

# CRS Report for Congress

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## **Spectrum Policy: Public Safety and Wireless Communications Interference**

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# Spectrum Policy: Public Safety and Wireless Communications Interference

## Summary

In mid-2005, wireless communications managers commenced the process of moving selected public safety radio channels to new frequencies. This is the first step in a three-year plan to move public safety users to new channels in order to mitigate persistent problems with interference to their radio communications. The interference usually takes the form of dropped calls or dead spaces with radio transmissions — primarily to or from first responders — in certain frequencies. The majority of documented incidents of interference have been attributed to the network operated by Nextel Communications, Inc. Nextel in 2005 completed a merger with Sprint Corporation, creating the U.S.'s third-largest mobile company. Its new corporate name is Sprint Nextel. As part of an agreement originally made between Nextel and the Federal Communications Commission, some public safety wireless users will be moved to new frequencies, with the wireless company paying all or part of the cost. This agreement is not affected by the merger. In return for these expenditures, and reflecting the value of spectrum that Sprint Nextel will be relinquishing, the FCC will assign new spectrum to the wireless company.

The rebanding plan is being implemented by the 800 MHz Transition Administrator (TA), created by the FCC for this purpose. The TA is to set priorities, establish schedules, and oversee reimbursement to parties for eligible expenses associated with relocation. Disagreements about the implementation of the plan that the TA cannot resolve on its own or through mediation will in most cases be referred to the FCC. There are ongoing debates about the transition plan, such as maintaining interoperability, scheduling, and reimbursement for costs incurred. If resolution of problems created by the rebanding appears unacceptable, public safety and others that use the affected frequencies could seek assistance from Congress.

## Contents

|  |   |
|--|---|
| Introduction .....   | 1 |
| Highlights of the FCC Rebanding Plan .....                     | 2 |
| Interference at 800 MHz .....                                  | 4 |
| Benefits of Rebanding .....                                    | 4 |
| Costs of Rebanding .....                                       | 6 |
| Transition Administrator .....                                 | 6 |
| Recent Congressional Activity Regarding Relocation Costs ..... | 7 |

# Spectrum Policy: Public Safety and Wireless Communications Interference

## Introduction

Broadcasting — whether it be radio, television, wireless telecommunications or other transmission technology — is subject to various types of signal interference, even when operating within assigned frequencies. The Federal Communications Commission (FCC) regulates commercial radio, television, commercial wireless services, and state and local public safety and other non-federal users of radio frequency spectrum. Its primary tool in dealing with interference to wireless transmissions is to prevent it by the judicious allocation of radio frequencies, following band plans designed to preclude or minimize most types of interference. In the case of frequencies at 800 MHz,<sup>1</sup> interference is being caused primarily by transmissions from commercial cell phone towers, many of which are part of Sprint Nextel's "push to talk" network.<sup>2</sup> When the frequencies in the 800 MHz band were first assigned, the FCC did not anticipate that channels in that band intended for short messages over commercial mobile radio (used by taxi dispatchers, for example) would — with time, technology, and soaring consumer demand for wireless service — be converted to a heavily-trafficked national cell phone network operated by Nextel Communications, Inc. The commercial allocations at 800 MHz were closely interleaved with public safety allocations, with the expectation that the (presumably) low-usage commercial assignments would act as buffers to prevent interference with public safety channels.

The FCC announced on July 8, 2004 that it had agreed upon a rebanding plan to consolidate public safety frequencies and those used by some other operators, such as utilities, in the lower part of the 800 MHz band, while moving some of the 800 MHz channels acquired by Nextel, and some other commercial users, to the higher end of the band. The subsequent merger between Sprint Corporation and Nextel, creating Sprint Nextel, does not alter the agreement reached between the FCC and

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<sup>1</sup> Radio frequency spectrum is measured in hertz. Radio frequency is the portion of electromagnetic spectrum that carries radio waves. The distance an energy wave takes to complete one cycle is its wavelength. Frequency is the number of wavelengths measured at a given point per unit of time, in cycles per second, or hertz (Hz). Typical designations are: kHz — kilohertz or thousands of hertz; MHz — megahertz, or millions of hertz; and GHz — gigahertz, or billions of hertz.

