BEFORE THE
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20554

In the Matter of	)	
	)	
Establishment of an Interference Temperature Metric to Quantify and Manage Interference and to Expand Available Unlicensed Operation in Certain Fixed, Mobile and Satellite Frequency Bands	))))	ET Docket No. 03-237

COMMENTS OF ERICSSON INC

Ericsson Inc ("Ericsson") hereby submits comments in response to the Federal Communications Commission's ("FCC" or "Commission") *Notice of Inquiry and Notice of Proposed Rulemaking*, released November 28, 2003,[1] seeking comment on a new "interference temperature" model for quantifying and managing interference. The Commission seeks to gather information relating to the use of a new interference temperature paradigm, representing a shift from the transmitter-based approach to interference management. In particular, the Commission seeks comment as to whether an interference temperature model could help accomplish its goals of more "efficient use of spectrum, and to create more opportunities for new and additional use of radio communications by the American public."[2]

Ericsson strongly urges the Commission to consider the many potential risks of adopting an interference temperature approach. Such an approach could undermine the safety, capacity needs, critical timing, quality, and reliability of licensed radio services by introducing regulatory and operational uncertainties. As discussed in greater detail below, Ericsson urges the Commission to consider the following:

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[1] *Notice of Inquiry and Notice of Proposed Rulemaking, In the Matter of Establishment of an Interference Temperature Metric to Quantify and Manage Interference and to Expand Available Unlicensed Operation in Certain Fixed, Mobile and Satellite Frequency Bands*, 18 FCC Rcd. 25, 309, ET Docket No. 03-237 (rel. Nov. 28, 2003) ("*NOI*").
[2] *NOI* ¶ 1.

- An interference temperature regulatory framework will negatively impact innovation and the marketplace;
- Current transmitter-based regulations are effective and predictable;
- A market-based approach, encouraging deregulation and the globalization of technologies, is preferable to an interference temperature model;
- The dynamic nature of the CMRS industry's Radio Frequency (RF) environment is ill-suited for an interference temperature regulatory framework; and
- Additional comprehensive studies are needed to demonstrate conclusively that an interference temperature model will not cause interference to licensed users.

Although the Commission's overall goals of efficient use of spectrum and greater service opportunities for consumers are important, an interference temperature model is not the appropriate means by which to achieve them. Such an approach is not technologically feasible at this time and will come at the cost of unnecessary supplementary investments and development of counteractive measures by the mobile telephony industry.

INTRODUCTION

Over the last decade, the telecommunications industry has undergone tremendous growth and evolution, including a growing convergence of technologies, applications, services, and markets. This convergence has been driven by innovations and the phenomenal growth in mobile terrestrial services. Indeed, the public mobile communication industry is now serving more than 1 billion mobile telephone users around the world,[3] using over 5.8 trillion minutes

[3] An In-Stat/MDR study released in August of 2003 noted that there were over 1 billion worldwide mobile subscribers and that a dramatic increase of about 186 million subscribers per year was expected, which would bring the global total to 2 billion by 2007 (*Event Horizon: Two Billion Mobile Subscribers by 2007: 2003 Subscriber Forecast*, Report No. IN0301117GW). *See also*, Dataquest's 2002 estimate that there would be 590 million digital wireless subscribers worldwide by the end of the year (Forbes, *Major Barriers Have Been Overcome To Clear The Path To Feedback Universe*, Oct. 7, 2002, <http://www.forbes.com/asap/2002/1007/020tab_print.html>).

annually.[4] This convergence is spawning new technologies which, in turn, are creating new business opportunities and consumer uses of previously undeveloped applications and services.

It is critical, therefore, in assessing any new or different regulatory model, that the regulatory framework chosen not have negative effects on continued growth and innovation. Spectrum policy and regulation should be developed to promote clarity, predictability, transparency, and fairness. In particular, the Commission must take the need for business stability into account, particularly in the case of public communications services. Businesses must be able to plan current and future use of their licensed spectrum and should not be deprived of a reasonable opportunity to develop their spectrum for novel uses. A stable horizon allows businesses to maximize capital investment, coordinate service expansion, and innovate, all to the benefit of consumers.

