DECT FORUM

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FCC Mail Room

August 11, 2008

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, S.W.
Room TW-A325
Washington, D.C. 20554

Re: Petition for Rulemaking

Dear Ms. Dortch,

The DECT Forum is submitting a petition for rulemaking, revising certain portions of the rules for the Unlicensed Personal Communications Services (UPCS) frequency band.

The DECT Forum has filed comments in WT Docket 04-356, expressing concern about the potential for harmful interference into the UPCS band. In order to avoid that possibility and improve the utility of the UPCS band we are making this petition to revise certain portions of the rules in FCC Part 15 for the UPCS band.

Sincerely,

For the DECT Forum
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RM- 11485

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FCC Mail Room

In Relation to	)	
	)	
Service Rules for Advanced Wireless Services in the 2155-2175 MHz Band	)	**WT Docket No. ~~07-195~~**
	)	
	)	
Service Rules for Advanced Wireless Services in the 1915-1920 MHz, 1995-2000 MHz, 2020-2025 MHz and 2175-2180 MHz Bands	)	**WT Docket No. ~~04-356~~**
	)	
	)	

Petition for Rulemaking

Petition for Rulemaking to coordinate the service rules of the UPCS Band with those ultimately adopted for the AWS H Block

The DECT Forum hereby files this Petition for Rulemaking to revise FCC Part 15 Subpart D, UPCS Band, to coordinate those rules with the service rules ultimately adopted for the 1915-1920 MHz AWS H Block.

Proposed service rules for the 1915-1920 MHz band are set forth in the Further Notice of Proposed Rulemaking (FNPRM) WT Docket No. 04-356. The DECT Forum believes that there will be harmful interference to the UPCS band if the proposed service rules are adopted. It is however possible to decrease the potential damage to the UPCS band by implementing changes in FCC Part 15 Subpart D[1] described in this Petition. These changes have no negative impact on the H Block. Furthermore, these changes have been wanted by the UPCS equipment vendors for some time, because they improve the utilization of the UPCS band, even in the absence of H Block interference. With the

[1] 47CFR15.301 through 47 CFR15.323

introduction of the H Block services, the introduction of these improvements have become a necessity.

The DECT Forum appreciates this opportunity to provide the FCC with this petition and recommendations for coordination of the proposed rules under FCC WT Docket No. 04-356 with the rules for the Unlicensed Personal Communications Services (UPCS) frequency band, particularly those contained in 47CFR15.323.

The DECT Forum is an international industry association embracing suppliers and operators of DECT based terminals, systems, and networks. DECT stands for "Digital Enhanced Cordless Telecommunications" and denotes a radio technology suited for voice data and networking applications with range requirements up to a few hundred meters. The DECT Forum represents the interests of the DECT industry with the following primary objectives:

- To promote DECT as the worldwide cordless communication standard.
- Pursue worldwide harmonization of frequencies for DECT products.
- To provide an interactive forum for sharing information and experience between regulatory and standardization agencies, operators, users and manufacturers.
- To manage the evolution of DECT in a way which protects legacy investments and permits orderly service migration and expansion.

I. Proposed Changes in 47 CFR 15.323

The DECT Forum proposes that the threshold requirement associated with the least-interfered-channel rule in 47CFR15.323(c)(5) be eliminated and that the minimum number of channels to be monitored be reduced to 20. These changes would amend 47CFR15.323(c)(5) from:

If access to spectrum is not available as determined by the above, and a minimum of 40 duplex system access channels are defined for the system, the time and spectrum windows with the lowest power level below a monitoring threshold of 50 dB above the thermal noise power determined for the emission bandwidth may be accessed.

To:

If access to spectrum is not available as determined by the above, and a minimum of 20 duplex system access channels are defined for the system, the time and spectrum windows with the lowest power level may be accessed.

If eliminating the threshold is not acceptable, a secondary solution is that proposed in the ANSI petition, to increase the threshold from 50 dB above thermal noise to 65 dB above thermal noise.

Furthermore, a reduction from 40 to 30 channels is a requirement to ensure proper access for the latest state of the art UPCS products. We are however proposing a limit of 20 to provide freedom for future broadband applications. The limit of 20 is also justified by the last change of the UPCS rules, when the allowed bandwidth was increased from 1.25 MHz to 2.5 MHz. This is a factor of two, therefore the number of channels required for UPCS equipments to be able to utilize the effective least-interfered-channel procedure, should be reduced by a factor of two. The need for the change of the number of channels was apparently forgotten when the change of the minimum bandwidth in the UPCS rules was made.

