

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

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

COMMENTS OF SPRINT NEXTEL CORPORATION

Michele C. Farquhar
Mark W. Brennan
HOGAN & HARTSON LLP
555 Thirteenth Street, NW
Washington, D.C. 20004
(202) 637-5663

Counsel for Sprint Nextel Corporation

Lawrence R. Krevor
Vice President, Government Affairs – Spectrum
Trey Hanbury
Director, Government Affairs
Richard B. Engelman
Director, Government Affairs
SPRINT NEXTEL CORPORATION
2001 Edmund Halley Drive
Reston, VA 20191
(703) 433-4141

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SUMMARY

Although Sprint Nextel supports many aspects of the Commission's proposed service rules for Advanced Wireless Services ("AWS") licenses in the 1915-1920 MHz and 1995-2000 MHz ("H Block") bands, it recommends that the Commission revise certain proposals, as discussed below. First, and most importantly, Sprint Nextel urges the Commission not to adopt its proposed 23 dBm/MHz EIRP power spectral density limit for mobile operations in the 1915-1920 MHz band. Instead, the Commission should adopt a bifurcated handset power limit (6 dBm EIRP for handsets operating in the 1917-1920 MHz band and 30 dBm EIRP for handsets operating in the 1915-1917 MHz band) to avoid harmful interference to PCS B Block operations and permit more flexibility where interference is not likely. Furthermore, Sprint Nextel encourages the Commission to adopt an out-of-band emissions ("OOBE") limit for H Block mobile emissions falling into the PCS 1930-1990 MHz band that reflects industry standards (*i.e.*, -76 dBm/MHz, derived as an average RMS measurement). Sprint Nextel also urges the Commission to modify its proposed construction requirements to allow H Block licensees to satisfy substantial service rather than specific, population-based construction requirements.

Sprint Nextel supports many of the Commission's other H Block proposals, including the proposed rules prohibiting base station and fixed transmissions in the 1915-1920 MHz band and mobile transmissions in the 1995-2000 MHz band; the proposal for reimbursing UTAM for expenses incurred relocating previous 1915-1920 MHz operations; the proposal to codify the relocation and cost-sharing requirements that apply to relocating Broadcast Auxiliary Service ("BAS") licensees from the 1995-2000 MHz band; and other licensing proposals.

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Sprint Nextel commends the Commission for continuing its efforts to develop service rules for the 1915-1920 MHz and 1995-2000 MHz bands (“H Block”).¹ With adequate technical safeguards that minimize the likelihood that mobile operations in the 1915-1920 MHz band will cause harmful interference to existing operations, the Commission can use competitive bidding to assign the H Block to licensees who can use the spectrum to offer more reliable, more innovative, and more robust mobile wireless services to American consumers.

I. OPERATING AND TECHNICAL RULES FOR THE 1915-1920 MHz AND 1995-2000 MHz BANDS

Sprint Nextel favors rules that allow licensees maximum flexibility in delivering their services. At the same time, the Commission must ensure that the new operations it authorizes do not cause unwarranted harmful interference to existing services. With respect to the H Block in particular, the Commission should ensure that the service rules ultimately adopted for the H Block promote the efficient and beneficial use of the band without causing harmful interference to scores of millions of consumers’ Personal Communications Services (“PCS”) handsets.

¹ *Service Rules for Advanced Wireless Services in the 1915-1920 MHz, 1995-2000 MHz, 2020-2025 MHz and 2175-2180 MHz Bands*, Further Notice of Proposed Rulemaking, FCC 08-158 (Jun. 20, 2008) (“FNPRM”).

A. Intermodulation and Receiver Overload Interference Pose a Significant Threat to Ongoing PCS B Block Operations.

Without adequate protections, the use of the 1915-1920 MHz band could result in significant harmful interference to existing PCS operations. If unchecked, intermodulation (“IM”) from the H Block mobile transmit band will cause highly damaging interference to code division multiple access (“CDMA”)-based operations in the PCS B Block. Only CDMA customers would suffer call degradation, dropped calls and/or an inability to receive calls as a result of IM caused by excessive mobile transmitter power in the 1917-1920 MHz band.² As detailed in these comments as well as previous filings, the Commission’s proposed power limits for the 1917-1920 MHz band will not adequately protect PCS consumers using CDMA handsets from IM interference.

Sprint Nextel holds nearly half of all PCS B Block licenses,³ and 42% of Sprint Nextel’s services are delivered over PCS B Block licenses. Because these services are concentrated in some of the nation’s most densely populated areas, where interference from the H Block is most likely to occur, the Commission should adopt more stringent mobile transmit power limits for the 1917-1920 MHz band than the limits proposed in the *FNPRM*.⁴ Conversely, in the 1915-1917 MHz band, where higher power mobile transmissions will not produce interference to incumbent PCS operations, the Commission should allow licensees to maximize efficient use of the H Block spectrum and permit higher power mobile transmissions than proposed in the *FNPRM*.

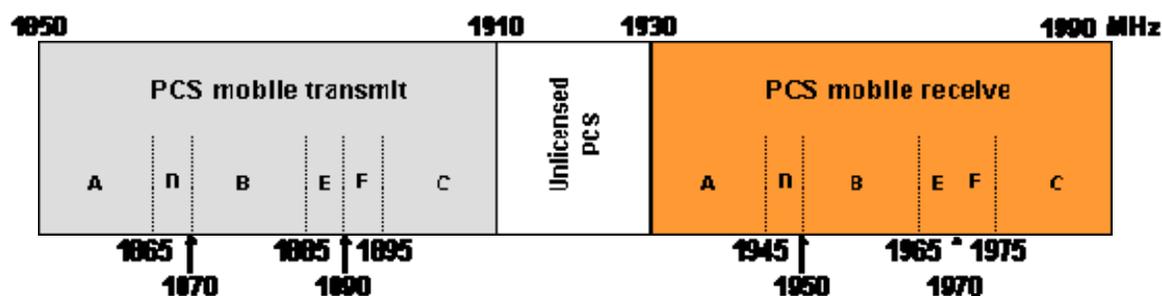
² Though substantially less of a risk than IM interference, receiver overload interference from the H Block could also hinder operations in the PCS band. Because measures designed to mitigate IM interference are more than sufficient to resolve the receiver overload problem, receiver overload interference is not addressed extensively in these Comments.

³ See Sprint Nextel Corporation, *Ex Parte Presentation*, WT Docket 04-356, at 5 (filed Sept. 14, 2005) (“*Sprint Ex Parte*”).

⁴ *Id.*

1. Unique to the Signal Configuration Present in the H Block, Intermodulation Interference Caused by High-Power Operations in the 1917-1920 MHz Band Produces Unavoidable Harmful Interference in the PCS B Block.

