DSL and cable modem service, many Americans have access to only one or the other.[45] And, as a result of the paucity of competition between cable modems and DSL, some ILECs have increased the price for residential DSL services since the demise over the past 6 months of many competitive DSL providers.[46] The implications of this scenario are patent:

> So while there is no clear winner in the cable-DSL broadband war, the fact [that] both technologies remain limited means there may be a loser: Consumers. That's because the vast majority don't have any broadband access at all.
>
> "More is made of cable versus DSL than there needs to be," [broadband analyst Michael] Harris said. "Because if you are able to choose between cable and DSL, you are one of the fortunate few."[47]

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[45] *See, e.g., AOL-Time Warner* at ¶ 84 ("[T]he record in this proceeding demonstrates that the availability of DSL in Time Warner service areas may not be sufficiently widespread to constrain the merged firm in the market for residential high-speed Internet access services, at least in the short term"), at ¶ 114 n.324 (citing Kinetic Strategies report indicating that as of November 2000 residential cable modem customers outnumbered residential DSL customers by more than 2 to 1).

[46] *See* Plosinka and Coffield, "Top-Dollar DSL," *Interactive Week*, at 14-15 (Feb. 19, 2001) (reporting that SBC Communications "is first out of the chute, quietly boosting standard residential [DSL] packages that sold for $40 per month last fall to $50" and attributing this development to the fact that "[i]n the last six months, many competitive residential DSL providers have gone bankrupt, sold out or ended the DSL portion of their businesses, leaving consumers in many U.S. regions a single choice for DSL service: the local phone company.")

[47] Brown, "Broadband Battle" (Sept. 2000), *at* http://www.broadbandweek.com/news/0009/0009_news_02.htm (last visited Feb. 21, 2001); *see also* Greene, "Bells Continue Major Push on DSL Amid CLECs' Woes," *TR's Last Mile Telecom Report*, at 2, 3 (Feb. 12, 2001) (RBOCs control approximately 90% of all residential DSL lines currently in service); Breznick, "Cable Maintains Data Lead but Bells are Making Strong Gains," *Communications Daily*, at 1 (Feb. 6, 2001) ("[Data Local Exchange Carriers], plagued by financial problems, have largely dropped out of [the] high-speed data race... As [a] group, Kinetic Strategies calculated, DLEC added only 131,7000 DSL customers in the 4th quarter, compared with 534,000 for [the RBOCs] and [an] estimated one million or so for cable operators. 'Now only the Regional Bell Operating Companies remain as formidable forces in the residential DSL market,' said Kinetic Strategies Pres. Michael Harris."); Douglass, "DSL's Big Push," L A. TIMES, Dec. 21, 2000, at T1(citing recent Cahners In-Stat Group study showing that 21% of DSL customers had to wait more than one month to receive service).

That is why there has been a consistent call from within the Commission for a fixed wireless alternative to DSL and cable.[48/]

Moreover, as documented in the comments being filed today in this proceeding by, *inter alia*, the National ITFS Association ("NIA") and the Catholic Television Network ("CTN"), there continues to be a pressing need for broadband service in elementary and secondary schools, high schools, colleges, universities and other institutions of higher learning in rural, small and large urban markets alike.[49/] There also is little question that ubiquitous broadband deployment is necessary to

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[48/] Hatfield, "Perspectives on the Next Generation of Communications," Keynote Address Before the Vehicular Technology Conference Fall 2000, at 3 (delivered Sept. 26, 2000) *at* http://www.fcc.gov/oet/speeches/perspec_next_generation.doc/ (last visited Feb. 21, 2001) ("[W]e cannot — indeed, we must not — allow spectrum scarcity to constrain competition among Commercial Mobile Radio Service providers. *Nor must we allow it to constrain competition between wireless providers and wireline providers in the provision of fixed, broadband access to the network.* As I have said in nearly every speech that I have made since I returned to the Commission, if the Nation is to enjoy the full, pro-competitive, deregulatory benefits envisioned by the passage of the Telecommunications Act of 1996, we need *wireless* systems as full-fledged competitors in the provision of local telecommunications services.") (emphasis added) (the "*Hatfield VTC Address*"); *see also* Statement of Thomas Sugrue, Chief, Wireless Telecommunications Bureau, before the Subcommittee on Telecommunications, Trade and Consumer Protection, United States House of Representatives, Re: Access to Buildings and Facilities by Telecommunications Providers (delivered May 13, 1999) ("Because their technology enables them to avoid the installation of new wireline networks, wireless service providers may be among those with the greatest potential quickly and efficiently to offer widespread competitive facilities-based services to end users.").