The figure for the minimum number of channels is not critical as long as it in larger than about 10. The rule intends that devices survey a significantly larger portion of the

band than the portion of the band that the access channel will occupy, and operate where there is the least interference with other users of the band. To achieve this objective any number of channels greater than about 10 is sufficient. The recommendation of changing to a minimum of 20 channels is both conservative and consistent with the recent change in maximum bandwidth.

II. Technical Analysis and Supporting Rational

On July 22, 2008 the DECT Forum submitted comments in WT Dockets 04-356 and 07-195. Those comments are attached to this petition and incorporated by reference. In those comments the DECT Forum provided its technical analysis and rational for the changes being petitioned in this document. Furthermore, in those comments one conclusion is that the maximum number of channels should be 30 or less, and the proposed number is 30. However, according to the arguments above, DECT Forum now proposes this limit to be 20. This amended recommendation is also being reported in reply comments from the DECT Forum filed on August 11, 2008.

III. Summary

In this petition the DECT Forum is requesting two changes to 47CFR15.323(c)(5):

1. The threshold requirement associated with the least-interfered-channel rule and
2. The minimum number of channels to be monitored under the least-interfered-channel rules

The proposed changes have no negative impact on adjacent PCS services, but will be needed to avoid blocking of a major part of the UPCS band by H-block transmissions. Furthermore, since it has been found that the proposed changes as such will considerably

improve the utilization, quality and services of the UPCS band, not least for new state-of-the-art broadband services, DECT Forum urges the Commission to adopt the proposed changes without delay, even if the decision on the H-block will be delayed.

The DECT Forum thanks the Commission for the opportunity to provide these comments and looks forward to the successful and effective implementation of the new bands being proposed in this rulemaking.

Respectfully submitted,

DECT Forum

August 11, 2008
for the DECT Forum
Erich Kamperschroer
Chairman of the DECT Forum

Annex I

Comments of the DECT Forum
Filed July 22, 2008
In WG Dockets 04-356 & 07-195

In the Matter of	)	
	)	
Service Rules for Advanced Wireless Services in the 2155-2175 MHz Band	)	**WT Docket No. 07-195**
	)	
	)	
Service Rules for Advanced Wireless Services in the 1915-1920 MHz, 1995-2000 MHz, 2020-2025 MHz and 2175-2180 MHz Bands	)	**WT Docket No. 04-356**
	)	
	)	

Comments from the DECT Forum on the Further Notice of Proposed Rulemaking specifically related to Revision of the Rules that may Impact the UPCS Band

The DECT Forum hereby files these comments primarily to oppose the proposed out-of-band emission limits for the 1915-1920 MHz band, as written in the Further Notice of Proposed Rulemaking (FNPRM) WT Docket No. 04-356. The problems with the current proposal are discussed and possible solutions offered. The DECT Forum believes that the best solution is to modify certain rules in the adjoining UPCS band to more effectively coordinate use of each band and minimize the potential for harmful interference to the UPCS band.

The DECT Forum appreciates this opportunity to provide the FCC with these comments and recommendations for coordination of the proposed rules under FCC WT Docket No. 04-356 with the rules for the Unlicensed Personal Communications Services (UPCS) frequency band, particularly those contained in 47CFR15.323.

The DECT Forum is an international industry association embracing suppliers and operators of DECT based terminals, systems, and networks. DECT stands for "Digital Enhanced Cordless Telecommunications" and denotes a radio technology suited for voice data and networking applications with range requirements up to a few hundred meters. The

DECT Forum represents the interests of the DECT industry with the following primary objectives:

- To promote DECT as the worldwide cordless communication standard.
- Pursue worldwide harmonization of frequencies for DECT products.
- To provide an interactive forum for sharing information and experience between regulatory and standardization agencies, operators, users and manufacturers.
- To manage the evolution of DECT in a way which protects legacy investments and permits orderly service migration and expansion.

In analyzing the proposed rules for the 1915-1920 MHz frequency band the DECT Forum has identified a potentially sever interference problem. The proposed out-of-band emission limits could deny use of large portions or even the entire UPCS band. In these comments we will describe this interference problem in the opening section. There are two possible solutions. One solution is to reduce the proposed out-of-band emissions limit to a level that avoids any significant potential for interference with UPCS band devices. However, due to the lack of guard band, only a minor reduction seams realistic, and a complementary primary solution appears preferable. The DECT Forum therefore proposes as a primary solution a complimentary modification of the rules for the UPCS band to significantly improve the coexistence when devices operating in the 1915-1920 MHz portion of the H Block, and UPCS band are in close proximity. The rational for these solutions will be described in the following sections of these comments.