The Commission seeks comment on whether a change in its approach to managing interference would enhance opportunities for spectrum access for unlicensed, low-power devices.[5] Generally, Ericsson agrees that unlicensed devices can contribute to the ubiquity of telecommunications services for consumers. However, use of unlicensed devices must be regulated with clear rules regarding access etiquette, maximum power levels, and/or duty cycle restrictions, among other technical considerations. Ericsson strongly believes that current regulations provide an environment of regulatory clarity because they are well understood, can be incorporated into equipment development by manufacturers, and their framework allows for innovation. The current model controls interference while facilitating access to, and the increasingly effective use of, spectrum. An interference temperature concept works against the

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[4] On average, an individual user will use over 400 minutes a month, or approximately 4,900 minutes per year, according to a Cingular study released in 2003 (*Guys Still Gab More On Wireless*, Jun. 23, 2003, <http://www.cingular.com/about/ latest_news/03_06_23.html>).

[5] *NOI* ¶ 9.

efficient use of and access to spectrum by introducing uncoordinated activities, thereby creating an environment of uncertainty and unpredictability for the licensee. Although such a model may be seen as creating some short-term opportunities for spectrum access by unlicensed devices, the harm to efficient licensed operations and the potential to hinder further innovation are, by far, too detrimental.

DISCUSSION

I. An Interference Temperature Model of Regulation Will Negatively Impact Innovation and the Marketplace.

The Commission seeks comment on the potential costs and benefits of an interference temperature policy with respect to licensees, manufacturers, and other potentially affected entities.[6] Ericsson believes that a transition from the current transmitter-based regulatory scheme to an interference temperature model will negatively impact innovation and the marketplace by interfering with the processes already in place and successfully at work in the mobile telecommunications industry. The mobile terrestrial industry, in particular, has been extremely successful in independently and continuously developing new technologies that maximize spectrum efficiency while providing services to millions of consumers at any moment in time.[7] Industry innovation is driven by the marketplace reality that new products must be increasingly more efficient and more advanced to compete effectively and attract new customers. Therefore, regulatory framework changes and mandates that supplant effective industry efforts are likely to

[6] *NOI* ¶ 17.

[7] CMRS carriers in the United States have achieved dramatic increases in spectrum efficiency in large part because of the spectrum shortages with which they have been faced. Specifically, while Japan, Germany, and the United Kingdom have 300 MHz, 305 MHZ, and 364 MHZ of commercial wireless spectrum respectively, the United States has approximately 190 MHz of licensed commercial wireless spectrum. Clearly, licensees have market incentives to deploy state-of-the-art technology and are already doing so in a manner far more efficient than any set of additional regulations could prescribe. *See* Comments of the Cellular Telecommunications & Internet Association, *In the Matter of United States Spectrum Management Policy for the 21st Century*, Docket No. 040127027-4027-01, Department of Commerce, National Telecommunications and Information Administration (fil. Mar. 18, 2004) at p. 7.

interfere with industry's ability to respond to the needs of the market, causing less product innovation and less competition. The current highly competitive mobile communication markets already successfully address spectrum access and efficiency through innovations.

Over the past ten years, the richness, choice, and quality of services offered by the CMRS industry have increased dramatically. Ten years ago, only voice service, primitive voicemail, extremely limited data capability, and limited emergency services were available to wireless consumers. The CMRS industry now provides consumers with compact phones, high quality voice service, email, wireless internet browsing at speeds at or above dial-up, WiFi, text messaging (SMS), automated information alerts, Enhanced 911 service, and the ability to take, store, and exchange photographs, location capability, and more.[8] CMRS innovations allow networks to be 76 times more efficient than they were ten years ago through use of spread spectrum, frequency hopping, digital modulation, and smart antennas.[9] Consumers' calls are far more secure, reliable, and of higher quality than they were ten years ago, due in large part to the replacement of AMPS with digital service.[10]

