

**Before the
Federal Communications Commission
Washington, DC 20554**

In re)
)
Spectrum Policy Task Force) ET Docket No. 02-135
Report)
)
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To: The Commission

**COMMENTS OF
ARCH WIRELESS OPERATING COMPANY, INC.**

Arch Wireless Operating Company, Inc. (“Arch”) hereby submits comments in response to the Report (“Report”) issued by the Commission’s Spectrum Policy Task Force (“Task Force”).¹ Arch is the leading provider of one and two-way wireless messaging and information services in the U.S., operating local, regional and nationwide messaging networks across the 50 states, the District of Columbia, the U.S. Virgin Islands and Puerto Rico. Arch holds thousands of Commission licenses spanning the 72, 150, 450 and 900 MHz bands. As a significant user of spectrum, Arch is directly impacted by the FCC’s spectrum allocation and management processes.

Arch restricts its comments to a limited number of issues of broad applicability, choosing instead to offer specific technical and legal analysis in subsequent, issue-specific proceedings which the company understands will be commenced at some point in the future. Arch applauds the Task Force’s comprehensive approach to evaluating ways to make spectrum management processes more efficient without sacrificing the integrity of incumbent operations; however,

Arch submits that the concept of an interference temperature as a means of maximizing spectral efficiency is likely unworkable given the immense complexity of the technical, managerial and regulatory challenges involved with implementing and enforcing such a paradigm. Further, Arch urges the Commission to be careful to distinguish those services and band users that are already highly efficient from those that are not, and to focus reform efforts on the latter. As explained herein, messaging is already among the most efficient of spectrum uses, and is also among the most reliable, which is why the service is the technology of choice for safety of life professionals that require anywhere, anytime communications capabilities. As such, messaging should be protected from the potentially disruptive changes that will flow from the radical revisions to current spectrum management proposed in the Report, just as the Task Force recommends that public safety and broadcast uses be protected. Finally, Arch supports the Task Force's recommendations to afford licensees greater opportunities to lease spectrum in a secondary market.

I. TRANSITION FROM PREDICTIVE TO QUANTITATIVE INTERFERENCE MANAGEMENT MODEL IS UNREALISTIC

Establishing an interference temperature is one of the cornerstones of the Task Force's initiative to maximize the efficient and flexible use of spectrum. As explained in the Report, interference temperature involves establishing a measure for the "worst case" level of RF noise in which a particular receiver would be expected to operate.² It is anticipated that "smart" devices could then exploit this information to make full, interference-free use of the band. The Report suggests that two benefits will flow from this concept: "[f]irst, licensed spectrum users

¹ See *Public Notice*, Commission Seeks Public Comment on Spectrum Policy Task Force Report, ET Docket 02-135, FCC 02-322 (Nov. 25, 2002); see also *Public Notice*, DA 02-6544 (Dec. 11, 2002) (extending the comment date to January 27, 2003).

² Report at 3.

will obtain certainty with regard to the maximum permissible level of aggregated noise, or interference, in their band . . . [and] [s]econd, to the extent that the interference temperature [limit] is not reached, other users (*e.g.*, unlicensed devices) could operate in the same band – with the interference temperature serving as the maximum cap on the potential RF energy.”³

With the interference temperature model, the Task Force is essentially contemplating a transition from an interference management paradigm in which a finite universe of transmitter classes and radio services are regulated, to a paradigm in which the cumulative RF environment as it exists in every point in space, at every point in time, would be regulated. In Arch’s view, such an undertaking would involve technical, managerial and regulatory complexity of such immense proportion that it presents an unworkable means of improving spectrum management in the near term. The cumulative RF environment is comprised of a seemingly unending assortment of dynamic variables such as the number, distance, direction, operating power and antenna patterns of other users, whether such users are fixed or mobile, frequency propagation issues, weather and terrain, *etc.* While it is possible for individual networks to be designed to take these parameters into account and achieve acceptable levels of performance (albeit while consuming considerable spectrum), it would be extremely risky to rely on this approach to manage spectrum utilization and prevent interference across a broad range of wide-area commercial users and applications.⁴

Arch fears that even a small miscalculation of the interference temperature, when applied to high power, wide-area commercial networks, could lead to a complete breakdown in all

³ *Id.* at 29-30.