I. Potential Interference Problem for UPCS Band Devices

The primary problem is that the out-of-band emission limits will interact with the listen-before-talk rules of the UPCS band in a way that could deny use of large portions or even the entire UPCS band when a device operating in the H Block, 1915-1920 MHz, is nearby. Devices in the UPCS band are required to implement a spectrum etiquette based

on a listen-before-talk protocol. UPCS devices must monitor and identify a usable channel before they can transmit. These devices can use any channel they locate with a power level of less than 30 dB above thermal noise, TN + 30 dB. Additionally, if certain conditions are met, UPCS devices can operate on a least-interfered-channel basis and use channels with power levels of up to 50 dB above thermal noise, TN + 50 dB.

This interference problem has been identified by American National Standards Institute Accredited Standards Committee C63 (ANSI ASC C63) for ElectroMagnetic Compatibility (EMC) Subcommittee 7 (Unlicensed Personal Communications Services) (SC7), which filed comments in 2005 under WT Dockets No. WT Docket No. 02-353 and 04-356.[1]

The potential for interference between bands has also been examined as an example in the recently approved IEEE Standard 1900.2, *IEEE Recommended Practice for the Analysis of In-Band and Adjacent Band Interference and Coexistence Between Radio Systems*.[2] Annexes D & E of IEEE Std. 1900.2 use the situation presented here as sample interference analysis cases dealing with "*selection of listen-before-talk threshold*" and "*effect of out-of-band emissions on a LBT band*". It is significant that the topic of IEEE Std. 1900.2 is interference and coexistence analysis. It is quite relevant that the examples in the annexes were provided to illustrate well presented interference analyses. The standard was drafted and balloted through the IEEE and represents the technical consensus on this topic of that very significant organization. The balloters had no rulemaking in view but rather focused completely on the technical validity and thoroughness of the material in the standard. As such these examples in the IEEE standard should be viewed as an

[1] The comments of ANSI ASC C63 SC7 are dated May 25, 2005, were filed under WT Dockets 02-353 and 04-356 and are attached to these comments as an appendix.
[2] IEEE Standard 1900.2-2008, IEEE Recommended Practice for the Analysis of In-Band and Adjacent Band Interference and Coexistence Between Radio Systems, has been balloted and approved as an IEEE standard and is scheduled to be published on July 29, 2008. Annexes D &E are provided as an appendix to these comments by permission of the IEEE.

objective and unbiased technical consensus opinion regarding the potential for interference between the 1915-1920 MHz band and the 1920-1930 MHz, UPCS bands.

As can be seen in the ANSI and IEEE discussions the core issue is that these two frequency bands are being managed differently, producing this potential for interference, as an unintended consequence.

II. Technical Analysis

To understand the potential interference problem the units used in the proposed out-of-band emission limit and the UPCS threshold limit must be put on equivalent terms. The proposed out-of-band emissions must be attenuated below the transmitter power (P) by at least 43 + 10 log (P), where P is the transmit power in watts.[3] The transmit power is proposed to be 200 mW/MHz peak EIRP for mobile and portable stations and 2 W/MHz peak EIRP for uplink fixed stations[4] operating in the band 1915 – 1920 MHz. For mobile and portable stations the out-of-band limit is 43 + -7 dB or 36 dB below the transmit power. Given the 23 dBm transmit power the out-of-band emission limit is -13 dBm/MHz. For uplink fixed stations the out-of-band emission limit is the same, -13 dBm/MHz..

The out-of-band emission limit, -13 dBm/MHz, can be expressed as an equivalent level above Thermal Noise floor, TN. TN is −114 dBm for 1 MHz bandwidth, the specified measurement bandwidth for this limit. Using the thermal noise floor as a reference, the assumed out-of-band emission limit of −13 dBm/MHz can be expressed as TN + 101 dB.