These technological changes have all occurred directly in response to a thriving marketplace and without an interference temperature model in place. Presently, mobile receiver manufacturers are making significant improvements in their products, particularly in the areas of indoor reception and multipath signal handling capabilities. Interference temperature will redirect the focus of manufacturers' research and development efforts and will impede the progress of these and other innovations. Supplanting market forces with an interference temperature model will undermine the vitality of the consumer market as well as consumer

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[8] *Innovation: The Keystone of the Commercial Wireless Experience*, CTIA Presentation to Commissioner Michael Copps (Mar. 4, 2004) at pp. 11, 15-16.
[9] *Id*. at p. 12.
[10] *Id.* at p. 13.

confidence in mobile products by allowing additional interference to licensed communications operations and decreasing service quality, coverage, and reliability. Such an impact will have serious consequences as consumers increase their reliance on wireless services including emergency services.

An interference temperature model will also create a false sense of security and stability in the management of spectrum use. With such a regulatory system in place, the Commission can authorize additional users in licensed or unlicensed spectrum, ostensibly to maximize its utility. Such efforts will likely introduce additional sources of interference, without a true understanding of its effects, under the guise that such interference is acceptable as long as an interference temperature policy is in place. Unfortunately, without a better understanding of such a policy, reliance on an interference temperature model will actually exacerbate interference conditions rather than fix or cure them.

A possible transition from the current transmitter-based regulatory scheme to an interference temperature model will create an environment of uncertainty and unpredictability that will negatively impact innovation and the marketplace by introducing additional interference to the incumbent and future mobile communication licensee holders.[11] The new regime would require replacement and/or modification of existing equipment to compensate for loss of coverage, capacity, and service quality. Therefore, transition to an interference temperature model will likely require additional antenna sites and equipment to maintain existing service coverage, reliability, and quality. Increasing the noise floor will also limit incumbent and future licensees' ability to provide additional services and technologies. Licensees will be constrained by the presence of additional, uncoordinated devices in the band and will also be severely affected by the imposed interference temperature threshold.

[11] *See* Section IV, below.

II. Current Transmitter-Based Regulations are Effective

The Commission seeks comment on whether an interference temperature model can change the current legal and regulatory framework, including general enforcement of rules.[12] To date, the Commission has addressed interference concerns in a manner that enables industry to continue to innovate. The Commission has established operation parameters, such as signal strength limitations, maximum transmitter power, antenna height, and out-of-band emissions. These transmitter regulations have been effective and do not need to be supplanted.

At the design stage, industry can incorporate emissions specifications and can test whether a transmitter interferes with other radio systems in adjacent frequency channels. Further, industry has established several measurements to verify that power amplifiers do not render adjacent frequencies unusable. These metrics determine the amount of RF power present in the adjacent or alternate frequency channels, due to nonlinear interaction between the power amplifier and a modulated spectrum, and provide feedback to manufacturers to correct unacceptable RF power levels. If a product fails to comply with the Commission's requirements at the design stage, it can be modified and retested before production begins.

Moreover, before commercial release of a product, the manufacturer must certify the product's compliance with the Commission's regulations and standards. These regulations and standards include whether the transmitter is on the correct frequency and not interfering with others, whether it is operating at the correct output RF power, and whether the emitted spectrum has the required shape. Transmitters must also transmit on the correct frequency, without drifting outside predefined limits, to meet regulatory requirements, and to enable rapid signal acquisition by the receiver. The appropriate RF power levels and performance parameters have been identified by the Commission and incorporated into the Commission's rules, which

[12] *NOI* ¶ 17.

adequately ensure that transmitters function as intended and do not interfere unacceptably with other signals.

On the other hand, an interference temperature will would cause a substantial change in the current regulatory system, without ensuring that a transmitting device does not interfere with other signals. The Commission's existing regulations set forth clear parameters that enable industry to predict the environment in which products must function. However, standards used in the current device and equipment certification process will become obsolete since an interference temperature regulatory framework would be dynamic and dependent on the threshold agreement with incumbent and future licensees. Therefore, certification will no longer ensure that RF devices do not create interference. Rather, certification will be limited to compliance with policy decisions that are established between the Commission and the incumbent licensee and can therefore vary between operators within the same bands providing the same services.

