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Air Transport Association of America, Inc. · *American Airlines*
ARINC · *ARRL, The National Assoc. for Amateur Radio*
Delta Air Lines, Inc. · *Garmin International, Inc.*
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National Ocean Industries Association · *NavCom Technology, Inc.* · *Nokia, Inc.*
Omnistar, Inc. · *QUALCOMM Incorporated* · *Raytheon Company*
SiRF Technology · *Sirius Satellite Radio* · *Thales Navigation*
Trimble Navigation Ltd. · *United Airlines* · *US GPS Industry Council*
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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

November 15, 2001

Michael K. Powell
Chairman
Federal Communications Commission
The Portals
445 Twelfth St., SW
Washington, DC 20554

Re: Coalition Proposal On Ultra-Wideband (UWB)
ET Docket No. 98-153

Dear Chairman Powell:

Testing to date on a limited number of UWB waveforms and receivers shows that each type of UWB device:

- is an intentional emitter
- has a unique wave form
- has characteristics that vary greatly from those of unintentional emitters
- causes significant interference below FCC Part 15 limits to systems tested
- should not be classified under existing Part 15 rules

Consequently the coalition's position, in its letter to you dated May 18, 2001, was that the Commission should authorize UWB on a category-by-category basis. The technical and regulatory regime could then be tailored to the specific requirements of each category of commercial UWB devices.[1] Following are the proposed categories of UWB devices, their principal technical characteristics, and the associated elements of the regulatory regime.

For the first three of the categories described below, the Commission would need formally to adopt technical operating parameters or standards for the service, after receiving comments from interested parties. Such proposed technical operating parameters, particularly

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for Category 3 (Communications Devices), could be included in the further NPRM that the coalition has urged the Commission to issue.

1. GROUND PENETRATING RADARS (GPR)

A. Defined Technical Characteristics and Operating Parameters:

- A non-networking UWB device that uses the return of its own transmitted signal for penetration of the ground to establish the position of an object;
- Uses a highly directional antenna;
- Operates only under the control of a professional licensed operator;
- Small number of individual devices, transportable throughout local areas;
- Operate under 1 GHz on a non-interfering basis to maximize penetration depth consistent with present operation of these devices;
- Require filtering techniques to ensure that GPRs do not radiate significantly outside their assigned frequency band;
- Require these filtering techniques to attain 35 dB of attenuation relative to band center (by inserting the filter between the modulator output and the antenna) to define a conventionally limited signal;
- Require that such devices must be designed such that RF energy is directed and restricted towards the ground and such that the device cannot be used to emanate into free space.

B. Regulatory Regime

The authorization process, besides setting technical operating parameters, must include a regulatory requirement to ensure operation by qualified professionals eligible for licensing under the Public Safety Pool of Frequencies in Part 90 of the FCC rules, as required under the earlier waivers issued to UWB proponents. The authorization process should also make it possible to trace the source of any interference problems. This can be achieved with a relatively simple registration requirement, whereby the individual municipality, law enforcement or rescue authorities register their GPR use with the FCC. Part 95 of the Commission's Rules, concerning licensing for General Mobile Radio Service (GMRS) provides a model; applicants simply file licenses on specified forms, and there is no notice, challenge, comment or hearing process required. We are prepared to submit separately a proposed draft Subpart to Part 95, providing for the licensing of GPR.

2. AUTOMOTIVE COLLISION RADARS

A. Defined Technical Characteristics and Operating Parameters

- The impact on other services below 17 GHz from the technical characteristics and operating parameters of UWB collision avoidance radars is largely unknown. In addition, aggregation effects on authorized services are unknown and untested, particularly in conjunction with overlapping, large-scale UWB communication networks operating at high data rates simultaneously (including mobile UWB communication devices) introduced into the same environment below 17 GHz;
- Propagation characteristics of UWB devices are unknown particularly when located at bumper-level;
- Large numbers of such devices, operating in a mobile environment;
- Spectrum already allocated to this application (17-24 GHz)

B. Regulatory Regime

An individual licensing approach appears impracticable. Therefore it appears sufficient if the vendor (in most cases the car manufacturer) certifies that the equipment meets the applicable technical operating parameters as adopted by the Commission for this category to operate within allocated radio frequency bands above 16 GHz. Part 2 of the Commission's Rules provides for three different types of equipment authorization processes, including a vendor certification procedure (see 47 CFR 2.907), any one of which could be utilized.