<sup>2</sup> In a letter it filed with the FCC, dated May 16, 2003, Nextel wrote: "Ten percent of all public safety agencies licensed at 800 MHz have reported experiencing interference from the lawful operations of Nextel [and others]." This letter and other comments can be found by going to the FCC Electronic Comment Filing System (ECFS) on the FCC website [<http://www.fcc.gov/cgb/ecfs/>]. In ECFS, click "Search for Filed Comments," insert "02-55" in the box marked "Proceeding," and then search the file.

Nextel. This rebanding is expected to eliminate interference caused by the close proximity and interleaving of commercial and public safety channels. The decision reached by the FCC in general supports a rebanding plan first proposed by Nextel in 2001. After months of negotiations, clarifications and technical corrections, a modified plan was accepted on February 7, 2005.<sup>3</sup> The conversion process is scheduled to be completed by June 26, 2008, within three years of the official start date set by the FCC. By December 26, 2006, Sprint Nextel is to have relocated public safety and other selected channels in at least 20 regions.<sup>4</sup> Sprint Nextel has requested a delay of 60 days for the official start date of the rebanding program, which would extend the deadlines.<sup>5</sup>

## Highlights of the FCC Rebanding Plan

The news release announcing the FCC decision regarding the decision for rebanding provides a summary of key points,<sup>6</sup> some of which are highlighted below. These provisions, negotiated with Nextel, apply to Sprint Nextel effective as of the date of the merger.

- Separate “generally incompatible technologies” by eliminating interleaving.
- Move channels designated for interoperability to the lower end of the band, close to the planned public safety band at 700 MHz.
- Require public safety systems to relocate to channels at 809-815 MHz and 854-860 MHz.
- Require certain business and industrial users to relocate to channels at 809-815 MHz and 854-860 MHz.
- Require Enhanced Specialized Mobile Radio users, “ESMR,” to relocate to 817-824 MHz and 862-869 MHz.
- Until the band relocation plan is complete, apply “Enhanced Best Practices” to define and correct interference that will place “strict responsibility on carriers to fix such interference.”
- Require Nextel to give up some of its licenses at 800 MHz and all of its licenses at 700 MHz.

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<sup>3</sup> “Nextel Accepts FCC 800 MHz Interference Solution,” FCC News, February 7, 2005 at [<http://www.fcc.com>].

<sup>4</sup> FCC Public Notice, DA 05-3348, December 30, 2005, WT Docket No. 02-55. For the purposes of the plan, the existing National Public Safety Planning Advisory Committee (NSPAC) regions will be used; see [<http://wireless.fcc.gov/publicsafety/plans.html>]. Viewed January 30, 2006.

<sup>5</sup> Letter to the FCC, Wireless Telecommunications Bureau, December 1, 2005, referenced in filing, December 7, 2005 on behalf of Sprint Nextel Corporation, WT Docket No. 02-55.

<sup>6</sup> “FCC Adopts Solution to Interference Problem Faced by 800 MHz Public Safety Radio System,” FCC News, July 8, 2004 at [<http://www.fcc.gov>]. Also posted at [<http://wireless.fcc.gov/publicsafety/800MHz/bandconfiguration/index2.html>]. Viewed January 30, 2006.

- Modify Nextel's licenses to provide the right to operate at 1910-1915 MHz and 1990-1995 MHz, "conditioned on Nextel fulfilling certain obligations specified in the Commission's decision."
- Value the 1.9 GHz spectrum rights to be assigned to Nextel at almost \$4.9 billion, less the cost of relocating incumbent users in those channels.
- Credit Nextel the value of the spectrum rights it is relinquishing at 700 MHz and 800 MHz plus the "actual costs" to Nextel in relocating "all incumbents in the 800 MHz band."
- Require Nextel to make an "anti-windfall payment" to the Treasury at the conclusion of the relocation process that will equal the difference between the \$4.9 billion valuation and the cumulative credits.
- Require Nextel to provide public safety users at 800 MHz and incumbent users at 1.9 GHz with "comparable facilities."
- Require Nextel to establish escrow accounts and a letter of credit in the amount of \$2.5 billion, to "ensure that the band reconfiguration process will be completed."
- Provide an independent "Transition Administrator" to authorize disbursements, "subject to *de novo* Commission review."