IM interference is possible because the H Block mobile transmit band (1915-1920 MHz) is spectrally close to the PCS mobile receive band (1930-1990 MHz). As shown in the PCS band plan below, the PCS mobile transmissions in the C block were originally located twenty megahertz from the lower edge of the PCS A Block mobile receive band. As a result, PCS handset manufacturers have incorporated filters and duplexers that were designed to use this frequency separation to significantly suppress the impact of A-to-F Block mobile transmissions on PCS mobile receivers.⁵

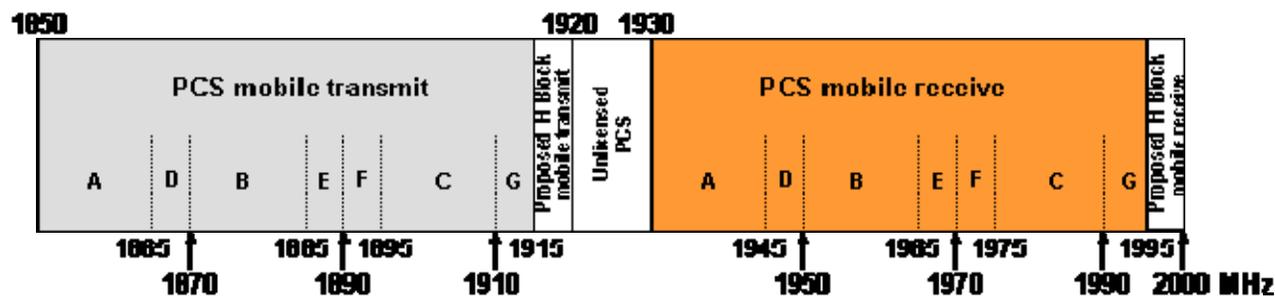


In 2004, the Commission established a new G Block under its AWS rules, with mobile transmissions from 1910-1915 MHz and mobile receive from 1990-1995 MHz.⁶ In that rulemaking proceeding, the Commission determined that the risk of receiver overload and out-of-band emissions (“OOBE”) interference from G Block mobile transmissions to existing PCS mobile receivers was low, even though the separation between the PCS mobile transmit band

⁵ Duplexers are circuits that permit the simultaneous transmission and reception of PCS signals in the same handset. Duplexers are designed to suppress the leakage of the transmitted signal into the handset’s receiver. A September 15, 2005 *ex parte* filed by Agilent Technologies, a major manufacturer of duplexers, provides a significant amount of useful information about duplexers. Ideally, filters and duplexers would only permit signals that are transmitted by PCS base stations to be received by PCS mobile receivers. However, filters and duplexers need some spectrum to transition from a blocking (or filtering) mode to a pass-through mode.

⁶ *Improving Public Safety Communications in the 800 MHz Band*, Report and Order, Fifth Report and Order, Fourth Memorandum Opinion and Order, and Order, 19 FCC Rcd 14969, at ¶¶ 236-38 (2004).

from the PCS mobile receive bands was reduced from twenty to fifteen megahertz.⁷ The PCS mobile transmit band separation would be reduced even further with the addition of the H Block, where the PCS mobile transmit band would be located ten megahertz from the PCS mobile receive band.



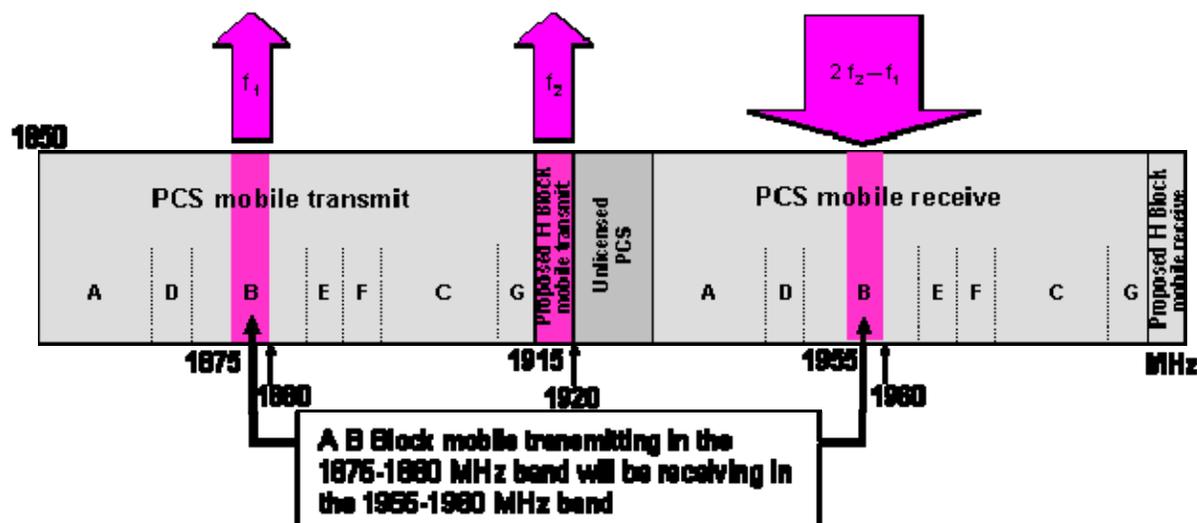
Reducing the frequency separation between the PCS mobile transmit band and the PCS mobile receive band is extraordinarily beneficial for expanding access to wireless services for consumers; however, the installed base of tens of millions of existing PCS mobile receivers was not designed with this narrower frequency separation in mind and will be vulnerable to IM interference.⁸

IM interference can occur in a receiver when two or more strong signals are present and the signals mix to create an IM product on a frequency that the receiver is trying to receive. Typically, IM interference requires the presence of at least two other transmitting devices operating at the same time and located near the receiver; however, that is not the case for the H

⁷ *Id.* at ¶ 230 (“Commenting parties generally concur that Broadband PCS mobile and base transmit bands will be able to continue to operate with a duplexer gap of fifteen megahertz without causing interference to each other. Because we are not modifying the existing designation for the 1915-1920 MHz band, we need not consider at this time those comments that discuss whether or how we could preserve an adequate separation gap between the Broadband PCS bands if we were to redesignate spectrum above 1915 MHz for high-power licensed services.”).

⁸ See Joint Comments of Sprint Corporation and Verizon Wireless, WT Docket No. 04-356, at 4 (filed Dec. 8, 2004) (“*Joint Comments*”) (“ . . . PCS mobiles are designed and manufactured to operate with 20 MHz of frequency separation between the mobile receive band (1930-1990 MHz) and the mobile transmit band (1850-1910 MHz). As a result, the filtering technology incorporated into many millions of new and legacy handsets is incapable of filtering out the fundamental signals from a mobile AWS device operating in the 1915-1920 MHz band.”).