Within the first megahertz of the UPCS band, the allowed out-of-band transmit power from a device in the H Block is measured with a bandwidth of at least 1% of the devices emission bandwidth, B. If B = 1.25 MHz (as for CDMA 2000), the allowed

[3] Proposed rule §27.53 (h)(3).
[4] Proposed rule §27.50 (d)(4).

interference becomes −13 dBm/12.5 kHz. TN is −133 for 12.5 kHz. Thus, −13 dBm/12.5 kHz can be expressed as TN + 120 dB.

In summary, the out-of-band emissions can be TN + 120 dB in the first megahertz and TN + 101 dB in the remainder of the band.

UPCS devices, which under present rules, are not allowed to use the least-interfered-channel rule, cannot use a channel where the power in the channel is greater than TN + 30 dB. UPCS devices that can operate under the least-interfered-channel rule have the alternative under those rules of using a channel where the power in the channel is greater than TN + 50 dB. This analysis is focused on operation under the least-interfered-channel rule, which is the operating condition of most state-of-the-art UPCS devices. This means that the first MHz of the UPCS band will only be usable if a device in the H Block is far enough away so as to have its emissions attenuated by 70 dB. The rest of the band is only usable if the H Block device is far enough away to have its emissions attenuated by 51 dB.

The following table from the ANSI filing calculates the separation distances required for the out-of-band emission limits to be below the UPCS least-interfered-channel threshold. For the 1st MHz of the band to be usable an H Block device must be over 30 m away! If the H Block device is closer than 4 m it potentially blocks the entire UPCS band!

Part of the UPCS band	Separation distance between PCS handsets and UPCS equipment		
	1 m	3.2 m	10 m
1920 – 1921 MHz	TN + 82 dB	TN + 72 dB	TN + 62 dB
1921 – 1930 MHz	TN + 63 dB	TN + 53 dB	TN + 43 dB

Table 1. Interfering power at different separation distances[5]

[5] From the ANSI ASC C63 SC7 filing dated May 25 2005.

This hindrance to using H Block and UPCS devices in close proximity to each other is clearly undesirable. The combined effect of the proposed out-of-band emissions limit and the UPCS least-interfered-channel threshold is that UPCS devices are forbidden from operating. However, the physical reality is that UPCS devices could operate but would loss some range. Rather than forbid UPCS devices from operating it would seem preferable to modify the rules to allow their operation up to the physical limitations of their operating environment.

It should be noted that there is not a potential for harmful interference from the UPCS band into the 1915-1920 MHz portion of the H Block because in that frequency band the H Block devices, e.g. indoor handsets, which can come close to indoor UPCS devices, are transmitting and not receiving in the 1915-1920 MHz band. The UPCS band out-of-band emission limits assures that the reception of those transmissions are protected. Furthermore, because the H Block devices do not operate on a listen-before-talk protocol they will not be blocked from using H Block channels due to UPCS out-of-band emissions. The issue being discussed here arises because different spectrum management structures are being used in these adjoining frequency bands. The challenge is to craft the rules to coordinate those differing spectrum management structures.

III. Partial Solution – Reduction of the Out-of-Band Emission Limit

One possible solution is a reduction in the out-of-band emission limit. To be effective the limit should be decreased by 15 dB from the current -13 dBm/MHz to -28 dBm/MHz. This solution while possible is likely to prove difficult for H Block devices to achieve and is therefore not optimal. DECT Forum therefore proposes a realistic 3 to 6 dB reduction. This limited reduction then requires additional elements to achieve the desired outcome and provide a full solution.

IV. Main Solution – Either remove the Least-Interfered-Channel Threshold or Increase it to 65 dB above Thermal Noise

The DECT Forum proposes that the preferred main solution to the problem would be to either eliminate the least-interfered-channel threshold or increase it from the current 50 dB above thermal noise to 65 dB above thermal noise. The later proposal is requested in the ANSI petition. Eliminating the threshold would mean that devices would survey the required minimum number of channels and use the channel with the lowest power.

The purpose of the threshold appears to be to protect devices from in-band interference in crowded environments. The UPCS etiquette assures that UPCS devices will separate themselves from each other. The only time a set of UPCS devices could occupy all available channels is in a highly congested area of non-cooperating UPCS devices. Cooperating UPCS devices are restricted to using no more than an aggregate of 6 MHz or no more than 1/3 of all defined channels. Consequently only a number of closely located but non-cooperative devices could fill all channels above the threshold.

