

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

<i>In the Matter of</i>	
WIRELESS OPERATIONS IN THE 3650-3700 MHZ BAND	ET 04-151
RULES FOR WIRELESS BROADBAND SERVICES IN THE 3650-3700 MHZ BAND	WT 05-96
ADDITIONAL SPECTRUM FOR UNLICENSED DEVICES BELOW 900 MHZ AND IN THE 3 GHZ BAND	ET 02-380
AMENDMENT OF THE COMMISSION'S RULES WITH REGARD TO THE 3650-3700 MHZ GOVERNMENT TRANSFER BAND	ET 98-237

CISCO OPPOSITION TO PETITIONS FOR RECONSIDERATION

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TABLE OF CONTENTS

	<u>Page</u>
SUMMARY	III
CISCO OPPOSITION TO PETITIONS FOR RECONSIDERATION.....	1
I. Nationwide, Non-Exclusive Licensing, with Registration of Higher-Powered Stations, Offers the Best Prospect for Maximizing the Most Promising Potential Uses of the 3650 MHz Band.	3
II. The Contention-Based Protocol Rule Is a Modest Technical Requirement that Should Only Exclude Spectrum Bullies.	10
III. The Commission Should Not Raise the Applicable Power Limits	12
CONCLUSION.....	13

SUMMARY

Cisco Systems, Inc. hereby supports the Commission's rules for the 3650-3700 MHz band as adopted in the Commission's Report and Order in this proceeding.¹ In particular, Cisco opposes the various petitions for reconsideration insofar as they urge the Commission to abandon its innovative non-exclusive licensing regime, to eliminate the requirement for contention-based protocols in the 3650 MHz band, and to raise the power limits applicable to equipment in this band. In Cisco's view, the Commission properly focused on writing a set of rules that would promote the prompt and efficient deployment of broadband services. Furthermore, the rules promote the Commission's goals in a technology-neutral way that serves the public interest. The petitions for reconsideration do not present any new facts or arguments that call into question the wisdom of nonexclusive licensing, or the contention-based protocol requirement, or the maximum permissible power levels.

Non-exclusive nationwide licensing has many of the more attractive features of unlicensed use, including low regulatory costs for end users, minimal delay, and tremendous flexibility of deployment. At the same time, the minimal licensing requirements together with the registration rules will facilitate coordination between operators and will give the Commission readily-available information about activities in the band. As a regulatory model that is somewhere between traditional licensing and unlicensed use, the nationwide non-exclusive licensing paradigm gives the Commission great flexibility to tailor licensing rules to the needs of a particular band, balancing the level of *a priori* regulatory burden against the level of interference protection that is likely to be required. Indeed, the overall level of balance in the new rules is evidenced by the fact that petitioners argue both that the rules will encourage

¹ *Wireless Operations in the 3650-3750 MHz Band*, Report and Order and Memorandum Opinion and Order, 20 F.C.C. Rcd. 6502 (2005) (hereafter "*Report and Order*").

squatting and that they will lead to a “tragedy of the commons” – two claims that are not only unfounded on their own, but mutually incompatible.

Similarly unfounded are the petitioners’ arguments against the contention-based protocol requirement, which is an extremely minimal regulation designed to prevent the very types of undesirable spectrum behaviors about which the petitioners profess to be most concerned. In effect, the contention-based protocol requirement says only that users who make conflicting demands on the spectrum must find some way to share – without specifying any particular method – instead of either user trying to overpower the other. Some technologies already satisfy this rule, and technologies that do not (including IEEE 802.16™ or “WiMAX”) can easily be extended in order to comply, without any of the delay or gamesmanship about which the Commission’s critics speculate.

Finally, the Commission should not raise the applicable power limits, for reasons aptly illustrated by the petitioners themselves. The power increase they seek is completely at odds with their stated agenda, and appears instead to be an attempt to tailor the technical specifications in this band to one particular technology – WiMAX. Cisco supports WiMAX and is a member of the WiMAX Forum, but the Commission should not write its rules in such a way as to make WiMAX v1.0 the *de facto* technical standard for the band. Given all the relevant considerations, Cisco believes the Commission’s *Report and Order* made the right trade-offs.