As the Commission further recognizes, under the current spectrum management regime, the primary restrictions the Commission applies to technical operations "are those necessary to ensure that interference is not caused to services operating in adjacent geographic areas or in adjacent or nearby frequency bands."[13] These restrictions "tend to convey certain rights on the other neighboring or nearby licensees, which are protected by such rules."[14] A regulatory framework based on interference temperature will no longer afford such protection. The current transmitter-based regulations are designed to address interference issues effectively. The continuous innovation and improvement in products in the industry demonstrates that current regulations are effective.

[13] *NOI* ¶ 16.
[14] *NOI* ¶ 6.

III. A Market-Based Approach is Preferable to Interference Temperature

The Commission seeks comment on whether its approach for managing interference should be changed to address the many changes in spectrum demand and operating environment in recent years.[15] As discussed in the previous section, Ericsson believes that existing regulatory policies are sufficient to manage interference issues. However, to the extent the Commission determines that a change is necessary, Ericsson urges the Commission to adopt a market-based deregulatory approach rather than an interference temperature model. Spectrum management policies that capitalize on existing market forces, such as deregulation and the globalization of technologies, have spawned intense competition and specialization of telecommunications services. If the Commission allows the market to function more freely to address and remedy interference issues between spectrum users, less regulatory intervention in markets will be necessary.

Simply put, the industry is too competitive for operators not to ensure that their services are reliable and high quality or they will lose customers. There is a built-in market incentive for licensees, independent of regulatory requirements, to use spectrum as efficiently as possible and to minimize the interference they receive from and cause to adjacent users. In a market-oriented model, there are sufficient incentives for industry to "self regulate" appropriate spectrum uses to ensure reliability and quality of service.

To the extent the Commission seeks additional regulatory rules to ensure access to spectrum for unlicensed devices, Ericsson believes a market-based, deregulatory approach is more appropriate. In particular, secondary spectrum trading rules can effectively make spectrum more accessible and, at the same time, provide licensed operators with the regulatory clarity and reliability they need in order to continue investing and innovating.

[15] *NOI* ¶ 9.

Spectrum is a valuable resource and, as such, its usage should be maximized for the benefit of society as a whole, including commercial opportunities. Spectrum trading offers a valuable tool for the management of the spectrum resource and the conditions of its use. As technology advances, the FCC should allow current services to adapt further to the changing market. These developments increase efficiency without undermining the incumbent licensee's ability to respond to changing markets by removing the available capacity through an interference temperature model. In contrast, a market-based, deregulatory approach, like spectrum trading, will expand licensees' opportunities to achieve new and more efficient uses of the spectrum resource.

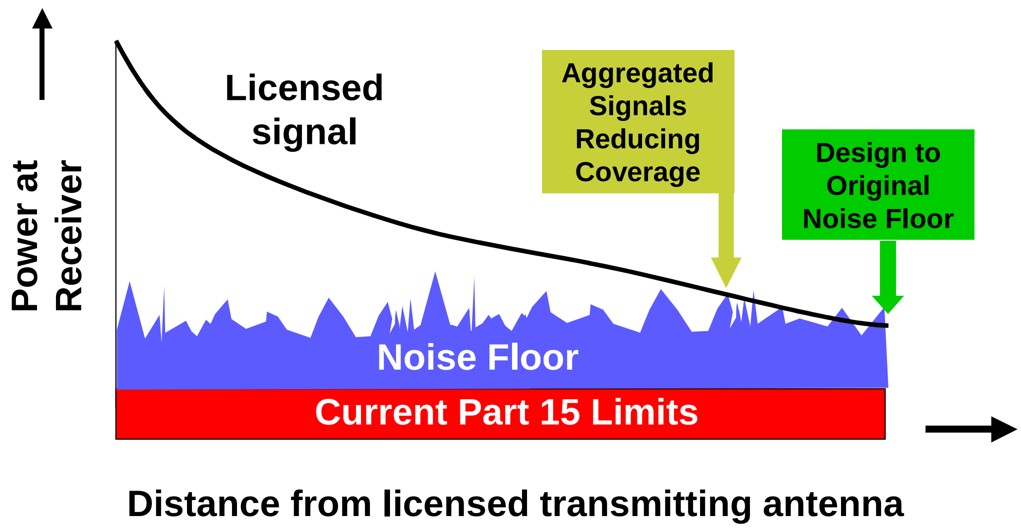
IV. The Interference Temperature Model is Especially Ill-Suited for CMRS Bands