Among the clarifications provided in a subsequent supplemental order<sup>7</sup> from the FCC is confirmation that the Transition Administrator (TA) has the authority to advance funds to pay for rebanding plans, based on a detailed estimate of costs and of time needed to complete rebanding. APCO<sup>8</sup> and other public safety groups have since contacted the FCC to express concern that it is difficult to obtain funding from Sprint Nextel for planning.<sup>9</sup> According to the letter, Sprint Nextel has required that cost estimates of rebanding plans be submitted for approval by Sprint Nextel before being presented to the TA. The letter states that "properly managed reconfiguration planning" is needed to assure continuity of operation during the rebanding process. Furthermore, the letter reports that "only two" plans have been approved for advanced funding while "a number" of plans are in mediation. Although plans may be approved in the future, the letter expresses concern over the delays in the process and its possible consequences in the future.

In response to the concerns expressed by the public safety groups, the TA modified requirements for requesting reimbursement for reconfiguration planning.

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<sup>7</sup> FCC, *Supplemental Order and Order of Reconsideration*, December 22, 2004, WT Docket No. 02-55.

<sup>8</sup> Association of Public-Safety Communications Officials — International. APCO helps coordinate frequency assignments for public safety and often assists the FCC in implementing spectrum policy for public safety.

<sup>9</sup> Letter to Catherine W. Seidel, Acting Chief, Wireless Telecommunications Bureau, FCC from APCO, International Association of Chiefs of Police, International Association of Fire Chiefs, Major Cities Chiefs Association, Major County Sheriffs' Association, National Sheriffs' Association, January 12, 2006, WT Docket No. 02-55.

Under new rules, the requests will now go first to the TA, which will review the request and forward to Sprint Nextel for action.<sup>10</sup>

## **Interference at 800 MHz**

Public safety currently uses 9.5 MHz of spectrum in the 800 MHz range at 806-821MHz and 851-869 MHz. The allocation of this spectrum interleaves public safety and private commercial communications using narrow slices of spectrum. This close proximity of public and commercial utilization is widely believed to be the primary cause of interference to communications by public safety and other entities using 800 MHz channels. The problem had become sufficiently troublesome that APCO established a committee to identify cases of interference. APCO is now participating in the rebanding effort.<sup>11</sup>

Although many wireless carriers have been identified in investigations of reports of interference, a large number of the documented cases of interference have been linked to operations of Nextel. To address the problem, Nextel prepared a White Paper<sup>12</sup> regarding use of the 800 MHz band and submitted it to the FCC in November 2001. In the letter to the FCC that accompanied the White Paper,<sup>13</sup> Nextel attributed interference problems to earlier actions by the FCC “authorizing public safety communications providers and [commercial] licensees to operate essentially incompatible systems on mixed, interleaved and adjacent 800 MHz channels . . . Intermodulation is the dominant cause of interference, with wideband noise and receiver overload playing a secondary role.” In the paper, Nextel presented a plan for spectrum realignment that would place public safety and commercial mobile radio services (CMRS) in separate blocks of contiguous spectrum. Nextel argued that the root cause of interference is the manner in which the spectrum has been allocated and that changing the allocation will eliminate the problem.

## **Benefits of Rebanding**

Radio frequency spectrum provides an invisible roadway for wireless transmissions; each band of measured spectrum is like a highway lane guiding communications to their destination. Spectrum allocations are divided into channels.

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<sup>10</sup> Announced February 1, 2006; the announcement and revised process are on the TA web site [[http://www.800ta.org/content/PDF/reconfiguration\\_materials/RFPF\\_FS.PDF](http://www.800ta.org/content/PDF/reconfiguration_materials/RFPF_FS.PDF)]. Viewed February 6, 2006.

<sup>11</sup> APCO has established an informational website, with contact information at [<http://www.apcointl.org/frequency/800hp.htm>]. Viewed January 30, 2006.

<sup>12</sup> “Promoting Public Safety Communications: Realigning the 800 MHz Land Mobile Radio Band to Rectify Commercial Public Radio - Public Safety Interference and Allocate Additional Spectrum to Meet Critical Public Safety Needs.” Available at [<http://www.fcc.gov/cgb/ecfs/>],” under Nextel, docket numbers 00-258, 95-18, 99-81 or 99-87, dated November 21, 2001.