The more likely scenario is that closely located UPCS devices would separate themselves from one another due to the least-interfered-channel rule. This fact has been verified by simulations shown in the earlier ANSI comment, made available in the Annex. There is shown that the potential traffic capacity within the UPCS band is considerable increased by increasing the least-interfered-channel threshold. The transmission of UPCS device would likely be far above the H Block out-of-band emissions. However, should out-of-band emissions from H Block devices then fill in the unused UPCS devices the threshold would effectively forbid additional UPCS devices from operating at all. The reality would be that the UPCS devices could use channels even in the face of out-of-band emissions from an H Block device but with some loss of range. If the loss of range is tolerable for the UPCS device there is no reason to deny them the right to operate.

For these reasons the DECT Forum recommends that the threshold for the least-interfered-channel rule be eliminated. If it is not eliminated it should be raised from the current 50 dB above thermal noise to at least 65 dB above thermal noise.

V. Main Solution – Eliminate the restriction to the Least-Interfered-Channel Rule

Not all UPCS devices are allowed to operate under the least-interfered-channel rule. To qualify a device must use a minimum of 40 channels. In this context it is important to note that UPCS devices, which under present rules, are not allowed to use the least-interfered-channel rule, cannot use a channel where the power in the channel is greater than TN + 30 dB.

Therefore, these devices will not be helped by improving the least-interfered-channel rule since they are required to use the TN + 30 dB limit. To avoid this consequence improvement in the least-interfered-channel rule must be combined with opening up operation under that rule to a larger category of UPCS devices, particularly state-of-the–art, wideband UPCS devices. Therefore DECT Forum also proposes to change the number of defined duplex access channels required to use the least-interfered-channel rule from 40 to 30 or less.

The reason for setting the new limit to 30 or less is as follows:

The 40 channel requirement was originally written when the UPCS band rules defined 8 1.25 MHz fixed channels. At that time the main technology using the UPCS band was PWT, a version of DECT modified to fit the 1,25 MHz channelization. PWT has like standard DECT 12 full-slot duplex access channels per carrier and 6 double-slot duplex access channels per carrier, giving totally 96 respectively 48 duplex access channel over 8 carriers. Thus the limit of 40 ensures that both full-slot and more broadband double-slot connections can use the least-interfered-channel rule. However, since that time the UPCS band rules have been modified to allow for flexible channels of up to 2.5 MHz, and standard DECT systems, having room for 5 carrier position in the UPCS band, could now use the UPCS band. This has led to a market success whereby DECT systems have considerably contributed to UTAM payments of it's debts. Since standard DECT only has room for 5 carriers, there will only be totally 12x5 = 60 full-slot duplex access channels

and 6x5 = 30 double-slot or long-slot duplex access channels. Thus there is an obvious need to allow state-of-the-art broadband long-slot DECT applications to the use the least-interfered-channels rule. This is the main reason why it is proposed to change the required number of duplex access channels to 30 or less. The need for this change will without doubt increase by the expected introduction of the H-band service.

VII. Comparison to Other National Regulations

It is worth noting that the DECT standard, used in over 100 countries, including all European countries, has no upper power threshold on least-interfered-channels or any specific limit on number of defined duplex access channels, but all slot types can use the least-interfered-channel concept. Devices are in operation under rules similar to those proposed here without interference problems. DECT Forum hopes that this information is helpful to bring confidence in the technical relevance of the DECT Forum proposals of this comment.

VII. Summary

In these comments an interference problem has been identified created by the dissimilar rules proposed for the H Block and the existing spectrum etiquette rules for the UPCS band. The result is that potentially the out-of-band emission limits proposed for the H Block could severely limit the use of the UPCS band. The DECT Forum proposes that the threshold requirement associated with the least-interfered-channel rule in 47CFR15.323(c)(5) be eliminated and that the minimum number of channels to be monitored be reduced to 30. These changes would amend 47CFR15.323(c)(5) from:

> *If access to spectrum is not available as determined by the above, and a minimum of 40 duplex system access channels are defined for the system, the time and spectrum windows with the lowest power level below a monitoring threshold of 50 dB above the thermal noise power determined for the emission bandwidth may be accessed.*

To:

> *If access to spectrum is not available as determined by the above, and a minimum of 30 duplex system access channels are defined for the system, the time and spectrum windows with the lowest power level may be accessed.*

If eliminating the threshold is not acceptable, a secondary solution is that proposed in the ANSI petition, to increase the threshold from 50 dB above thermal noise to 65 dB above thermal noise.