As the Commission notes, the Spectrum Policy Task Force said that an interference temperature model may not be feasible in all bands. Consequently, it seeks comment on how the model should be applied to specific services.[16] For the reasons described below, Ericsson believes that application of an interference temperature model to CMRS bands will be detrimental to consumers and licensed operators.

A. An Interference Temperature Model Will Negatively Effect CMRS Operators.

Using an interference temperature model to allow unlicensed underlay usage in the CMRS bands will have a negative impact on licensed operators. The following diagram illustrates the power at the receiver as a function of the distance from a transmitting antenna:[17]

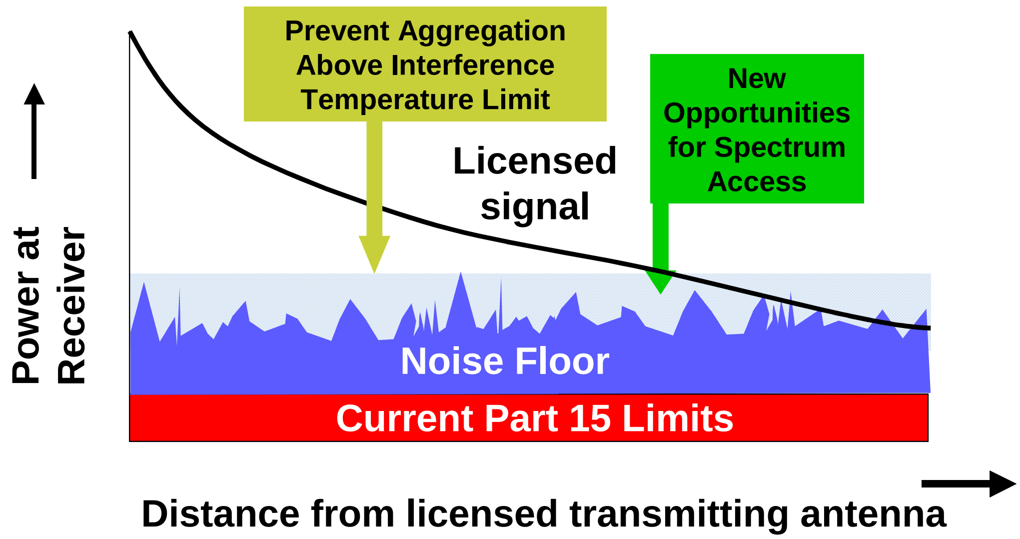
[16] *NOI* ¶ 18.
[17] *Spectrum Policy Task Force Report, In the Matter of the Commission Seeks Comment on Spectrum Policy Task Force Report*, ET Docket No. 02-135 (fil. Nov. 2002), at p. 33, fig. 2.



As shown in the above diagram, license holders typically design their systems to operate down to the original noise floor which, coincidentally, is an indication of maximizing spectrum usage. As additional interfering signals appear, the noise floor will increase at various points within the service area, as indicated by the peaks above the original noise floor. This action reduces the service quality and signal coverage of the transmitting station.

As depicted in the diagram below, the Spectrum Policy Task Force contends that an interference temperature will provide a limit on the amount of new interference that the licensee may experience.[18] That is, establishing an interference temperature limit will ensure that the transmitting station can provide service at all locations where its signal exceeds that limit.

[18] *Id., at p. 33, fig. 3.*



According to the Task Force, the limit will assure that the licensed operation will not experience any further degradation or loss of service from new interference and will provide incumbents greater certainty regarding the maximum permissible level of interfering RF energy in the bands in which they operate.[19] However, the assumption of aggregate effects does not apply equally across all spectrum bands. In particular, it is not applicable in bands that have minimal amounts of existing interference, such as CMRS.