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² *Wireless Operations in the 3650-3750 MHz Band*, Report and Order and Memorandum Opinion and Order, 20 F.C.C. Rcd. 6502 (2005) (hereafter "*Report and Order*").

As adopted, the rules provide significant benefits for wireless broadband deployment. The new rules provide an innovative system of non-exclusive licensing combined with registration of fixed and base stations, which will support low-cost wireless backhaul for Wireless Internet Service Providers (“WISPs”) as well as certain enterprise applications. The new rules might also enable rural WISPs to provide end user services, using existing unlicensed technologies or any other technology that successfully resolves conflicting demands on the spectrum according to a contention-based protocol. Most importantly, the rules are technology-neutral. While the Order mentions IEEE 802.11™ technology as satisfying technical requirements for the band, any wireless broadband technology can be extended to satisfy the limited demands imposed by the rules, including the requirement for a contention-based protocol.

The Commission should rarely revisit any decision on the basis of petitions that present no new facts or arguments, and the petitioners simply have not presented new facts or arguments that have any material bearing on the wisdom of nonexclusive licensing, or the contention-based protocol requirement, or the maximum permissible power levels. On the contrary, the petitioners’ arguments on these points come to little more than a plea for a band that is primarily devoted to geographically licensed, wireless broadband service that is distributed to subscribers using IEEE 802.16™ (or “WiMAX”) technology, as that technology currently exists or is standardized. Cisco is a member of the WiMAX Forum, and Cisco believes that IEEE 802.16™ may well be one of several wireless broadband technologies that gain acceptance in the market – if not in the U.S. then certainly in other parts of the world. But Cisco also believes that it would be unwise for the Commission to bet exclusively on WiMAX in the 3650 MHz band, or even to bet primarily on the use of these frequencies for general distribution of capacity directly to

subscribers. The band is substantially encumbered in many of the top markets due to the need to protect incumbents. From a business perspective, the absence of uniform availability of spectrum will impair the ability of potential service providers to raise capital, participate in auctions, and deploy networks. These disadvantages make it less likely that this band will support a wireless broadband service offering that can overcome the head start enjoyed by cable and DSL. Instead, Cisco believes that backhaul applications, which can flourish in rural and urban areas alike, are much more likely to predominate in the 3650-3700 MHz band. Stated differently, if the Commission were to grant the petitions favoring IEEE 802.16™ technology, wireless broadband use of this band would probably develop, but it would develop more slowly and would probably never approach the intensity of use that is likely to occur under the opportunistic, non-exclusive licensing model the Commission embraced in the rules as promulgated. Given all the relevant considerations, Cisco believes the Commission's *Report and Order* made the right trade-offs.

I. Nationwide, Non-Exclusive Licensing, with Registration of Higher-Powered Stations, Offers the Best Prospect for Maximizing the Most Promising Potential Uses of the 3650 MHz Band.

The petitioners almost all say they agree with the Commission's goals of making additional broadband spectrum available in rural areas and promoting efficient use in urban areas, where there could be congestion. However, petitioners largely fail to acknowledge that the Commission must pursue these goals within the constraints imposed by significant numbers of pre-existing uses in the nation's largest metropolitan areas. Because they ignore this central fact about the 3650 MHz band, their arguments are wholly unpersuasive. As the Commission made clear in the *Report and Order*, the choice of a non-exclusive licensing regime was based not only on the generic merits of non-exclusive licensing, but also "on certain characteristics of

this spectrum, including the need to protect grandfathered FSS earth station operations against harmful interference (which precludes ubiquitous use of this spectrum for other purposes throughout the United States, particularly in major population centers along much of the east and west coasts).”³