In addition DECT Forum proposes that the proposed out-of-band emissions for H-band devices operating in the 1915-1920 MHz band be reduced by 3-6 dB. For example, require that out-of-band emissions must be attenuated below the transmitter power (P) by at least 49 + 10 log (P), where P is the transmit power. This will decrease the potential range limitations of UPCS devices.

The DECT Forum thanks the Commission for the opportunity to provide these comments and looks forward to the successful and effective implementation of the new bands being proposed in this rulemaking.

Respectfully submitted,

DECT Forum

July 21, 2008
for the DECT Forum
Erich Kamperschroer
Chairman of the DECT Forum

Annex I

March 25, 2005 Comments of ANSI ASC C63 SC7

In the Matter of	)	
	)	
Service Rules for Advanced Wireless Services in the 1915-1920 MHz, 1995-2000 MHz, 2020-2025 MHz and 2175-2180 MHz Bands	)	**WT Docket No. 04-356**
	)	
Service Rules for Advanced Wireless Services in the 1.7 GHz and 2.1 GHz Bands	)	**WT Docket No. 02-353**

LATE FILED COMMENTS
OF
AMERICAN NATIONAL STANDARDS INSTITUTE
ACCREDITED STANDARDS COMMITTEE C63 (EMC)
SUBCOMMITTEE 7 (UPCS)
ANSI ASC C63 SC7

American National Standards Institute Accredited Standards Committee C63 (ANSI ASC C63) for ElectroMagnetic Compatibility (EMC) Subcommittee 7 (Unlicensed Personal Communications Services) (SC7) herby files and asks that the FCC (Commission) accept this document as late filed comments to FCC 04-218 the Notice of Proposed Rulemaking released September 24, 2004. These comments are the result of the work of the ANSI ASC C63 SC7 working group charged with revising ANSI C63.17, which in its published version the FCC has adopted as the test methodology for 47 CFR15 subpart D. The understanding contained in these comments arose from the deliberations of the committee and occurred after the original comment period closed. However, as a result of the committee's work a connection between the rules for the UPCS band and those being considered for the AWS band has been recognized and the committee wishes to bring this to the attention of the FCC.

In these comments requests that the upper monitoring threshold, contained in 47CFR15.323 (c)(5) be increased from 50 dB above thermal noise to 65 dB above thermal noise. Thus this petition requests that the first sentence of 47CFR15.323 (c)(5), which currently reads:

(5) If access to spectrum is not available as determined by the above, and a minimum of 40 duplex system access channels are defined for the system, the time and spectrum windows with the lowest power level below a monitoring threshold of 50 dB above the thermal noise power determined for the emission bandwidth may be accessed. ...

Would be revised to read:

(5) If access to spectrum is not available as determined by the above, and a minimum of 40 duplex system access channels are defined for the system, the time and spectrum windows with the lowest power level below a monitoring threshold of 65 dB above the thermal noise power determined for the emission bandwidth may be accessed. ...

During the course of its work the ANSI ASC C63 SC7 committee has come to believe that the current monitoring threshold value of 50 dB was arrived at through an analysis which optimized for distance or range. However, while some use scenarios should be optimized for distance, in other use scenarios it is preferable to subordinate range for density of devices. In other usage scenarios it is preferable that a number of devices are able to operate in close proximity and density of devices is preferable to range. The change in this monitoring threshold from 50 to 65 dB would allow manufacturers to optimize their devices for distance or range, as best suits the needs of their users.

A second reason for changing this value is to prepare the UPCS band for widespread use of the PCS H-Block AWS service (1915 – 1920 MHz). The committee's analysis reveals that with the current "upper threshold" a single PCS H-Block device could block the entire UPCS band in its vicinity.

Background

Subcommittee 7 (UPCS) of ANSI ASC C63 is responsible for the development and maintenance of UPCS EMC and etiquette standards, including ANSI C63.17 which was

developed by SC 7 and first published in 1998. ANSI C63.17 has been adopted by the FCC to provide the test methodology for 47CFR15 Subpart D.[6] In the fall of 2004, in response to the FCC revision of the rules for the UPCS band[7], SC7 began to revise ANSI C63.17 to reflect changes to 47CFR15 Subpart D and other needed revisions to the document. During the course of its work the committee identified what it believes is a better value for the limit ANSI C63.17 calls the "upper threshold", which is contained in 47CFR15.323(c)(5). The value of this "upper threshold" is currently 50 dB above thermal noise. The analysis of the committee is that the current value is entirely suitable if the usage of UPCS devices is in relatively sparse usage environments where range is the primary factor.