3. COMMUNICATIONS DEVICES

A. Defined Technical Characteristics and Operating Parameters:

- Large numbers of such devices operating individually and in networks in fixed indoor and mobile and fixed outdoor locations;
- Operate between 6 and 12 GHz on a non-interfering basis with levels of in-band emissions for each device not exceeding the current Part 15 electric field strength of 500 μ V/m at 3 m (approximately a range of power density of -129 dBW/MHz to -135 dBW/MHz at 6 and 12 GHz respectively). This would require a filter attenuation of 31 dB to meet the out-of-band power density emission level below 6 GHz of -160 dBW/MHz required in the next paragraph;
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to or less than –160 dBW/MHz peak at 3 meters.[2] This level is required to protect authorized systems operating below 6 and above 12 GHz, particularly in restricted frequency bands.[3];

- Produce a signal which (i) has its fractional bandwidth η greater than 0.25[4] or (ii) occupies 1.5 GHz or more of spectrum;
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B. Regulatory Regime

An individual licensing scheme is impracticable due to the large numbers of such devices. Equally, certification of compliance with existing FCC Part 15 approach is not appropriate because testing to date has shown that UWB devices have characteristics that vary greatly from those of unintentional emitters. A new part should be established for these communication devices and networks at the conclusion of a Further Notice of Proposed Rule-Making.

Therefore, an expedited further step is required: UWB manufacturers apply for registration of each new type of UWB device, including new antenna designs or other significant changes in device specifications, the applications are placed on public notice, comments are accepted on technical interference, demonstration of aggregate effects on the noise floor, and consistency with the applicable technical standard. There would be an expedited procedure for Commission consideration and approval, and approved applications would go into a Commission-maintained "Register". Part 68 of the Rules (Customer Premises Telephone Equipment) provides a model.

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4. EXPERIMENTAL DEVICES

A. Illustrative Devices

- Sensing
- Medical (coordinate with Food and Drug Administration as necessary)
- Wall Imaging Devices (WID)

These devices may not operate in restricted bands. The number of such devices authorized, the length of the experimental period and the allowable technical characteristics must be chosen so that this is not a backdoor approach for an operational system.

B. Regulatory Regime

The Commission's existing procedures for granting authorizations for experimental use would apply, and any necessary specific conditions would be laid out in the authorization (see Part 5 of the Commission's Rules) including, as required, conditions under the existing waivers granted to UWB applicants by FCC Order granted July 8, 1999 (DA 99-1340). If and when a particular UWB application or device sufficiently matured and was ready for commercial exploitation, it would be the subject of a regulatory approach developed through a Further Notice of Proposed Rule-Making that is tailored to that application.

5. FUTURE CATEGORIES OF UWB DEVICES

As new categories may develop in the future, the Commission would fashion a regulatory approach through a Further Notice of Proposed Rule-Making tailored to each such new category, or apply or modify one of the existing approaches if appropriate.

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We hope that you will find that our proposal offers a constructive, fair and balanced solution and we would be pleased to discuss it further with you at your convenience.

Respectfully submitted,

Robert D. Briskman

Robert D. Briskman
Sirius Satellite Radio
On behalf of the parties listed above

cc: Commissioner Kathleen Q. Abernathy
Commissioner Michael J. Copps
Commissioner Kevin J. Martin
Bruce A. Franca, Acting Chief, OET
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November 15, 2001

Kathleen Q. Abernathy
Commissioner
Federal Communications Commission
The Portals
445 Twelfth St., SW
Washington, DC 20554

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4. EXPERIMENTAL DEVICES

A. Illustrative Devices

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These devices may not operate in restricted bands. The number of such devices authorized, the length of the experimental period and the allowable technical characteristics must be chosen so that this is not a backdoor approach for an operational system.