Block. For many PCS handsets operating in the PCS B Block, an IM product can occur in a handset receiver due to the presence of the handset's transmitted signal and a nearby H Block mobile transmission.⁹ In particular, when handsets operate in the center five megahertz portion of the PCS B Block, the PCS B Block signal transmitted by the handset on 1875-1880 MHz can combine with a nearby H Block mobile transmission on 1915-1920 MHz *in that same handset's receiver*. This internal mixing would result in a signal appearing in the exact channel that the PCS handset is trying to receive on, as shown in the following diagram.



The IM product, f_{IM} , would be created based on the formula $f_{IM} = 2f_2 - f_1$, where f_2 is the H Block mobile transmission in the 1915-1920 MHz band and f_1 is the B Block mobile transmission in the 1875-1880 MHz portion of the B Block. The IM product would occur on frequencies that include the portion of the B Block that the mobile is attempting to receive (*i.e.*,

⁹ CDMA transmissions, such as those used by Sprint Nextel and Verizon Wireless in the PCS band, as well as WCDMA or UMTS transmissions, which AT&T and T-Mobile use in certain frequency bands, occur from a mobile device at the same time that the mobile device is trying to receive. Although much of the mobile transmitted signal is filtered out of the mobile receiver, there is still some leakage of the mobile transmitted signal into the mobile receiver. This means that a single strong external signal, such as an H Block mobile transmission, could cause an IM product to be created and IM interference to occur. GSM technology divides mobile transmissions and mobile reception into different time slots, so GSM devices would not experience IM interference unless both an H Block transmitter and another B Block PCS transmitter were operating nearby at the same time.

in the 1955-1960 MHz portion of the B Block). Though of lesser magnitude, IM interference could also occur when handsets are operating in the F Block.¹⁰

2. During the Course of the H Block Allocation Proceeding, Commenters Achieved Near Unanimity that Permitting Mobile Transmit Operations of 23 dBm EIRP in the 1917-1920 MHz Band Would Produce Unavoidable Interference to B Block Mobile Operations.

In the 2004 *Notice* in this proceeding,¹¹ the Commission invited comment on the appropriate power limit that should be applied to portable and mobile transmitters in the 1915-1920 MHz band. The 2004 *Notice* asked whether the mobile power for handsets transmitting in the 1915-1920 MHz band should be limited to 200 mW peak EIRP (the equivalent of 23 dBm EIRP) or whether more stringent power limitations were needed.¹² In response, numerous parties filed comments indicating that the mobile power limit should be significantly *lower* than 23 dBm EIRP at least for portions of the 1915-1920 MHz band.¹³ For example, Sprint Corporation and Verizon Wireless filed a report prepared by V-COMM indicating that a limit of 5 dBm EIRP for the 1918.125-1920 MHz band and 8 dBm EIRP for the 1916.875-1918.125 MHz band was needed to protect existing PCS handsets from experiencing interference.¹⁴ CTIA – The Wireless Association® (“CTIA”) filed comments indicating that the power limit should be 5 dBm EIRP in the upper third of the 1915-1920 MHz band and 8 dBm EIRP for the middle

¹⁰ See *Joint Comments*, Attachment A at 15-18.

¹¹ See *Service Rules for Advanced Wireless Services in the 1915-1920 MHz, 1995-2000 MHz, 2020-2025 MHz and 2175-2180 MHz Bands*, Notice of Proposed Rulemaking, 19 FCC Rcd 19263 (2004) (“*NPRM*”).

¹² *Id.* at ¶¶ 107-08.

¹³ The current *FNPRM* proposes a power spectral density (“PSD”) limit of 200 mW/MHz (or 23 dBm/MHz). For a handset using the typical CDMA bandwidth of 1.25 MHz, the proposed PSD limit equates to a transmitter power limit of 24 dBm, or 1 dB more than the FCC originally proposed and to which commenters objected. For a handset using the typical UMTS bandwidth of 5 MHz, the proposed PSD limit equates to an even greater transmitter power limit of 30 dBm.

¹⁴ See *Joint Comments*, Attachment A at 24.

third of the band.¹⁵ Both of these proposals were based on measurements that had been made on several PCS handsets by Rutgers University's Wireless Information Network Laboratory (WINLAB) and by PCTEST Engineering Laboratory.¹⁶ Those test measurements remain as valid today as when they were first submitted in the record of this proceeding.

Other parties agreed with the analysis. For instance, AT&T's predecessor-in-interest, Cingular Wireless ("Cingular/AT&T"), agreed. In its Reply Comments, Cingular/AT&T indicated that the 23 dBm EIRP mobile power limit discussed in the *Notice* is "at least an order of magnitude [at least 10 dBm] too high."¹⁷ In addition, Nextel Communications ("Nextel"), which had originally indicated support for a 23 dBm EIRP limit, conducted additional engineering review and analysis concerning IM interference.¹⁸ After its additional analysis, Nextel joined with Sprint Corporation and Verizon Wireless to submit a "Joint H Block Proposal" that proposed to limit transmissions in the 1917-1920 MHz band to 6 dBm EIRP and to permit 30 dBm EIRP in the 1915-1917 MHz band.¹⁹

¹⁵ See Comments of CTIA – The Wireless Association,® WT Docket No. 04-356, at 23 (filed Dec. 8, 2004) ("*CTIA Comments*").

¹⁶ These measurements were submitted as an attachment to CTIA's Comments.

¹⁷ See Reply Comments of Cingular Wireless LLC, WT Docket No. 04-356, at 15 (filed Feb. 8, 2005). An order of magnitude reduction in power can be expressed as a 10 dB reduction in power. Rather than adopt power limits that vary based on the portion of the H Block that is being used, Cingular/AT&T suggested that a single power limit of 13 dBm be adopted throughout the 1915-1920 MHz band. *Id.* at 16-19. AT&T, the successor to Cingular Wireless, affirmed this position in its *ex parte* of June 5, 2008 in this proceeding.

¹⁸ See Comments of Nextel Communications, WT Docket No. 04-356, at 22 (filed Dec. 8, 2004).