There are however situations where it is desirable to have a number of UPCS devices operating in close proximity. Examples of such operating environments would be a cubicle (partitions between offices do not fully extend to the ceiling of the building) office environment where every cubicle might have a UPCS device in it. Under the current rules the committee believes only one UPCS device in every four cubicles could be used simultaneously. Under its proposed value of 65 dB, the committee believes that a UPCS device could be operated simultaneously in every cubicle, in a typical cubicle partition environment. In such a scenario each device would lose range due to the density of spectral use. However, in such dense systems it is common practice to install a system in which devices may operating a short distance from the nearest base station, and in this way the loss of range has little if any.

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[6] 47CFR15.31(a)(2)
Unlicensed Personal Communication Service (UPCS) devices are to be measured for compliance using ANSI C63.17-1998: "Methods of Measurement of the Electromagnetic and Operational Compatibility of Unlicensed Personal Communications Services (UPCS) Devices", (incorporated by reference, see § 15.38). This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51.

[7] FCC 04-219

Technical Analysis

Background

UPCS equipment is only allowed to transmit if the interference is less than a threshold defined in the FCC part 15.323 rules. There are two thresholds defined in the FCC rules for the UPCS band, a "lower threshold" (thermal noise floor, TN, + 30 dB), and an "upper threshold" (TN + 50 dB). The "upper threshold" only applies to equipment which has more than 40 system access channels and which implements the Least Interfered Channel, LIC, selection procedure.

Interference Levels from Future AWS Devices

The critical interference scenario to evaluate for UPCS equipment is the interference created by UPCS equipment or H-Block (1915 – 1920 MHz) devices which are used in the same local indoor environment. Typical environments are offices, factories and homes. In these common environments devices are within 1-10 meters, typically within 1-5 m.

The permitted out-of-band transmit power from an H-block PCS handset is currently -13 dBm/MHz within the band 1921-1930 MHz. Interference level can be expressed as equivalent level above Thermal Noise floor, TN. TN is -114 dBm for 1 MHz bandwidth. Thus -13 dBm/MHz can be expressed as TN + 101 dB.

Within the band 1920-1921 MHz the allowed out-of-block transmit power from an H-block PCS handset is -13 dBm/1% of B, where B is the bandwidth of the PCS handset transmission. If B = 1.25 MHz (as for CDMA 2000), the allowed interference becomes -13 dBm/12.5 kHz. TN is -133 for 12.5 kHz. Thus -13 dBm/12.5 kHz can be expressed as TN + 120 dB.

Assuming free space propagation, the attenuation at 1 m, 3.2 m and 10 m is about 38 dB, 48 dB and 58 dB, respectively, for UPCS band frequencies. Table 1 gives the interference levels into the UPCS band.

The interference power is expressed as equivalent level above Thermal Noise floor, TN, for a PCS transmitter with an out-of-band emission power of -13 dBm/12.5kHz within 1920 – 1921 MHz and -13 dBm/MHz within 1921 – 1930 MHz.

Part of the UPCS band	Separation distance between PCS handsets and UPCS equipment		
	1 m	3.2 m	10 m
1920 – 1921 MHz	TN + 82 dB	TN + 72 dB	TN + 62 dB
1921 – 1930 MHz	TN + 63 dB	TN + 53 dB	TN + 43 dB

Table 1. Interfering power at different separation distances

Analysis of the "Upper Threshold"

Reviewing the interference levels of Table 1 we find:

a) Equipment using the lower threshold is not at all feasible for use.

b) Equipment using LIC (the upper threshold) is feasible for use, but the upper threshold must be increased at by 15 dB, to assure that one active H-block device would not block the whole UPCS band for a base station or a handset.

As can be seen in Table 1, only at a distance of 10 m and in the frequency block 1921 – 1930 MHz is the interference from a single H-Block transmitter under the current "upper threshold" limit of TN + 50 dB! A change to the value recommended in this petition of TN + 65 dB would allow use of UPCS with H-Block devices in close proximity.

UPCS equipment has the potential to avoid the most interfered channels by using the "Least Interfered Channel", LIC, procedure. Assuming the UPCS equipment would move away from the 1920 – 1921 MHz area when an H-Block device is operating, the analysis can be limited to the main 1921– 1930 MHz band, where the potential interference levels are lower than within 1920–1921 MHz.