<sup>13</sup> From Robert S. Foosaner, Senior Vice President and Chief Regulatory Officer, Nextel Communications, Inc., to Mr. Thomas Sugrue, Chief, Wireless Telecommunications Bureau, November 21, 2001.

When many channels are within a designated spectrum band, the allocation is referred to as narrowband. Broadband has comparatively fewer channels and therefore greater capacity for sending images and other data at high speeds. Contiguous spectrum for broadband is important for advanced wireless applications. The term wideband is sometimes used in the telecommunications industry to describe limited broadband applications transmitted on narrowband channels. An example is “mobile data” networking for public safety. This system provides voice and data communications and supports interoperability for text messages. The possibility that contiguous spectrum for public safety at 800 MHz could be leveraged for better wideband applications<sup>14</sup> is one potential benefit of the rebanding proposals.

In 1995, at the request of Congress, the FCC and NTIA established the Public Safety Wireless Advisory Committee (PSWAC) to study public safety spectrum use and to make recommendations for meeting its spectrum needs. The following year, PSWAC submitted a report<sup>15</sup> concluding that “unless immediate measures are taken to alleviate spectrum shortfalls and promote interoperability, Public Safety agencies will not be able to adequately discharge their obligation to protect life and property in a safe, efficient, and cost effective manner.”<sup>16</sup> Among PSWAC’s recommendations to the FCC and NTIA was the request for 95 MHz of additional spectrum for state and local public safety needs. In response to the report, Congress directed the FCC to allocate 24 MHz of spectrum to non-federal public safety agencies from the 746-806 MHz range as part of the reallocation of channels to be cleared in the migration from analog to digital television broadcasting.<sup>17</sup> This spectrum, generally, is not yet available to public safety users.<sup>18</sup> Another benefit of rebanding would be the relocation of “NPSPAC” channels<sup>19</sup> — reserved for special public safety uses — to the lower end of the spectrum band, effectively creating contiguous spectrum from the 700 MHz channels designated for public safety through the 809 - 815 MHz frequencies to be allocated to public safety under the rebanding plan. The relocation plan also provides for an increase in the amount of spectrum at 800 MHz potentially available to public safety. This also could be considered a benefit.

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<sup>14</sup> Nextel, in its filings regarding its proposal, maintains that there will be enough contiguous spectrum to support low-speed data, high-speed data, and video.

<sup>15</sup> “Final Report of the Public Safety Wireless Advisory Committee to the Federal Communications Commission and the National Telecommunications and Information Administration,” September 11, 1996.

<sup>16</sup> *Op. cit.*, page 2.

<sup>17</sup> “Balanced Budget Act of 1997,” P.L.105-33, Title III.

<sup>18</sup> For additional information see CRS Report RL32622, *Public Safety, Interoperability and the Transition to Digital Television*, by Linda K. Moore.

<sup>19</sup> Frequencies designated by the National Public Safety Planning Advisory Committee for uses such as mutual aid and interoperability.



## Costs of Rebanding

In evaluating the possible costs associated with rebanding, opinions diverge on what should be included as a reimbursable cost; whether the true costs — taking into account rebuilding infrastructure (such as replacing antennas), and disruption and downtime — will be fully covered; and what should be the replacement technologies for equipment covered in the proposal. In early 2002, Motorola prepared cost estimates for the Nextel plan.<sup>20</sup> It estimated relocation costs for public safety at \$1.1 to \$1.5 billion; the estimated cost for B/ILT and others was put at \$1.7 to \$2.4 billion. Total costs of relocation under Nextel's proposal would, according to Motorola's calculations, range from \$2.8 to \$3.9 billion. To prepare these estimates, Motorola assumed that all equipment operating on 800 MHz frequencies would have to be retuned or replaced, and that 30 to 40% of radios would have to be replaced. The spread in the estimates was attributed to uncertainties such as the number of times a system might have to be moved in order to maintain full radio coverage during the rebanding. The lower estimates are based on changing frequencies only once. An Annapolis-based company that specializes in public safety communications, Concepts to Operations, Inc. (CTO), prepared a report on the "probable costs" of rebanding.<sup>21</sup> Using many of the same assumptions as Motorola, but including estimated costs for changes in infrastructure, CTO concluded that the cost of rebanding would be \$3.36 billion.