¹⁹ See Joint Reply Comments of Sprint Corporation, Verizon Wireless and Nextel Communications, WT Docket No. 04-356 (filed Feb. 8, 2005) ("*Joint Reply Comments*"). The only party to disagree was T-Mobile. T-Mobile, which uses GSM technology that *is not vulnerable* to the IM interference that high-power H Block mobile transmitters in the 1917-1920 MHz band would produce, supported a 23 dBm EIRP limit as sufficient to protect GSM users but provided no evidentiary basis whatsoever to show that this limit would prevent harmful interference to CDMA or UMTS users. See Comments of T-Mobile USA, Inc., WT Docket No. 04-356 (filed Dec. 8, 2004) ("*T-Mobile Comments*") at 3 ("T-Mobile believes a power limit of 200 mW EIRP for H block handsets, as measured on an average basis, should protect its incumbent *GSM* PCS operations."); at 4 ("T-Mobile does not opine on the technical limitations and requirements necessary to protect CDMA networks; rather, its comments are limited to the effects that use of the H block spectrum for PCS-like services will have on its existing *GSM* network."); and at 6 ("After its initial review, T-Mobile believes that a handset transmit power limitation of 200 mW average EIRP for operations in

The overwhelming evidentiary record in this proceeding favors reducing power limits in a manner that tracks the performance characteristics of state-of-the art duplexer technology actually deployed in consumer handsets. Since 2004, moreover, the interference environment has grown worse – not better – as millions more consumers have acquired handsets capable of operating on the PCS B Block that are vulnerable to, and will experience harmful IM interference from, H Block mobile transmitters. As a result, the Commission’s power limits should – at least for a period long enough to allow for the development and deployment of more efficient duplexer technology – correspond to actual PCS system performance characteristics and permit high power (30 dBm EIRP) in the 1915-1917 MHz band where IM is unlikely to occur and lower power (6 dBm EIRP) in the 1917-1920 MHz band where IM would otherwise occur.

3. Consistent Test Data From Multiple Different Sources Indicate That H Block Licensees Must Reduce Mobile Transmitter Power in the 1917-1920 MHz Band to Avoid Widespread Intermodulation Interference to Scores of Millions of PCS Users.

IM interference poses a significant threat to PCS B Block operations. As detailed in the V-COMM Report filed previously in this docket,²⁰ if H Block mobiles are allowed to operate at a power level of 23 dBm EIRP, then 56 dB of free space loss would be needed to ensure that the power of H Block mobiles received by PCS B Block handsets does not exceed a signal strength

the 1915-1920 MHz band should adequately protect its existing *GSM* PCS handsets.”) (emphasis added). In fact, T-Mobile’s comments indicate that CDMA equipment would need to be overhauled to protect against interference under a 23 dBm EIRP limit. *T-Mobile Comments* at 8-9 (“T-Mobile is cognizant of the effects that H block operations, regardless of technology utilized, may potentially have for CDMA and UMTS PCS handsets under worst-case scenarios. T-Mobile is not a designer or manufacturer of handset or filtering technology and cannot accurately predict the cost, time to market, or availability of more robust handsets and filtering technology . . . T-Mobile urges the Commission to [seek comment on] the availability and feasibility of developing more robust, market competitive handsets for CDMA and UMTS technology that are more resistant to potential H block interference.”).

²⁰ Verizon Wireless commissioned V-COMM, an engineering consulting firm with decades of experience analyzing, developing and implementing RF-based networks, to provide expert interpretation and analysis of the test data compiled by PCTest and WINLAB. The V-COMM Report was attached to joint comments submitted by Sprint earlier in the proceeding. See *Joint Comments of Sprint Corporation and Verizon Wireless*, WT Docket No. 04-356, at 8 (filed on Dec. 8, 2004) (“*Joint Comments*”).

of -36 dBm.²¹ Under a 23 dBm EIRP mobile output power limit for the H Block, the worst-case handset tested would experience severe interference at a distance from the H Block mobile device of 41 feet and the majority of handsets tested would experience severe interference at a distance of 26 feet.²² In practical terms, this means that the Commission's proposed mobile power spectral density limit of 23 dBm/MHz EIRP, which would permit even higher power levels for mobiles operating with greater than 1 megahertz bandwidth, would severely restrict the distance from which H Block mobile terminals could operate in relation to PCS B Block handsets.²³ Indeed, H Block handsets would always have to operate more than 26 feet (or 8 meters) away from PCS B Block handsets (operating at a receive level of -105 dBm) to avoid harmful interference.²⁴ PCS subscribers often operate their handsets well within 26 feet of

²¹ See V-COMM Report at 16.

²² *Id.* at 16-17 (“In the worst case with an upper H Block interferer, the IM causes interference to the PCS handset within 12.5 meters (41 feet) of an H Block device transmitting at the FCC limit of +23 dBm. This result occurred for the PCTEST DUT B at the call level of -105 dBm at ambient room temperature, showing IM interference occurring at the -40 dBm level. In WINLAB’s tests, two CDMA phones (DUT 2 & 4) showed IM interference occurring at -36 dBm in the same test. The -36 dBm level is equivalent to separation distance of 8 meters (26 feet). At these very large separation distances, the H-Block devices have the potential to cause IM interference to multiple PCS handsets operating, even to handsets having obstructed views (i.e., handsets operating in adjacent rooms.)”) (internal citations omitted). IM interference is even more prevalent at higher temperatures. *Id.* at 17 (“The IM test results at the elevated temperature showed worse even impacts than the ambient test results by 1 to 8 dB, and the results of the static receive level of -100 dBm were better by 1 to 9 dB. The -105 dBm call level represents the faded condition of a call that is operating at an average signal level of -100 dBm. This faded condition can be expected to occur 34% of the time (or 1 out of every 3 seconds) during the call. Even in cases when the interference doesn’t drop the call, this amount of interference (34% of the time) will cause users to be annoyed and calls to be disrupted, to the point where users will certainly terminate the call.”).

²³ See, e.g., *id.* at 17 (“A middle H Block interferer also causes IM interference to incumbent PCS handsets, albeit to a lesser degree than an upper H Block interferer. Test results show that a middle H Block interferer at 1917.5 MHz causes about 3 dB less on average (or in the range of 1 to 7 dB less severe) IM interference than an upper H Block interferer. For example, the WINLAB CDMA DUT 1, 2, 3 & 4 showed the IM impact is 1 to 3 dB less severe for a middle H Block interferer at the call level of -100 dBm, and 1 to 6 dB less severe for a call at -105 dBm, at ambient room temperature. Also, PCTEST DUT A showed 7 dB less impact, and DUT B showed 1 dB less impact at the -100 dBm call level, for a middle H Block interferer. IM interference from a middle H Block signal showed interference occurs at the level of -32 dBm for WINLAB DUT 2 & 4, and at -38 dBm for PCTEST DUT B, for tests at ambient and call level of -105 dBm. These interference levels are equivalent to separation distances of 5 meters and 10 meters, respectively, away from a middle H-Block signal transmitting at the +23 dBm power limit. These separation distances are very large considering the proximity of people using PCS phones in crowded situations.”) (internal citations omitted).