In the CMRS band, an interference temperature limit will actually increase the level of noise in the band from underlay transmitters and result in increased aggregate effects that do not currently exist. In this scenario, systems that were designed to operate to the level of the noise floor will receive additional interference. Therefore, they will no longer be able to operate to the expected performance or costs since the noise floor will be permitted to rise to the limit of the defined interference temperature. Consequently, many existing products will become obsolete without potentially expensive modification.

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[19] *NOI* ¶ 15.

As the previous diagrams demonstrate, setting an interference temperature (which is equivalent to raising the noise floor for the entire station coverage area) will also reduce the coverage and/or capacity of the entire site, requiring additional base stations to cover the same geographic area. Not only will this create a significant cost to the incumbent licensee to acquire additional sites and base stations and to re-engineer its coverage, but it will diminish the quality of service and reliability for consumers.

Diminished service quality and reliability caused by an interference temperature model may also pose unintended harm to public safety. For example, if a user experiences excessive interference, he may not be able to complete a 911 emergency call in a remote area or on the fringe of coverage where excessive interference harmed the quality of service. Therefore, an interference temperature policy will not only harm the FCC's goals of improving the quality and reliability of CMRS service, but also will dampen the FCC's substantial efforts to improve public safety.

The FCC should not assume that interference temperature will work in CMRS bands simply because in some locations, additional interference will not impact operational performance of the system, or because modern CMRS systems can adapt to local interference, *e.g.*, by applying power control. In the CMRS interference environment, the allocation of transmit power by the base station to a mobile terminal is proportional to the total interference level at the mobile terminal. The power that is used for a particular mobile terminal is not available for other mobiles served by the same station. Therefore, the greater the interference experienced by single or multiple mobile terminals, the fewer the mobiles that can be served by the base station. For this reason, an interference increase at any terminal will decrease the capacity of the base station.

As shown in these diagrams, the interference temperature concept will provide unlicensed users additional spectrum at the substantial expense of the licensee, who, in some cases, has spent billions of dollars to procure access to the spectrum, by eliminating coverage that the licensee currently uses to extend service. Eliminating coverage will impact future licensed operations and systems as well.

B. Feasibility of the Interference Temperature Model in CMRS Bands is Questionable.

The Commission indicates that, in theory, "interference temperature measurements would be taken at various receiver locations and these measurements would be combined to estimate the real-time condition of the RF environment."[20] The Commission notes that "the degree of certainty of the estimates would depend on such factors as the transmitter signal ranges, the uniformity of signal levels over an area, the density and location of temperature measuring devices and the sharing of the data taken by nearby devices; *e.g.*, through '*ad hoc* cooperative wireless networks.'"[21]

The Commission recognizes that, in the past, no approach has ever been able to use real-time adaptation to the actual RF environment as a means of spectrum management successfully, for good reason.[22] Specifically, the underlayment transmitter will only be aware of the actual interference noise level at its location. That knowledge will not be useful to the measurement or underlay receiver. Specifically, the measurement receiver needs to distinguish between interference temperature itself and the superimposed useful signals from the CMRS transmitter. This causes significant complexity because the measurement receiver will, in principle, have to apply dedicated processing to detect and measure the CMRS signal. If the CMRS signal is not

[20] *NOI* ¶ 10.
[21] *Id.*
[22] *NOI* ¶ 8.

cancelled (*i.e.*, deducted) from the total measured received power, the measurement receiver may misinterpret the received power of the CMRS signal as the interference temperature. Accordingly, it will not allow additional interference in the range of this measured power level. Thus, underlay transmitters will be prevented from communications.

If the interference level at the underlayment transmitter's location extrapolates to other locations in the environment, the extrapolations will quickly become inaccurate with increasing distance in spatially different propagation environments. As such, the principle is only applicable to very short-range transmissions.

