devices. Indeed, since UWB communications devices will have a useful range on the

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<sup>9</sup>See XtremeSpectrum Ex Parte Letter (filed September 10, 2001).

<sup>10</sup> Excess noise PSD = 41.3 (Class B) – 30 (mask level) – 38 (propagation loss) + 3 (two devices) – 60 (1 MHz)

order of ten meters,<sup>11</sup> a significant reduction in EIRP would not sufficiently reduce the harmful interference to victim receivers in the proximity of UWB devices.

In sum, any claim that an indoor use restriction will solve the interference problem in the PCS bands is simply wrong. PCS is, by its very nature, an anywhere service. Subscribers buy PCS phones to use them indoors or outdoors.

Finally, the Intel Letter is silent on the issue of the extent of harmful interference to incumbent systems from the aggregation of UWB devices. This silence is remarkable in light of Intel's October 27, 2000 Reply Comments, in which Intel admitted:

The aggregation of several UWB devices in the same area could have the potential of further increasing the noise floor of operating devices in the same frequency. If these devices are assumed to add non-coherently (assuming that different UWB transmissions operating in the same geographic area are not synchronized), then the aggregated average interference power will simply add. The additional interference will either reduce the acceptable operational distances of other wireless devices or impact the available link margin and potentially impact the perceived performance levels.

Intel Reply Comments at Pg. 20.

In other words, Intel has admitted that the aggregation of UWB devices will diminish the operation of other wireless devices. To be sure, Intel went on to try to explain away this thorny problem by speculating that the random location of UWB devices, the random data arrival rates, the possible mobility of the devices, and the possibility of ceasing transmissions when it is not necessary could lessen the aggregate interference. Speculation is no substitute for empirical study. The record shows that the aggregation of UWB devices will exacerbate the harmful interference to existing services, and no test in the record proves how this interference can be ameliorated.

For all of these reasons, and consistent with the stated positions of DoD and other Federal agencies, we urge the Executive Branch and the FCC to conclude that UWB communications devices should be precluded from operating below 6 GHz.

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<sup>11</sup>See XtremeSpectrum Letter to The Honorable Donald Evans, Norman Y. Mineta, Donald H. Rumsfeld and Daniel S. Golden dated September 17, 2001 and filed in FCC ET Docket No. 98-153.

Respectfully submitted,

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