²⁴ *Id.* at 16.

another handset and, thus, harmful interference would be commonplace if an H Block handset's power spectral density limit was set at 23 dBm/MHz EIRP.²⁵ Because the IM and receiver overload interference problems are rooted in the design and inherent limitations of the duplexer technology incorporated into the PCS handsets, there is no "fix" that can be implemented within H Block mobile devices, other than reducing the output power of H Block mobile device transmissions.²⁶

As further evidence of the interference problem, Sprint has submitted the results of H Block interference testing performed by Nokia Inc. ("Nokia"), a major manufacturer of PCS handsets with expertise in the area of handset design and performance. This testing demonstrated the susceptibility of existing and new PCS handset models to interference caused by operations in the H Block spectrum, at the power levels proposed by the Commission (the "Nokia Test Report").²⁷

The potential for IM interference is particularly threatening to CDMA carriers such as Sprint Nextel.²⁸ Depending upon how the H Block eventually is channelized, H Block mobiles

²⁵ Sprint Nextel prefers that the mobile power limit be specified based on the power generated by the handset for use in the full transmitted bandwidth. The Commission's RF safety rules and standards, as well as cellular industry standards, are based on overall mobile transmit power. Power spectral density limits have more typically been used only when the limits involve base stations or OOB, where the goal is to ensure that the power is not concentrated on certain out-of-band frequencies.

²⁶ As explained in prior comments in this proceeding, the receive filters of SAW duplexer filters (and FBAR filters) inside PCS handsets do not block out H Block transmissions because the slope of the receive filter's skirt overlaps the H Block. *See Joint Comments* at 10 n.19. As a result, "The duplexers in millions of PCS handsets deployed today [are] 'listening' to the H Block transmissions." *Id.*, quoting "H Block Overload Test Results, Single Tone Desensitization (Overload) and Duplexer Testing Over Temperature," attached to *ex parte* Comments of Sprint, ET Docket No. 00-258, at 4 (filed Sept. 1, 2004) ("*Sprint September 2004 Ex Parte*").

²⁷ *See Sprint September 2004 Ex Parte*.

²⁸ *See, e.g., V-COMM Report* at 17 ("Hence, the H-Block transmit power limit of +23 dBm will not protect victim PCS phones. At this transmit level, H-Block [signals will be received by] victim PCS handsets 1 meter away, assuming 3 dB for head, body and miscellaneous losses. At this level, all CDMA handsets dropped their calls in the IM tests with an upper H Block signal. For the middle H Block IM tests, 4 out of 6 CDMA handsets dropped their calls at this level, with the other 2 handsets showing severe interference at this level of H-Block interference.") (emphasis in original).

could cause IM interference to as many as five PCS B Block CDMA channels.²⁹ In addition, IM interference from H Block handsets can degrade PCS B Block calls from even longer distances than receiver overload interference, creating the worst case interference threat to CDMA operations in the PCS B Block.³⁰ Moreover, even if a given PCS B Block licensee is not utilizing a CDMA channel otherwise subject to IM interference, ignoring the IM interference danger would place future users at risk as these channels are deployed. The IM interference risk could also thwart planned EVDO wireless broadband deployments throughout the country.

As discussed previously in footnote 9, the IM interference problem only arises with respect to technologies based on CDMA and does not affect GSM carriers. Thus, if the Commission adopted an H Block mobile power limit sufficient to protect legacy and new PCS handsets from receiver overload interference, GSM handsets would be protected from H Block interference while CDMA handsets still would have to be reconfigured with new filtering technology to cope with the remaining IM interference threat. By ignoring the IM interference problem, therefore, the Commission would effectively be favoring one technology over another and holding similarly situated licensees to different interference standards. The Commission should focus on interference measures that enhance, rather than stifle, CDMA operations.

²⁹ CDMA carriers serve millions of subscribers within the Metropolitan Trading Areas of their PCS B Block licenses, but channelization schemes deployed within these areas vary depending upon cell capacity, usage and other factors. Because IM interference impacts PCS B Block operations at much greater distances than overload interference, whatever percentage of subscribers would be on one of these affected PCS B Block channels at any given time would also be at much greater risk of encountering IM interference than overload interference.

³⁰ See V-COMM Report at 16 (“IM interference from H Block signals will cause the worst interference to victim PCS handsets of the three types of interference that can occur (e.g. receiver overload, IM and OOBE). The IM interference occurs at lower receive levels, or about 6 to 10 dB lower, as compared to the receiver overload test results for the CDMA handsets. Consequently, this represents the most difficult compatibility issue for H Block devices to co-exist with existing PCS handsets. Therefore, these IM test results should be used to determine the appropriate H Block transmit power limits to protect existing PCS handsets.”).

4. Bifurcated Power Limits for the 1915-1920 MHz Band Will Maximize Efficient and Flexible Use of the H Block While Protecting Incumbent PCS Operations From Harmful Interference.

As already demonstrated, the potential for harmful interference is greater for the 1917-1920 MHz portion of the H Block, as compared to the 1915-1917 MHz portion. Extensive industry and independent testing demonstrates that the level of tolerable H Block mobile transmit power for various handsets slopes down from 1915 MHz to 1920 MHz.³¹ Because manufacturers and carriers cannot program handsets to respond perfectly to the precise contours of this sloped curve,³² Sprint Nextel encourages the Commission to establish mobile device power limits that are more stringent for 1917-1920 MHz band than for the 1915-1917 MHz band. Specifically, based on test data submitted by CTIA,³³ Sprint Nextel continues to recommend an initial 6 dBm EIRP limit for mobile or portable device operations at 1917-1920 MHz and a 30 dBm EIRP limit for mobile or portable device operations at 1915-1917 MHz.

As discussed in Joint Reply Comments filed previously in this proceeding, these initial limits could be eased over time as more efficient filtering technology – *i.e.*, filters that are better at rejecting signals in the H Block – emerges within the base of PCS handsets in operation.³⁴ In the meantime, creating a bifurcated mobile and portable transmit power limit, with higher power allowed at 1915-1917 MHz and lower power allowed at 1917-1920 MHz, would be consistent with the downward sloping curve of tolerable operating power in the 1915-1920 MHz band and

³¹ See *Sprint Ex Parte* at 9. Different types of handsets have different downward sloping curves that can vary depending on handset temperature and operating conditions, but all handsets can operate at greater power closer to 1915 MHz than they can at 1920 MHz.

³² *Id.*

³³ See *CTIA Comments* at 18-23.