In the CMRS band, the receiver's RF environment must be measured either by a device which is sufficiently near the CRMS receiver, or the CMRS or underlay receiver must communicate its own environment. Assuming that a matrix of measuring devices is used to communicate the receiver's RF environment, "the degree of certainty of the estimates would depend on such factors as the transmitter signal ranges, the uniformity of signal levels over an area, the density and location of temperature measuring devices and the sharing of the data taken by nearby devices."[23]

Accordingly, the accuracy of estimates will be far from certain. Moreover, additional uncertainty will exist since most underlay transmitters will exceed the interference temperature threshold limits in their immediate vicinity. Therefore, the minimum distance between such transmission and the potential victim receiver will need to be known as the transmission occurs, as well as the proximity between the licensed user and unlicensed device. As such, using a matrix of measuring devices cannot overcome the degree of uncertainty in a highly unpredictable environment with mobile devices.

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[23] *NOI* ¶ 10.

For the mobile radio networks uplink, it will be sufficient to measure the interference temperature within each base station so the measurement grid will coincide with the base station grid. However, the measurement for the downlink will be much more difficult where the required grid density is dependent upon the propagation conditions. A simple analysis assumes that the underlay transmitter has free space propagation conditions in the relevant range of influence. Assume further that a minimum distance ("dmin") from the underlay transmitter to any victim receiver can be ensured. The ratio between the highest interference that the underlay transmitter can cause and the measured interference at a distance ("d") from the underlay transmitter is simply 20*log(d/dmin). If dmin = 1 meter and d = 10 meters, the measurement error is 20dB, *i.e.*, the underlay transmitter can cause up to 20dB higher interference than what is measured.

Assume the interference temperature threshold limit is at -115dBm/MHz, *i.e.*, 10dB below the thermal noise floor, plus a 9dB noise figure. In this case, any underlay transmitter will be limited to transmit at a Power Spectral Density ("PSD") so low that it is measured with, at most, (-115-20 = -135) dBm/MHz at the measurement location. The minimum distance between the underlay transmitter and the measurement receiver is 1 meter as well, the underlay transmitter power must be limited to a PSD of -96.5dBm/MHz, at a frequency of 2GHz, because the free space 1 meter loss, at this frequency, is 38.5dB. It follows, then, that d = 10 meters corresponds to the worst case distance in a square measurement grid with 14 meter spacing, *i.e.*, in such a grid, no location is further than 10 meters away from a measurement location.

This example shows that the PSD value which would be tolerable for underlay transmitters is so low that no reasonable communication applications could be achieved, despite an extremely dense measurement grid. This situation could only be relaxed if the minimum distance from an underlay transmitter to a victim and measurement receiver is substantially increased.

The ability to measure interference in a dynamic RF environment is, at best, uncertain. Even assuming the technological capabilities exist, the location of any given transmitter will be unknown at any particular point in time, given the mobility of users. The RF matrix-monitoring model, therefore, will require installing a potentially enormous network of expensive and complex infrastructure to monitor interference temperature universally, without any guarantee that it will actually address the interference from underlay transmitters.

As a second technique for monitoring the RF environment in real-time, the underlayment receiver could measure the interference itself and communicate this measurement to other underlayment devices, either directly or via relay stations. This technique not only falls victim to many of the same shortcomings of a matrix solution, but also the receivers themselves raise the temperature level by communicating their immediate RF environment. This downward spiral exacerbates the noise conditions, decreases the receiver's battery life to send interference temperature transmissions, and takes valuable spectrum that could otherwise be used for communications. For these reasons, interference temperature will cause decreased spectrum access and inefficient spectrum usage.

In addition to these technical drawbacks, this second technique does not solve the problem that background interference must be measured at the very locations of the CMRS receivers, since measurements taken at the location of the underlayment devices are inaccurate. The measurement uncertainty, *i.e.*, how well measurements correlate with actual interference at the CMRS receivers, depends on propagation environments and density of underlay devices. The same considerations given for the measurement matrix technique apply to this technique.

As a third technique, the licensed CMRS receiver can perform interference measurements and communicate the results to unlicensed devices, either directly or via relay stations. This technique is strictly hypothetical, since existing CMRS devices do not support this kind of communication. Nevertheless, this technique is the only one that measures background interference where it is, in fact, relevant, *i.e.*, measuring interference at the receiver that relies on a controlled interference environment.