Cisco believes the Commission’s appraisal of the real-world prospects for commercial use of the 3650 MHz band is correct. Exclusion zones to protect satellite earth stations or federal government installations will make it impossible to use this band for general distribution of broadband capacity to subscribers in New York, Los Angeles, San Francisco, Philadelphia, Baltimore, Washington, or Dallas, to name just a few of the affected metropolitan areas. To be sure, these exclusion zones do not prevent WISPs from “shoehorning” in some compatible use of the spectrum in these areas, but with only 50 megahertz available – probably no more than four simultaneous ten-megahertz channels per sector – there seems to be little reason why any operator would support mass-marketed subscriber equipment in this band. Furthermore, even in areas that are completely unaffected by the exclusion zones, WISPs have other spectrum in which most of their hub-to-subscriber links can already operate with relatively high quality of service using existing unlicensed technologies. Given the constraints and the alternatives, it is not realistic to expect that the 3650 MHz band is going to be widely used in the United States for general distribution of broadband capacity to subscribers.

The Commission was also correct to conclude that the 3650 MHz spectrum may be quite valuable notwithstanding the foregoing. Although WISPs are unlikely to use this spectrum for general distribution in either rural or urban areas, they can and will use it to expand coverage in the most sparsely populated regions, and to interconnect their hubs reliably and at low cost

³ *Report and Order* ¶ 25. See also *Report and Order* ¶ 47 (according this consideration “primary significance”).

without depending on wireline backhaul. And indeed, this backhaul use of the 3650 MHz band might also be used for campus-type enterprise deployments, even in metropolitan areas that are otherwise heavily encumbered by satellite and government uses, since it may be possible for narrow beam width antennas to be used which allow the exclusion zones to be avoided.

The rules do not *foreclose* other uses, and once again Cisco commends the Commission for building the flexibility for mobile and transportable user transceivers into the rules for the 3650 MHz band. But the fact that these uses are *permitted* should not mislead anyone into thinking that they are the paradigm case on which regulatory decisions should be based.

Because this spectrum is more broadly available in rural areas than in major metropolitan areas, a number of commenters suggest that the Commission in effect authorize two different services, one for the largest metropolitan areas and one for everywhere else. This is rarely a good idea, even for large fixed stations and even for legacy services.⁴ The geographic patchwork approach has even less to commend it when a *new* service using smaller transportable and mobile user devices is contemplated. If the predominant use of this spectrum in rural areas were likely to be for subscriber links – a completely unrealistic possibility in most urban areas – then such a hard urban/rural dichotomy might be a reasonable approach. Here, however, the most likely use in areas where the spectrum is “cleanest” is one that can also be implemented opportunistically in areas of encumbrance and congestion – the backhaul use. Under these

⁴ See *Amendment of the Commission’s Rules to Relocate the Digital Electronic Message Service from the 18 GHz Band to the 24 GHz Band and to Allocate the 24 GHz Band for Fixed Service*, 12 F.C.C. Rcd. 3471 ¶ 11 (1997) (relocating an entire service from 18 GHz to 24 GHz because relocation was required in two cities for national security reasons). See also *Biennial Regulatory Review – Amendment of Parts 1, 22, 24, 27, and 90 to Streamline and Harmonize Various Rules Affecting Wireless Radio Services*, [Report and Order and Further Notice of Proposed Rulemaking, WT Docket No. 03-264](#), ¶¶ 33-34, 36 (rel. Aug. 9, 2005) (modifying Section 90.635 of the Commission’s rules to remove the distinction between urban and suburban sites when setting the maximum power and antenna height limits for conventional 800 MHz and 900 MHz systems because several decades of experience confirmed that there is no bright line distinction between the operational requirements of systems in these two areas.)

circumstances, the Commission did the right thing by keeping the rules the same for all users nationwide.

Once we focus on the highest, best, and most likely use of the spectrum, the Commission's rules are not just reasonable, but superior to any of the alternatives proposed by the commenters. Non-exclusive nationwide licensing has many of the more attractive features of unlicensed use, including low regulatory costs for end users, minimal delay, and tremendous flexibility of deployment. At the same time, the minimal licensing requirements together with the registration rules will facilitate coordination between operators and will give the Commission readily-available information about activities in the band. As a regulatory model that is somewhere between traditional licensing and unlicensed use, the nationwide non-exclusive licensing paradigm gives the Commission great flexibility to tailor licensing rules to the needs of a particular band, balancing the level of *a priori* regulatory burden against the level of interference protection that is likely to be required. Cisco believes the balance struck by the Commission in the *Report and Order* is perfect for WISPs, whose network topology may need to change in response to relatively small changes in subscriber density.