⁴ Assuming, *arguendo*, that interference temperature can be reasonably managed, Arch questions whether it is (or will ever be) feasible to develop affordable, user-friendly messaging devices that measure and instantaneously adjust their operating parameters in concert with the total RF environment so as to remain within the applicable interference temperature.

communications being offered on the subject bands. For example, if through a malfunction of one or more high power transmitters, the noise floor began to rise, each user would likely commensurately increase its power in order to be heard over other users. The resulting collective increase in the noise temperature would lead to other users reciprocating in kind, until such point that the spectrum is so saturated with noise that receivers would be overrun. Alternatively, the noise temperature may rise to a point where no additional emissions would be allowed for any user. All users would then be forced to shut down to avoid violating the allowable temperature level.

In either scenario mentioned above, it would be extremely difficult to identify when, where and by whom a particular interference temperature limit was violated. Thus, the interference temperature model will likely present the Commission's already over-burdened Enforcement Bureau with an untenable enforcement situation. Despite these complexities and real-world technical and enforcement challenges, Arch would support an effort by the Task Force or the Commission to test the concept of an interference temperature on a limited basis subject to very explicit and conservative technical and geographic parameters, and for a specific and limited period of time.

II. POLICIES FACILITATING MORE EFFICIENT UTILIZATION OF LICENSED SPECTRUM MUST PROTECT EFFICIENT INCUMBENT USERS THAT PROVIDE A CLEAR PUBLIC BENEFIT

A. Messaging is an Efficient Spectrum User

The Report is primarily concerned with changing the Commission's spectrum allocations and management policies in order to maximize the efficient use of spectrum. Toward this end, the Report identifies three metrics of efficiency: spectrum efficiency (which occurs when the maximum amount of information is transmitted within the least amount of spectrum); technical efficiency (which occurs when inputs, such as spectrum, equipment, capital and labor are

deployed in a manner that generates the most output for the least cost); and economic efficiency (which occurs when all inputs are deployed in a manner that generates the most value for consumers).⁵ As explained below, messaging already proves itself a spectrally efficient service under each of these criteria.

Narrowband carriers, by definition, utilize relatively small, discrete slices of spectrum in the bands below 1 GHz to transmit and receive text messages of short duration and length over geographically large service areas.⁶ Messaging networks are elegant in their simplicity. All spectrum and air time is dedicated to delivering the message to the appropriate device with minimal overhead. Messaging networks, which do not utilize complicated frequency hopping or power control protocols, are designed to take maximum advantage of limited bandwidth. As a consequence, messaging networks can accommodate comparatively more users, with minimum spectrum, at appreciably less cost than many other services. Indeed, a single 25 kHz channel alone can support in excess of 100,000 subscribers.

Because of its efficient design, messaging is among the most reliable, commercial wireless communications technologies. Messaging's simulcast design enables its transmissions to more easily and consistently reach deeply into areas shielded by terrain and man made structures than other wireless technologies. For maximum efficiency and economy, this design takes advantage of the full dynamic range of messaging's assigned spectrum. In addition, messaging networks typically time-synchronize transmitters and receivers, with individual receivers assigned to specific time slots. Although a messaging transmitter may remain fully loaded and in continuous operation throughout the day, transmissions directed to a particular

⁵ *Id.* at 21.

⁶ Indeed, the transmission of a 90-character message generally takes as little as 152 milliseconds of airtime.

receiver occur only in the assigned time. Because of this time synchronization, end-user receivers are inactive except during their assigned time slot, making them extremely energy efficient (indeed, a single battery will last a month or more in most units).