The FCC rebanding plan requires that Sprint Nextel pledge \$2.5 billion in cash and letters of credit to cover relocation costs for public safety. Sprint Nextel's obligation to cover the costs of rebanding is not limited to \$2.5 billion, however. Sprint Nextel is expected to pay all the agreed upon costs, even if this total exceeds \$2.5 billion. The difference between the values of the spectrum Sprint Nextel is relinquishing and of the new spectrum it is receiving is an increase of approximately \$2.8 billion. This is the notational value, before specified relocations costs, that Sprint Nextel might be obligated to pay the U.S. Treasury. If the rebanding plan costs reach \$2.5 billion, the "anti-windfall payment" due the U.S. Treasury would be \$300 million. If the costs exceed \$2.8 billion, the Treasury receives nothing. If the costs are no more than \$850 million (a preliminary estimate provided by Nextel), the payment to the Treasury could approach \$2 billion.

## Transition Administrator

The Transition Administrator (TA) was chosen by a committee appointed by the FCC. The responsibilities of the TA are to facilitate a smooth transition and to oversee the administration and financial management of the plan.<sup>22</sup> A key responsibility is establishing a relocation schedule on a region-by-region basis. In general the TA has been instructed by the FCC to give priority to regions on the basis

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<sup>20</sup> Filed May 6, 2002, WT Docket No.02-55.

<sup>21</sup> The cost analysis was prepared for Preferred Communications System, Inc. and filed with the FCC by Preferred Communications System, March 1, 2004.

<sup>22</sup> See the TA website at [<http://www.800ta.org/>] for additional information. Viewed January 30, 2006.

of population but the TA can establish priorities based on other criteria, such as severe interference problems. The TA is also to monitor progress in the rebanding plans and to enforce the 18-month and 36-month deadlines set by the FCC. It is the TA that will request estimates of rebanding costs from public safety and private wireless networks covered by the plan, and decide whether or not to provide funds in advance. Disagreements about the implementation of the plan that the TA cannot resolve on its own or through mediation will in most cases be referred to the FCC.<sup>23</sup>

## Recent Congressional Activity Regarding Relocation Costs

The FCC, in cooperation with the National Telecommunications and Information Administration (NTIA), the Department of Defense, and other federal representatives, recently developed a band relocation and funding plan to move federal wireless users from desirable spectrum at 1710 - 1755 MHz, and possibly from other frequencies. The plan requires the establishment of a trust fund to hold proceeds from auctions of specified radio frequencies in order to cover the costs of relocation by current federal users of those frequencies. It was agreed among the developers of the plan that an act of Congress was required in order to bypass the appropriations process to fund the relocation.<sup>24</sup> Legislation was introduced and passed at the end of the 108<sup>th</sup> Congress (P.L. 108- 494, Title II). The act creates a Spectrum Relocation Fund to hold the proceeds of specified auctions and to use these funds to cover relocation costs by federal agencies.

Compared to the plan for reimbursing federal agencies for the cost of relocation, Nextel has offered limited reimbursement to state, local and tribal public safety agencies that will be obliged to move to new radio frequencies. Reimbursements to public safety for relocation costs are limited primarily to equipment exchanges and retuning existing radios. If a public safety agency wishes to install a new system at the time of relocation to another frequency under the Sprint Nextel plan, it will be responsible for the cost of the upgrade. Federal agencies, however, may acquire new systems “to achieve comparable capability of systems, regardless of whether that capability is achieved by relocating to a new frequency assignment or by utilizing an alternative technology” as part of the relocation, with the cost covered by the fund.<sup>25</sup>

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<sup>23</sup> At [<http://wireless.fcc.gov/publicsafety/800MHz/bandreconfiguration/index2.html>]. Viewed January 30, 2006.

<sup>24</sup> Additional information is provided in CRS Report RS21508, *Spectrum Management and Special Funds*, Linda K. Moore.

<sup>25</sup> P.L. 108-494, Title II, Sec. 203, ‘(3).