Some petitioners disparage the degree of protection that registration will provide, while others engage in hand-wringing about how onerous the coordination requirement may prove. Coordination requirements have long been subject to both types of criticism, yet they survive because they represent the sensible center where more doctrinaire approaches to spectrum management intersect. The merit of a mutual coordination requirement is precisely that it does *not* give first-movers an absolute right to exclude later entrants to the extent that later entrants can be accommodated without significant expense or degradation of service, but it *does* give first-movers the assurance that later entrants cannot simply set up a new radio and "shout" them

off the air. Although coordination has perhaps been de-emphasized in the era of auctions on the one hand and unlicensed devices on the other, the fact is that major licensed service providers all have to coordinate with adjacent users (adjacent both geographically and in the Table of Allocations) and the concept is not nearly as mystifying as the petitioners pretend. This road is in fact quite well-traveled.

Intel, Redline, and Alvarion claim that non-exclusive licensing will encourage “squatting,” by which they presumably mean the licensing and registration of stations for the purpose of impeding later entrants rather than for the purpose of providing service.⁵ Tellingly, these same petitioners also assert that non-exclusive licensing will result in a “tragedy of the commons.” The two arguments are wholly incompatible, and the fact that the same petitioners argue them both is strong evidence that each fear is exaggerated.

To begin with, the Intel/Redline/Alvarion petition never explains what anyone has to gain from squatting in this band. Any right to exclude others arguably has a value that is technically non-zero, but the Commission in this case has explicitly *not* created a licensing regime that gives licensees any right to exclude others. On the contrary, by requiring mutual coordination among all licensees, and by further requiring that all equipment in the band use a contention-based protocol, the Commission has taken affirmative steps to promote open entry unimpeded by regulatory obstacles. It is not easy even to imagine what “squatting” might look like under these regulatory conditions. In any event, the Intel/Redline/Alvarion petition does not suggest even a hypothetical situation in which squatting will pay, let alone a real risk of such magnitude that it should drive regulatory policy.

⁵ Petition for Reconsideration of Intel Corporation, Redline Communications, Inc., [and] Alvarion, Inc. (June 10, 2005), at 8.

The “tragedy of the commons” fears expressed by Intel, Redline, and Alvarion⁶ are more coherent, though no less exaggerated. As noted above, the “tragedy of the commons” argument conflicts directly with the argument that the band will be beset by squatters who provide no service, which provides ample grounds for skepticism. But even overlooking this bit of self-contradiction, the “tragedy of the commons” argument is implausible in the 3650 MHz band for three main reasons.

First, the petitioners overlook the substantial extent to which the Commission’s rules do not, in fact, create a commons. The licensing requirement, the registration option for base and mobile stations, the coordination obligation, and the contention-based protocol rule are all significant departures from the pure unlicensed model, and collectively they create conditions that will promote sharing rather than the “selfish” uses that can lead to tragedy in a true commons. As usage in the 3650 MHz band intensifies, the licensing and registration rules will make that information available to everyone – including not just the Commission, but also potential new entrants. The coordination obligation and the contention-based protocol rule make clear to potential new entrants that they cannot simply overpower existing users, but must instead share a shrinking amount of unused spectrum on equal terms. At the same time, the “cost” of being a user in the 3650 MHz band will be rising because of these same obligations. Under these circumstances, the same economic theory that gives us the “tragedy of the commons” scenario actually predicts that new deployment in the band will slow to a sustainable level well before tragedy actually ensues. This point should be clear to Intel, Redline, and Alvarion, since their comments clearly show that they recognize how non-price considerations can effectively mediate

⁶ *Id.* at 11-18.

conflicting demands on “free” spectrum in much the same way that price mediates conflicting demands in spectrum management regimes based on property rights.⁷

Second, the risk of tragedy in the 3650 MHz is dramatically reduced if, as Cisco and the Commission expect, the band is used primarily for opportunistic, narrowbeam, backhaul applications that are specifically designed around pre-existing users. Even if the 3650 MHz band could be squeezed into the “commons” metaphor, these backhaul applications are hardly analogous to voracious herds of peripatetic cattle. To be sure, the rules do not eliminate the possibility of harmful interference even for these applications, but even where conflict arises, the contention-based protocol and the coordination obligation will go a long way to prevent any genuine tragedy even for the two users who are involved, let alone the rest of the users in the band.

