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

In the Matter of	)	
	)	
Spectrum Policy Task Force	)	ET Docket No. 02-135
	)	
	)	

ADDITIONAL COMMENTS BY HYPRES, INC.

HYPRES, Inc. is submitting these additional comments in response to requests for relevant information related to the Spectrum Policy Task Force request for public comments on issues related to the Commission's Spectrum Policies. We request that this document be considered an addendum to our on-time submission dated July 5, 2002. This information was not developed in time for inclusion in the previous comments.

In the event that these comments cannot be considered as part of the previous document, we request that they be considered an Ex Parte submission to the docket.

Spectrum Pollution

As pointed out in the section "Interference Protection" in our previous document, operators of radio transmitters often radiate energy outside their assigned frequency bands. This possibility is exacerbated by the introduction of Software Defined Radio (SDR) technology. An SDR radio may need to combine a number of different transmission channels in the digital domain prior to digital to analog conversion (DAC). The output of the DAC is used as an exciter input to a high power amplifier (HPA) which increases the power level to that needed to drive the antenna.

Operating parameters of the HPA include bandwidth, power output, and linearity. As out-of-band intermodulation products appear in the output signal as a function of linearity, the design must trade off these parameters to obtain the desired transmitter performance at an acceptable level of intermodulation emissions. The result is low HPA operating efficiency, and higher cost to reach needed power levels.

A very cost effective solution to this problem is to effectively improve HPA performance. Interference is reduced with the use of spectrally pure carriers and ultra-linear power amplifiers. HYPRES Digital RF capability, based on superconductor circuits, has the ability to provide real-time digital pre-distortion to compensate for non-linearity in HPAs.

Spectrally pure carriers begin with multi-GHz clocks with clock jitter measured in sub-picoseconds, followed by inherently-perfect DACs, to generate the "near-perfect sine wave". Fast digital circuits, using superconductor technology, enable digital pre-distortion on a multi-GHz RF waveform, greatly simplifying the algorithms and the complexity of signal processing over working at baseband. This performance enables a new linearization capability, a digital RF pre-distorter, with much greater linearity, bandwidth and efficiency than conventional baseband pre-distorter schemes and other approaches such as "feed forward" linearization

Radio System Economics

If the ultra-linear HPAs were in wide use, spectrum pollution would be substantially reduced, and the ambient noise floor would be generally lowered. But system operators have little incentive to operate their transmitters more cleanly in areas other than in-band interference, where they are interfering with their own services. They will push regulatory limits of out-of-band emissions in order to reduce cost and improve service.

We propose a solution similar to that used in regulating air pollution. There are certain minimum levels of acceptable pollution, but in some cases factory operators have an option of either installing scrubbers or buying emission rights from other local factories who have lowered emissions. The course of action is their economic decision, but the end result is a controlled level of pollutants without the negative economic impact of shutting down older facilities.

We propose that system operators be provided with an economic incentive to operate their transmitters with a cleaner signal. One such approach in areas where spectrum is auctioned is to offer a substantial discount from the auction price for lowered interference. The operator could pick any one of a number of improved signal characteristics. The better the signal they agree to use, the greater the discount from the final auction price of spectrum. The discount should be economically sufficient to incentivize the operator to transmit with a cleaner signal, and should have graduating scale depending on spectral purity. Alternatively or in combination, a periodic fee could be assessed depending on the purity of the transmission signals and the degree of implementation.

The means to monitor conformance to their agreed-upon performance is provided by the monitoring capability proposed in our previous document. There we suggest that spectrum monitoring can be another service offering provided by network operators with their existing infrastructure and available background processor time.

We suggest that this is a win-win situation. Operators win because they make their own economic trade-offs, with prospects of lowered cost, and have the side benefit of better performance in their networks. Regulators win because the overall quality of spectrum usage is improved and the monitoring system provides much improved data on current spectral conditions. Equipment manufacturers win because a market arises for improved equipment performance, generating the cash flow needed to develop new technology.

Conclusion

We have proposed an economic approach to provide an incentive for improved transmitter performance, and to provide incentive for new radio system technology. We urge the Commission to consider such an approach, and to implement the needed policies.

Respectfully submitted,

Jack Rosa
CEO and President
Vice Chairman, Board Of Directors
HYPRES, Inc.

July 11, 2002