³⁴ See *Joint Reply Comments* at Attachment – Joint H Block Proposal.

would be workable for manufacturers and carriers alike.³⁵ Notified of the possibility that these initial power limits could be eased over time, carriers operating in the PCS B Block, including Sprint Nextel, would be likely to encourage manufacturers to strengthen their mobile receiver performance, which would allow even more intensive and efficient use of the H Block spectrum in the future.³⁶

The interference studies submitted in the record show that higher mobile transmit power, up to 30 dBm EIRP, can be permitted in the 1915-1917 MHz portion of the H Block band without risk of IM or receiver overload interference. Adoption of a 30 dBm EIRP limit for this portion of the band would provide a higher level of consistency with the PCS rules that apply to the adjacent G Block and would facilitate economies in the design of H Block equipment.³⁷ In addition, a 30 dBm EIRP limit would provide for more efficient and flexible use of this portion of the band, without sacrificing any usable spectrum.³⁸

³⁵ See *Sprint Ex Parte* at 9. A bifurcated power limit also would be more spectrum-efficient; a fixed power limit of 13 dBm across the entire band would sacrifice useful spectrum at 1915-1917 MHz while emissions from the 1917-1920 MHz band would cause service-disrupting interference to millions of B Block mobile receive handsets. *Id.*

³⁶ See *Sprint Ex Parte* at 11.

³⁷ Mobile broadband PCS devices are permitted to transmit with up to 2 watts EIRP (33 dBm). See 47 C.F.R. § 24.232(c). The range of maximum power limits for Class II mobiles set forth in the PCS industry standard, TIA-98 – to which CDMA handsets are certified – is +23 to +30 dBm.

³⁸ Although PCS handsets typically operate at or below the +23 dBm power level, which permits them to meet the RF radiation exposure requirements contained in 47 C.F.R. § 2.1093, data cards and other non-handset PCS devices are able to operate at up to +30 dBm and still meet the RF radiation exposure requirements applicable to those devices (*e.g.*, 47 C.F.R. § 2.1091). In addition, the maximum transmit power for PCS handsets towards the peak antenna gain direction measures +26 to +28 dBm, including the peak antenna gain of +3 dBi or more. Accordingly, while Sprint Nextel does not anticipate that mobile operations in the 1915-1917 MHz band will exceed the +23 dBm level on average for handsets (and generally will operate below that level), the +30 dBm limit is proposed to accommodate and account for the variance in handset antenna gains and permit full utilization of the band by other devices.

One of the most important responsibilities imposed on the Commission by the Communications Act is the responsibility to prevent harmful interference.³⁹ The Commission could best satisfy this obligation for the H Block by adopting the bifurcated power limits suggested above. If the Commission instead decides to set the power limit for 1915-1920 MHz operations at the 23 dBm/MHz EIRP level, it will substantially increase the chances of harmful interference, in contravention of its statutory obligations.

B. The Commission's Out-of-Band Emissions Limit Proposal Should Be Revised to Reflect Industry Standards.

The Commission seeks comment on its proposal to “require mobiles at 1915-1920 MHz to attenuate OOB by $90 + 10 \log P$ dB within the PCS band (1930-1990 MHz band).”⁴⁰ As noted in its previous comments in this proceeding, Sprint Nextel encourages the Commission to establish an OOB limit of -76 dBm/MHz (derived as an average RMS measurement) for all H Block emissions that fall into the 1930-1990 MHz band.⁴¹ This is equivalent to an OOB attenuation of $106 + 10 \log P$. The Telecommunications Industry Association (“TIA”) has already established this limit as an industry standard for CDMA, and this standard can be met by other technologies on a technology-neutral basis.⁴² Specifically, test data in the record demonstrates that GSM handsets can meet a -76 dBm/MHz OOB limit, provided that compliance with the limits is measured on an RMS average basis. Under Sprint Nextel’s

³⁹ See 47 U.S.C. § 303(f) (“[t]he Commission from time to time, as public convenience, interest, or necessity requires, shall . . . [m]ake such regulations not inconsistent with law as it may deem necessary to prevent interference between stations and to carry out the provisions of this chapter . . .”).

⁴⁰ FNPRM, Appendix B at ¶ 25.

⁴¹ See *Joint Reply Comments* at 3; *Sprint Ex Parte* at 7.

⁴² T-Mobile stated that it believes “all existing CDMA and GSM PCS hand-sets fully comply with OOB limits of -76 dBm/MHz, confirming that such OOB restrictions are eminently achievable and commercially viable.” See *T-Mobile Comments* at 10.

proposal, this limit would be applied prospectively to handsets twelve months from the adoption of the rules in this proceeding.

At the same time, Sprint Nextel supports the Commission's proposal to adopt an OOB limit of $43 + 10 \log (P)$ dB for base and fixed stations at 1995-2000 MHz.⁴³ This proposed limit represents the standard limit adopted by the Commission for new wireless services. There is nothing particularly unique about base and fixed stations operating in the 1995-2000 MHz that would require different treatment by the Commission.

C. The Commission Should Establish a Power Spectral Density Limit for H Block Base Station Operations.

Sprint Nextel urges the Commission to adopt an H Block base station power limit consistent with the detailed rules contained in sections 27.50(d)(1) and 27.50(d)(2), which establish power spectral density ("PSD")-based limits of 1640 watts/MHz in non-rural areas and 3280 watts/MHz in rural areas if the emission bandwidth is greater than 1 MHz.⁴⁴ Such limits are consistent with the relief afforded AWS and PCS providers in other bands used for services similar to those likely to be deployed in the H Block, and there is no reason why a PSD-based limit should not be established for the H Block as well.

D. The Commission Should Prohibit Base Station and Fixed Transmissions in the 1915-1920 MHz Band and Mobile Transmissions in the 1995-2000 MHz Band.

In its *Further Notice*, the Commission seeks comment on its proposed rules to "prohibit base and fixed transmission in the 1915-1920 MHz band" and "prohibit mobile transmission in the 1995-2000 MHz band."⁴⁵ Sprint Nextel agrees that these prohibitions are needed to protect existing services from harmful interference. Furthermore, adopting such restrictions would be

⁴³ FNPRM at ¶ 4.

⁴⁴ 47 C.F.R. §§ 27.50(d)(1), (2).

⁴⁵ FNPRM at ¶ 4.

consistent with the restrictions the Commission has placed on nearby PCS bands, specifically the G Block.⁴⁶

The H Block is immediately adjacent to the G Block, and there is no guard band between the two. To maximize efficiency and avoid harmful interference to incumbent operators, the Commission should specify uplink and downlink operations in the 1915-1920 MHz and 1995-2000 MHz bands similar to those adopted for every other PCS band.

II. THE COMMISSION SHOULD MODIFY ITS H BLOCK CONSTRUCTION PROPOSAL

The Commission's H Block license construction proposal would require H Block licensees to construct facilities sufficient to cover "1) at least 35 percent of the population in each licensed area within four years and 2) at least 70 percent of the population in each licensed area [by] the end of the license term."⁴⁷ Rather than imposing its proposed construction requirements, the Commission should adopt the same "substantial service" requirements that it has imposed on the G Block.⁴⁸

The Commission has correctly observed that the imposition of a flexible substantial service requirement would best promote its policy goals by "provid[ing] licensees with the flexibility to offer the full range of services under the allocations table and accommodate new and innovative services."⁴⁹ The Commission has also found that the imposition of substantial service "fulfills [its] obligations under Section 309(j)(4)(B) of the Act, and that ... auction rules ... together with ... service rules ... and [its] overall competition and universal service policies,

⁴⁶ See 47 C.F.R. § 24.229(c).