The interference levels within 1921-1930 MHz, have however the potential to block the whole band due to the current low UPCS "upper threshold"! Hence, the conclusion of

the committee is that it is advisable to change the "upper threshold" to TN + 65 dB in anticipation of the deployment of H-Block devices in the near future. **Thus, having an upper threshold of "thermal noise floor + 65 dBm" would free at least the 1921 – 1930 MHz for intended UPCS** use.

Increased Utilization of the UPCS band

A second reason for increasing the UPCS "upper threshold" is to make the band available in more usage scenarios.

Simulations show that for high traffic density open areas (e.g. large office landscapes and exhibition halls with close to free space propagation) the present "upper threshold" limit constricts the utility of the UPCS band. Figure 1 below is a simulation of a system covering a 3 floor 100x100 m building. There are 25 equally spaced base stations on each floor (20 m base station separation). The system has 120 duplex access channels (10 carriers with 12 duplex channels each) on a 20 MHz spectrum allocation. Moving portables, intra-cell and inter-cell handover is included in the simulation.

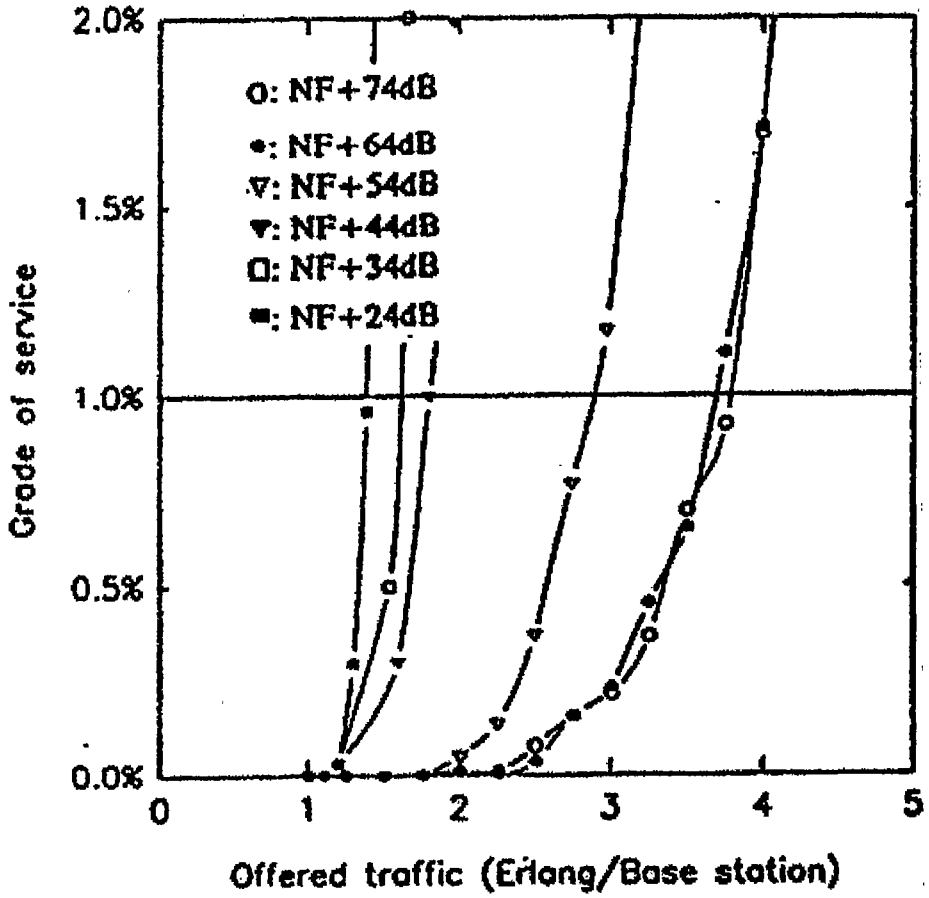

Figure 1 - Capacity as function of the UPCS upper threshold limit.
Free space model of 120 system access channels

Figure 1 shows that for this specific simulation, the capacity (1 % grade of service limit) the system capacity would increase by at least 60% if the upper threshold is changed from TN + 50 dB to TN + 65 dB.

For the UPCS band only 10 MHz and 60 access channels are available. In this case it is even more important that an appropriate "upper threshold" be used. If the "upper threshold" is too low it will restrict use of channels that are perfectly useful for communication. In dense usage environments there would be a loss of range. However,