Third, before any commons-type arrangement can become a tragedy, there must be overuse, and that key ingredient is neither present nor anywhere on the horizon in the 3650 MHz band. The Commission’s licensing, registration, coordination, and contention-based protocol rules leave the band wide open for immediate deployment, yet at the same time they postpone any potential for overuse as long as possible. Furthermore, there is more than one potential tragedy to worry about in the 3650 MHz band. The rules for the 3650 MHz band are evidently too entry-friendly for the petitioners, but if the Commission were instead to optimize the band for any particular technology there would be a much greater risk that the band would be chronically underused in both rural and urban areas. The Commission has wisely chosen to balance these countervailing risks instead of letting its fear of one evil make the opposite evil a certainty.

⁷ Intel/Redline/Alvarion Petition at 21-22 (noting that “the cost of ‘free’ bandwidth – complying with government power limits, putting up with competing users – [can become] too high”). This is not, of course, an overnight phenomenon.

Any band, whether licensed or unlicensed, can eventually become so full that additional entry is unattractive, but the Commission would be borrowing troubles from the future if it were to forego the benefits of nationwide non-exclusive licensing today based on the uncertain prospect of congestion in some future decade.

II. The Contention-Based Protocol Rule Is a Modest Technical Requirement that Should Only Exclude Spectrum Bullies.

A number of petitioners attack the Commission's requirement for a contention-based protocol.⁸ Taken together, the petitioners charge variously that the contention-based protocol will be ineffective,⁹ or that it unfairly excludes IEEE 802.16™ technologies,¹⁰ or that it is unclear whether IEEE 802.16™ technologies can or do satisfy the contention-based protocol requirement.¹¹ Other petitioners have suggested that the Commission's enforcement of the contention-based protocol requirement through the equipment certification process will delay deployment in the band,¹² or even more imaginatively, that it will be tantamount to a *de facto* takeover of the standards process.¹³ These arguments against the contention-based protocol rule are entirely specious. Cisco believes the Commission's contention-based protocol rule is sufficiently clear, and that it imposes only a minimal regulatory burden that is more than justified by the resulting increase in spectrum efficiency.

The most important thing about the Commission's contention-based protocol rule is how minimal it is. It does not mandate a technology. It is quite evidently designed to *prohibit*

⁸ Intel/Redline/Alvarion Petition at 11-18; Petition for Reconsideration of WiMAX Forum (undated) at 10; Petition for Reconsideration of Motorola, Inc. (June 10, 2005), at 6; Petition for Reconsideration of the Wireless Communications Association International, Inc. (June 10, 2005), at 5-10.

⁹ Intel/Redline/Alvarion Petition at 11-18; Motorola Petition at 4-5; WCAI Petition at 7-10.

¹⁰ Intel/Redline/Alvarion Petition at 17-18.

¹¹ Redline Petition for Reconsideration (undated), at 2.

¹² WiMAX Forum Petition at 10; Motorola Petition at 5-6; WCAI Petition at 5.

¹³ Intel/Redline/Alvarion Petition at 10 n.20.

extremely undesirable spectrum behavior rather than to require any particular standard or technology to be used in the 3650 MHz band. In effect, the contention-based protocol requirement says only that users who make conflicting demands on the spectrum must find some way to share – without specifying any particular method – instead of either user trying to overpower the other. It certainly cannot be argued that the use of such a protocol is infeasible. As the Commission notes, Wi-Fi already uses such a protocol. Even if IEEE 802.16™ does not currently satisfy this requirement, it could easily be extended in order to comply, without any of the delay or gamesmanship about which the Commission’s critics speculate.