⁴⁷ See *FNPRM* at ¶ 19.

⁴⁸ See 47 C.F.R. § 24.203(d).

⁴⁹ *Service Rules for the 746-764 and 776-794 MHz Bands, and Revisions to Part 27 of the Commission's Rules*, WT Docket No. 99-168, First Report and Order, 15 FCC Rcd 476, at ¶ 70 (2000) ("*Upper 700 MHz First Report and Order*").

constitute effective safeguards and performance requirements for licensing ... spectrum.”⁵⁰

These previous findings support the conclusion that substantial service is the appropriate license construction standard to impose on H Block licensees.

First, the wisdom of substantial service and a flexible and market-oriented approach to network build-out has been demonstrated in the marketplace. The advantages of substantial service were forcefully affirmed by the Commission when it last examined ways to expand the deployment of wireless services in rural areas. In that proceeding, the Commission compared the advantages and disadvantages of a more flexible substantial service approach to those of more prescriptive build-out regimes, and decided to afford licensees in the small number of auctionable wireless services that were not already subject to substantial service the ability to take advantage of that regime.⁵¹ In reaching its decision, the Commission stated its belief that “modifying [its] rules to permit these additional licensees to satisfy their construction requirements by providing substantial service will increase their flexibility to develop rural-focused business plans and deploy spectrum-based services in more sparsely populated areas without being bound to concrete population or geographic coverage requirements.”⁵² Notably, in this same decision the Commission rejected proposals to abandon substantial service in favor of

⁵⁰ *Id.* at ¶ 72.

⁵¹ See *Facilitating the Provision of Spectrum-Based Services to Rural Areas and Promoting Opportunities for Rural Telephone Companies to Provide Spectrum-Based Services*, Report and Order, 19 FCC Rcd 19078, at ¶ 75 (“*Rural Report and Order*”) (providing licensees in the 30 MHz broadband PCS, 800 MHz SMR, 220 MHz, and LMS services with “the option of satisfying their construction requirements by providing substantial service or by complying with other service-specific construction benchmarks already available to them under the Commission’s rules”).

⁵² *Id.* at ¶ 76. Quoting Reply Comments filed by Southern LINC in the proceeding, the Commission stated that “while a substantial service alternative, by itself, does not guarantee that all licensees will serve rural areas, the additional flexibility of this alternative undoubtedly improves the likelihood of rural deployment and provides licensees with the opportunity to target rural areas.” *Id.* at ¶ 76 (internal citations omitted).

less flexible build-out regimes.⁵³ The Commission also declined to adopt geographic area-based construction benchmarks, noting that its substantial service policies afford wireless providers interested in providing service to particular geographic regions within their license areas the flexibility to do so without risking the loss of their licenses.⁵⁴ Nothing has changed to justify a shift from this policy.

Second, adoption of the Commission's current policy would make it less viable financially to provide service using the H Block in rural markets, or markets in which rural areas exist, impeding deployment and eliminating the advantages of using the spectrum to deploy next-generation networks in those markets. The Commission's proposed construction requirements would also reduce the flexibility of wireless operators to design and deploy their networks in a manner that best promotes their business plans. Imposing overly stringent requirements could even cause certain potential bidders to avoid the auction altogether. If the Commission's H Block license construction proposal is adopted, H Block operators – all of whom would already be forced to construct more transmitter locations to cope with the lower power at which H Block mobiles should be transmitting to avoid harmful interference – may find it financially challenging to justify the level of network deployment necessary to satisfy the Commission's population-based benchmarks in less densely populated areas, making those areas much less attractive to acquire at auction. Consequently, the high cost of Commission-mandated network build-out – and the potential lack of interest in certain licenses that could result – could further exacerbate the disparity between network coverage in urban and rural areas. In light of these detrimental effects, the Commission should not impose its proposed H Block construction

⁵³ *Id.* at ¶ 78.

⁵⁴ *Id.* at ¶ 82.

requirements and, instead, adopt traditional substantial service requirements that apply to other bands (including the adjacent G Block).

III. SPRINT NEXTEL SUPPORTS THE COMMISSION'S H BLOCK REIMBURSEMENT AND LICENSING PROPOSALS

A. The Commission Should Require Successful H Block Licensees to Reimburse UTAM for its 1915-1920 MHz Relocation Expenses on a Pro Rata Basis.

Sprint Nextel supports the Commission's proposal that the holder of initial H Block licenses pay UTAM a *pro rata* share of the total expenses incurred by UTAM in relocating former 1915-1920 MHz incumbents.⁵⁵ According to the proposed rule, "AWS licensees in the 1915-1920 MHz band, which constitutes 25% of the 1910-1930 MHz band, shall, on a *pro rata* shared basis, reimburse 25% of the total relocation costs incurred by UTAM, Inc. in clearing the 1910-1930 MHz band of Part 101 Fixed Microwave Service (FS) links."⁵⁶ Furthermore, the Commission proposed that "[t]he amount owed will be determined by multiplying the net winning bid for an H Block license (i.e., an individual BTA) by \$12,629,857 and then dividing by the sum of the net winning bids for all H Block licenses won in the initial auction."⁵⁷ The Commission offers a fair and accurate formula for determining the appropriate amount that each H Block licensee should pay to reimburse UTAM.

The Commission also appropriately seeks to prevent new entrants from improperly paying the relocation expenses UTAM incurred and directs new entrants to reimburse UTAM within thirty days of licensing.⁵⁸ Timely payment of new entrants' relocation obligations to the party that has cleared the band is not only essential to managing spectrum resources for the

⁵⁵ FNPRM at Appendix A, § 27.5(k).

⁵⁶ *Id.*

⁵⁷ *Id.*

⁵⁸ See NPRM at ¶ 36.

benefit of consumers, but also is fair to the party that has incurred expenses in clearing incumbent operators from spectrum that other licensees will occupy. Consistent with longstanding Commission policy and in basic fairness to UTAM, licensees should pay their fair share of relocation expenses to UTAM within thirty days.

B. The Commission Should Adopt Relocation and Cost-Sharing Requirements for Relocating Broadcast Auxiliary Service Licensees in the 1995-2000 MHz Band.

Broadcast Auxiliary Service (“BAS”) licenses provide essential news, weather, emergency alerts, sports, and local programming that television broadcasters use to serve their communities. To avoid service disruptions that might leave local communities without a source of free, over-the-air news and information in an emergency, the Commission has required new entrants in the 1990-2025 MHz bands to fully fund the relocation of BAS licensees to new locations above 2025 MHz.