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On behalf of the parties listed above

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November 15, 2001

Michael J. Copps
Commissioner
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445 Twelfth St., SW
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A. Defined Technical Characteristics and Operating Parameters:

- Large numbers of such devices operating individually and in networks in fixed indoor and mobile and fixed outdoor locations;
- Operate between 6 and 12 GHz on a non-interfering basis with levels of in-band emissions for each device not exceeding the current Part 15 electric field strength of 500 μ V/m at 3 m (approximately a range of power density of -129 dBW/MHz to -135 dBW/MHz at 6 and 12 GHz respectively). This would require a filter attenuation of 31 dB to meet the out-of-band power density emission level below 6 GHz of -160 dBW/MHz required in the next paragraph;
- Limit out-of-band emissions, with the UWB lower band edge at 6 GHz and the upper band edge at 12 GHz, to a transmission power density equal

to or less than –160 dBW/MHz peak at 3 meters.[2] This level is required to protect authorized systems operating below 6 and above 12 GHz, particularly in restricted frequency bands.[3];

- Produce a signal which (i) has its fractional bandwidth η greater than 0.25[4] or (ii) occupies 1.5 GHz or more of spectrum;
- Operate only with filtering included between the modulator and the antenna to maintain the overall emission levels the same as those tested during the licensing of the device. This requirement is particularly important with UWB devices as change of the antenna characteristics are known to alter significantly the center frequency and spectrum of the emissions;
- Take measures to guard against a significant rise in the noise floor to protect both overlaid services and UWB communications networks. An active oversight mechanism must be established for monitoring and controlling UWB usage to accomplish this.

B. Regulatory Regime

An individual licensing scheme is impracticable due to the large numbers of such devices. Equally, certification of compliance with existing FCC Part 15 approach is not appropriate because testing to date has shown that UWB devices have characteristics that vary greatly from those of unintentional emitters. A new part should be established for these communication devices and networks at the conclusion of a Further Notice of Proposed Rule-Making.

Therefore, an expedited further step is required: UWB manufacturers apply for registration of each new type of UWB device, including new antenna designs or other significant changes in device specifications, the applications are placed on public notice, comments are accepted on technical interference, demonstration of aggregate effects on the noise floor, and consistency with the applicable technical standard. There would be an expedited procedure for Commission consideration and approval, and approved applications would go into a Commission-maintained "Register". Part 68 of the Rules (Customer Premises Telephone Equipment) provides a model.

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2 Free space propagation and an aggregation factor for multiple devices of 4 db are assumed.

3 Note that additional study may be required if UWB communications devices incorporate enhancements such as E-911 that may use an embedded GPS function.

4 i.e., fractional bandwidth η greater than: $2 (f_H - f_L) / f_H + f_L$, where f_H is the upper frequency of the –10 dB emission point and f_L is the lower frequency of the –10 dB point.

4. EXPERIMENTAL DEVICES

A. Illustrative Devices

- Sensing
- Medical (coordinate with Food and Drug Administration as necessary)
- Wall Imaging Devices (WID)

These devices may not operate in restricted bands. The number of such devices authorized, the length of the experimental period and the allowable technical characteristics must be chosen so that this is not a backdoor approach for an operational system.

B. Regulatory Regime

The Commission's existing procedures for granting authorizations for experimental use would apply, and any necessary specific conditions would be laid out in the authorization (see Part 5 of the Commission's Rules) including, as required, conditions under the existing waivers granted to UWB applicants by FCC Order granted July 8, 1999 (DA 99-1340). If and when a particular UWB application or device sufficiently matured and was ready for commercial exploitation, it would be the subject of a regulatory approach developed through a Further Notice of Proposed Rule-Making that is tailored to that application.

5. FUTURE CATEGORIES OF UWB DEVICES

As new categories may develop in the future, the Commission would fashion a regulatory approach through a Further Notice of Proposed Rule-Making tailored to each such new category, or apply or modify one of the existing approaches if appropriate.

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We hope that you will find that our proposal offers a constructive, fair and balanced solution and we would be pleased to discuss it further with you at your convenience.

Respectfully submitted,

Robert D. Briskman

Robert D. Briskman
Sirius Satellite Radio
On behalf of the parties listed above

cc: Chairman Michael K. Powell
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Ms. Magalie Roman Salas, Secretary