It is messaging's very reliability that has made it the technology of choice for doctors, hospitals, and other safety of life professionals that require anytime, anywhere communications capability. This reliability could be jeopardized by spectrum overlays, underlays, easements, interruptible operations or other uses of licensed, messaging spectrum that would raise the noise floor. Indeed, losing exclusive use of its bands would require a provider of messaging like Arch to deploy more complicated protocols, consume more spectrum to provide for more sophisticated monitoring functions, and deploy more transmitters to overcome interference from additional users on the same spectrum. The net effect of these developments for messaging providers would be to prohibitively increase the cost of doing business as well as degrade the technical efficiencies inherent in the way messaging networks are currently operated. These two results, in concert, would seriously undermine the continued economic viability of providing messaging as a stand alone service. Further, because messaging is already a spectrally efficient service, there is no clear policy or technical reason for altering the current spectrum management model as applied to messaging. Consequently, the Commission should preserve the current spectrum and interference management paradigm for messaging.

B. Messaging Provides a Publicly Beneficial Service

As the Task Force observes, the Commission's spectrum policy and allocation decisions over the years have been guided by any number of public interest considerations, including for example: national security and public safety concerns, international coordination issues, interests of customers and incumbent licensees that come to rely on a particular service or device, and

ensuring access by persons with disabilities.⁷ Arch submits that market-oriented approaches alone, while useful for maximizing efficiencies, cannot be the Commission’s sole guide in making spectrum decisions. The Task Force appears to acknowledge this fact when it recognized that continued use of the command and control model of spectrum regulation may be required in those situations where “prescribing spectrum use by regulation is necessary to accomplish compelling public interest objectives.”⁸ This is particularly true for those spectrum users that provide clear, non-market driven public interest benefits, such as broadcasters and public safety users. Arch believes that messaging, because of its anytime/anywhere reliability and consequent wide spread use by safety of life professionals, is among this group of incumbent uses that provide an important public benefit. Therefore, messaging should be afforded the same considerations as public safety and broadcast operations as the Commission adopts and implements any of the spectrum management revisions suggested by the Task Force.

III. ARCH SUPPORTS AFFORDING LICENSEES GREATER OPPORTUNITIES TO LEASE SPECTRUM IN A SECONDARY MARKET

One of the overriding objectives of the Report is to identify ways for new entrants to gain improved access to licensed spectrum. To facilitate this objective, the Task Force offers two alternative approaches: (1) expanding secondary market rights, and (2) providing for government-defined easements on licensed spectrum. Under the secondary markets approach, “licensees would hold the rights associated with determining which potential entrants could have access to the spectrum and under what conditions.”⁹ Under the easements approach, “the Commission, and not the licensee, would establish conditions for user access to the spectrum,

⁷ Report at 11.

⁸ *Id.* at 41.

⁹ *Id.* at 55.

and the consent of the licensee would not be required so long as the non-licensee user complied with the conditions.”¹⁰ Arch agrees that secondary markets should continue to be used to provide access opportunities for new entrants as well as provide opportunities for incumbent licensees to grow their businesses; however, Arch strongly opposes the use of easements, even on a limited basis.

First, as indicated above, Arch has serious reservations about the technical and practical feasibility of setting and enforcing a workable interference temperature, and thus it cannot support a policy that assesses spectrum rights on the basis of whether a particular user operates above or below such a threshold. Second, assuming *arguendo* that an interference temperature model can be implemented, the suggestion that unlicensed users could be allowed to operate above it – *i.e.*, in circumstances where they will almost certainly cause harmful interference – so long as they employ a “listen before transmitting” protocol and that they cease transmissions as soon as they cause interference, raises very serious concerns for messaging providers. Although this protocol may work in the relatively low power, limited range realm of Part 15 devices, Arch doubts whether such a protocol could be successfully utilized by full power, wide-area commercial devices operating in an enormously complicated and dynamic RF environment. Further, Arch agrees with the concerns raised by the Task Force that making spectrum available on a government easement model raises the potential for “squatter’s rights” – *i.e.*, secondary users becoming so entrenched in a particular band that it becomes politically difficult to dislodge them in favor of primary users.

¹⁰ *Id.*