What must be conceded is that certain types of contention-based protocols may result in less-than-total protection under certain circumstances. Petitioners say, for example, that listen-before-talk protocols do not eliminate the possibility of interference in “long-range, higher-powered” applications. But it would be more accurate to say that listen-before-talk protocols have difficulty where the power at one end of a long link is much higher than the power at the other – a subscriber-to-hub link, for example. Thus, the question again boils down to the type of use that one expects to predominate in the band. Cisco, like the Commission, expects this band to be used predominantly for backhaul and predominantly in uncongested areas.

Furthermore, the petitioners’ only proposed solution for this rather narrow difficulty with one type of contention-based protocol is to radically revise the rules for the band, starting with the selection of exclusive geographic licensees. Most potential users – and surely most potential rural users – are likely to receive more service faster by taking their chances with listen-before-talk or some other contention-based protocol than by hoping that an exclusively licensed service provider will soon blanket their neighborhood with service. The Commission should not deny

the benefits of the very prudent contention-based protocol rule to all of the predominant users of the band based on concerns about how that rule will perform in a tiny minority of cases.

III. The Commission Should Not Raise the Applicable Power Limits

Given various petitioners' professions of concern about performance of contention-based protocols in longer-range, higher-powered situations, it is somewhat curious that several of these same commenters also ask the Commission to raise its power limits for the purpose of enabling longer ranges.¹⁴ The Commission should reject this aspect of the petitions as well.

The stated purpose of the requested power increase is, once again, to make the band more hospitable to subscriber-to-hub services. But that particular application is unlikely to flourish in the 3650 MHz band for reasons that have nothing to do with power levels. Furthermore, raising the power levels is also at odds with some petitioners' stated concern about a "tragedy of the commons." Cisco is not overly concerned about a "tragedy of the commons" in this band anytime in the foreseeable future, but of course all successfully managed bands can fill up eventually, including non-exclusively licensed bands. Thus, while congestion is not a major policy concern in this band at this time, it seems imprudent to alter the technical rules in such a way as to make nodes larger and increase the number of subscribers per node.¹⁵

More fundamentally, however, the requested power increase seems to be just one more indication that the overall goal of these petitions for reconsideration is to make the 3650 MHz band safe for WiMAX. As noted already, Cisco supports WiMAX and is a member of the WiMAX Forum, but the Commission should not write its rules in such a way as to make

¹⁴ WiMAX Forum Petition at 11; Intel/Redline/Alvarion Petition at 20; Redline Petition at 3-4.

¹⁵ Moreover, the Commission did not choose the current power and emission limits randomly. Besides choosing power limits sufficient for viable terrestrial operations, the Commission was also cognizant of the need to protect FSS operations within the 3650-3700 MHz band as well as adjacent C-band FSS operations. *See e.g. Report and Order at* ¶ 47 and ¶ 50.

WiMAX v1.0 the *de facto* technical standard for the band.¹⁶ The Commission's existing rules make many trade-offs, and for that reason they may seem vulnerable to a "Goldilocks" critique that there is not enough of this or too much of that. On balance, however, Cisco believes the Commission made eminently sensible decisions to promote the public interest, even if some or all private interests are to varying degrees dissatisfied.

CONCLUSION

For the foregoing reasons, Cisco urges the Commission to deny the petitions for reconsideration insofar as they request exclusive licensing, higher power, or the elimination of the contention-based protocol requirement.

Respectfully submitted,

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¹⁶ And Cisco joins the Commission in recognizing that other bands may host WiMAX technology. For example, as the Commission points out the 2500-2690 MHz band is available for the development of broadband services with exclusive license rights. *Report and Order* at ¶ 30 n.52. It is likely that future 802.16 standards will better address coexistence with other RLANs, and will take this Report and Order into account.

Certificate of Service

I hereby certify that, on this 11th day of August, 2005, a copy of the foregoing Cisco's Opposition to Petitions of Reconsideration, was sent by first class mail, postage paid, to the following recipients:

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