When measurements are communicated directly to the unlicensed device, the transmission from the CMRS device conveying the RF environment measurement must be detectable by the unlicensed device in order for the unlicensed device to limit its transmit power accordingly. At the same time, transmissions from the unlicensed device must NOT be detectable by the licensed device. This asymmetry poses additional technical problems. The transmission frequency of the measurement information must also increase with both the licensed and unlicensed device velocities. The lower the frequency of measurement transmissions, the higher the level of uncertainty as to whether the measurement remains accurate. The level of accuracy or relevance applied to the measurement information must ensure that underlay transmissions do not introduce additional interference.

The significant level of uncertainty using a measurement matrix-model to monitor real-time RF environment and the significant cost actually to scale a matrix to the resolution necessary for realistic monitoring negate any perceived implementation benefit. The level of uncertainty is not reduced when considering the usage of CMRS or underlayment receivers to monitor and communicate their RF environment. Rather, each possible technique presents equally difficult concerns that cannot be readily resolved, while, at the same time, introducing considerable uncertainty into the CMRS band.

V. The Interference Temperature Model Needs Extensive Additional Studies

As the Commission itself recognizes, implementation of an interference temperature model raises numerous questions of technical feasibility.[24] Ericsson believes that a great deal more research will be necessary to determine whether many of the concepts introduced are even possible. For example, because of the nature of the mobile environment and the significant difficulties in quantifying the interference temperature environment in real-time, the ability to identify, prevent, and curtail interference to the licensee will be seriously limited. This lack of enforceability creates additional uncertainty and unpredictability that undermines the benefits of increasing spectrum access and its efficient usage even further.

There are many unanswered questions that the FCC needs to address before it adopts an interference temperature standard. Industry and the Commission will need to conduct more research to determine if such a concept will even be technically achievable. At a minimum, it must be shown conclusively, through technical studies, that underlay devices can operate in licensed bands without causing interference. Accordingly, Ericsson urges the Commission to refrain from adopting such a concept until it investigates the technical implementation issues more thoroughly.

CONCLUSION

Ericsson strongly urges the Commission not to shift the current interference management paradigm to an interference temperature model. Although Ericsson recognizes the value of increasing the efficient use and access to spectrum, an interference temperature-based regulatory scheme will impede the FCC's expressed goal of ensuring reliable communications, especially in the CMRS band. Interference temperature provisions will undermine this goal by allowing additional interference and introducing uncertainty in the band, creating an unknown operating

[24] *NOI* ¶¶ 18-28.

environment and disincentives for investment and innovation in the industry. The CMRS industry already has a proven record of innovation, efficiency, and competitiveness. Therefore, changing the regulatory framework to achieve these goals is simply not justified. Further, by allowing additional interference to existing equipment, the interference temperature concept will require current and new licensees to make substantial additional investments in the future to upgrade or replace existing equipment. In effect, licensees will subsidize unlicensed usage in bands that have been allocated based on auction proceeds.

Rather than create additional users in bands that are already efficiently used, the Commission should explore other existing methods, such as promoting secondary spectrum trading or unlicensed use of spectrum that is available but unused because of geographic or economic concerns. In addition, recently-available spectrum bands in the 5 GHz range that are still in their commercial infancy offer a substantial amount of available spectrum for unlicensed devices. Accordingly, alternatives exist that will not require changing and disrupting a regulatory framework that promotes continued innovation and efficient spectrum use for systems like CMRS.

Ultimately, the FCC's spectrum policy and regulations should not degrade business stability, predictability, and transparency. Accordingly, Ericsson urges the Commission not to adopt an interference temperature-based method of managing interference.

Respectfully submitted this 5th day of April, 2004.

Mark Racek, Director, Spectrum Policy
Ericsson Inc
Office of Public Affairs
1634 I Street, N.W., Suite 600
Washington, D.C. 20006-4083
Telephone: (202) 783-2200
Facsimile: (202) 783-2206

Elisabeth H. Ross
Birch, Horton, Bittner & Cherot
1155 Connecticut Avenue, N.W.
Suite 1200
Washington, D.C. 20036
Telephone: (202) 659-5800
Facsimile: (202) 659-1027

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