Since 2004, new 1990-2025 MHz band entrants have had the same obligation to clear the spectrum of BAS uses prior to operation or reimburse the first new entrant into the band for doing so.⁵⁹ In this proceeding, the Commission sought comment on a new subsection (f) to Section 74.690 of its rules that would codify the existing relocation and cost-reimbursement principles that already apply to new licensees in the 1995-2000 MHz band.⁶⁰

The proposed new subsection (f) would not alter any of the existing relocation obligations of the new entrants to the 1990-2025 MHz band, including Sprint Nextel and the MSS licensees; however, the new subsection would allow new H Block licensees to participate in the existing BAS relocation process with the consensus of other new entrants to the band.

⁵⁹ See *Amendment of Part 2 of the Commission’s Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services*, Sixth Report and Order, 19 FCC Rcd 20720, at ¶ 72 (2004) (requiring AWS new entrants that enter the band prior to the end of 800 MHz reconfiguration to reimburse Sprint Nextel for their *pro rata* share of BAS relocation costs).

⁶⁰ FNPRM at ¶ 4.

Sprint Nextel supports the adoption of this new subsection, which allows H Block licensees to participate in the relocation process without interfering with the existing BAS relocation process and rules.

The process of relocating BAS is extremely complex. Each BAS licensee generally operates a complex, integrated network of fixed and portable links scattered among a wide variety of facilities and locations that licensees have assembled, piece-by-piece, often over several decades. These facilities vary greatly in location, use, accessibility, and upkeep, with many facilities having scores of delicately integrated transmitters, receivers, antennas, controllers, and related equipment. Some of this equipment is in near-constant use and requires special considerations to ensure continued operational readiness. Other equipment is thirty years old or older and can prove difficult to locate because it is used only occasionally or kept as a backup in a remote location. Given the dynamic channel coordination among multiple BAS licensees in a market, moreover, careful frequency and operational coordination is essential to preventing BAS service disruptions which can compromise homeland security and national emergency preparedness.⁶¹

The proposed new subsection (f) would not disrupt the carefully orchestrated BAS transition plan that is already underway. Instead, the proposed subsection would codify the H Block licensees' existing cost-reimbursement obligations and allow them to participate fully in the relocation process if they choose to do so. Thus, Sprint Nextel supports the adoption of new subsection (f) to Section 74.690 for H Block licensees.

⁶¹ Under the existing relocation process, Sprint Nextel has spent hundreds of millions of dollars and tens of thousands of hours to anticipate, plan for, and resolve the legal, technical, and logistical challenges inherent in the national BAS transition.

C. Sprint Nextel Supports the Commission's H Block Licensing Proposals.

Although, as noted above, Sprint Nextel has significant concerns regarding the proposed power level of the H Block mobile transmit band, it broadly supports the Commission's proposed H Block licensing rules described below, with one exception.

- ***Geographic Service Areas.*** Licensing the H Block using exclusive geographic area licensing on a Basic Trading Area ("BTA") basis would be extremely beneficial. Several PCS Blocks are also licensed on a BTA basis, making it easier for existing operators to acquire H Block spectrum in areas where they are currently capacity constrained.

- ***Eligibility Restrictions.*** As the Commission has noted, "eligibility restrictions on licenses may be imposed only when open eligibility would pose a significant likelihood of substantial harm to competition in specific markets and when an eligibility restriction would be effective in eliminating that harm."⁶² Sprint Nextel agrees that eligibility restrictions should not be imposed on the H Block because there is no evidence that open eligibility will "pose a significant likelihood of substantial harm to competition in any specific markets."⁶³

- ***License Terms.*** The *FNPRM* proposes a 10-year initial license term.⁶⁴ This initial license term is consistent with initial license terms set by the Commission for similar services. Moreover, Sprint Nextel agrees with the Commission that "a 10-year license term, combined with a renewal expectancy, will help to provide a stable regulatory environment that will be attractive to investors, and thereby encourage development of these frequency bands."⁶⁵

⁶² *NPRM* at ¶ 69.

⁶³ *Id.*

⁶⁴ *FNPRM* at ¶ 4.

⁶⁵ *NPRM* at ¶ 70.

- ***Disaggregation, Partitioning, and Leasing.*** The Commission seeks comment on whether H Block licensees should be allowed to disaggregate, partition, and lease their licensed spectrum. Sprint Nextel supports such an approach and believes that such actions would “promote efficient spectrum use and economic opportunity for a wide variety of applicants, including small business, rural telephone, minority-owned, and women-owned applicants.”⁶⁶

- ***Competitive Bidding.*** The Commission seeks comment on “its proposal . . . that mutually exclusive applications . . . be resolved through competitive bidding.”⁶⁷ As the Commission has noted, under a geographic area licensing scheme that creates the possibility of mutually exclusive license applications, it is required by the Communications Act to assign initial licenses through the use of competitive bidding.⁶⁸ Such a rule would be consistent with the public interest and promote the goal of ensuring that initial H Block licenses are assigned to those entities that value them most highly.

The only exception to Sprint Nextel’s broad support for the Commission’s proposed licensing framework is to encourage the Commission to license the H Block under the rules that apply to the PCS, rather than AWS, bands. The H Block represents ideal expansion spectrum for PCS carriers, which operate under the PCS rules. While the AWS rules are somewhat more flexible and less proscriptive in certain respects than the PCS rules, the additional benefits of the AWS regime are minor. Moreover, operating an integrated communications system under two different rule parts will likely lead to regulatory compliance and operational challenges that would not be present if the Commission regulated the H Block in the same manner as it regulated every other block of PCS spectrum.

⁶⁶ *Id.* at ¶ 77.

⁶⁷ *FNPRM* at ¶ 4.

⁶⁸ *See* 47 U.S.C. § 309(j)(1), (2); *NPRM* at ¶ 7.

IV. CONCLUSION.

By providing adequate technical safeguards that minimize the likelihood that 1915-1920 MHz mobile operations will cause harmful interference to existing PCS operations, the Commission can implement workable service rules in the H Block spectrum. In order to accomplish this goal, Sprint Nextel urges the Commission to adopt the revisions to its H Block proposals offered above.

Respectfully submitted,

SPRINT NEXTEL CORPORATION

Michele C. Farquhar
Mark W. Brennan
HOGAN & HARTSON LLP
555 Thirteenth Street, NW
Washington, D.C. 20004
(202) 637-5663

Counsel for Sprint Nextel Corporation

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Lawrence R. Krevor
Vice President, Government Affairs – Spectrum
Trey Hanbury
Director, Government Affairs
Richard B. Engelman
Director, Government Affairs
SPRINT NEXTEL CORPORATION
2001 Edmund Halley Drive
Reston, VA 20191
(703) 433-4141