[49/] Indeed, President Bush has emphasized that technology in the classroom is a fundamental component of his administration's education policy. "No Child Left Behind," Education Policy of George W. Bush (Sept. 2, 1999), *at* http://www.georgewbush.com/media/pdfs/edu_nochildleftbehind.pdf (last visited Feb. 21, 2001); *see also* Opposition by Mississippi Board of Trustees of State Institutions of Higher Learning, RM-9911 (filed Aug. 24, 2000); Comments of South Piedmont Community College, RM-9911 (filed Aug. 22, 2000); Comments of Randolph Community College, RM-9911 (filed Aug. 22, 2000); Opposition of the University of Minnesota, RM-9911 (filed Aug. 28, 2000); Consolidated Opposition of the Instructional Telecommunications Foundation, Inc., RM-9911 and RM-9920 (filed Aug. 28, 2000); Joint Opposition of the Archdiocese of Los Angeles Education and Welfare Corporation, Carinas Telecommunications Corp., the Catholic Bishop of Chicago, Catholic Television Network, the Colorado State Board of Agriculture, Counterpoint Communications, Inc., the Macomb Intermediate School District, Dioceses of the San Francisco Bay Area, the National Conference on Citizenship, Oakland Schools, the Office of Radio and Television of the Archdiocese of Hartford, the Roman Catholic Archbishop of the Archdiocese of Detroit, the Roman Catholic Communications Corp., the Roman Catholic Diocese of Dallas, the Roman Catholic Diocese of Orange, Stanford University, and the University of Colorado, RM-9911 (filed Aug. 28, 2000);

satisfy the accelerating demand for distance learning services, as lifelong learners become increasingly dependent on remote access to receive course-related and other educational materials that can only be distributed via broadband. As recognized in a recent report to the President and Congress prepared by the Web-based Education Commission (the "WEB Commission") co-chaired by Senator Bob Kerrey:

> For education, broadband access means the elimination of time and distance from the learning equation. Broadband carries with it powerful multimedia learning opportunities, the full interactivity of instructional content, and the quality and speed of communications. Broadband access today is 50 to several hundred times more powerful than its precursors. Broadband access tomorrow holds even greater promise.[50/]

The WEB Commission report notes that U.S. colleges and universities already offer more than 6,000 accredited distance learning courses, and approximately 84% of four year colleges are expected to offer distance learning courses in 2002, up from 62% in 1998.[51/] By next year it is

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Comments of the San Bernardino Community College District, RM-9911 (filed Aug. 28, 2000); Comments of The Association for Telecommunications Professionals in Higher Education, RM-9911 (filed Aug. 28, 2000); Opposition of the Arizona Board of Regents for Arizona State University, Boston Catholic Television Center, Inc., Butler County Community College, California State University - Northridge, Charlotte-Mecklenburg Public Broadcasting Authority, Connecticut Public Broadcasting, Inc., Diocese of Youngstown, Ohio, Dutchess Community College, Educational Television Association of Metropolitan Cleveland, Friends University, Hampton Roads Educational Telecommunications Association, Inc., Hartness Community College District, Jefferson County Board of Education, Monterey County Superintendent of Schools, New Jersey Public Broadcasting Authority, Newman University, San Jose State University, Santa Clara County Board of Education, Santa Cruz County Superintendent of Schools, University of North Carolina, WHYY, Inc, Wichita Public Schools-USD#259 and Wichita State University, RM-9911 (filed Aug. 28, 2000); Comments of Pikes Peak Community College, RM-9911 (filed Aug. 28, 2000).

[50/] *Web Commission Report* at 22.

[51/] *Id.* at 77.

expected that nearly 15% of all post-secondary students (2.2 million) will be enrolled in distance learning courses, nearly 300% more than in 1998.[52] That is why the WEB Commission

> is issuing a call to action to: make powerful new Internet resources, *especially broadband access*, widely and equitably available and affordable for all learners. The promise of high quality web-based education is made possible by technological and communications trends that could lead to important educational applications over the next two to three years. These include greater bandwidth, expansion of broadband and wireless computing, opportunities provided by digital convergence, and lowering costs of connectivity.[53]

Similarly, Chairman Powell has recognized the transforming effect of broadband-based distance learning on education in the United States:

> Telecommunications and information services also make it possible for residents of North Dakota and elsewhere who are interested in educational fulfillment and professional advancement to take advantage of resources offered by the higher education institutions in the State and throughout the world.
>
> For some students, this may happen at special learning centers, that are essentially high-tech conferencing facilities with audio/video/data capability, where students can see and speak with instructors who may be several hundred miles away. In other situations, armed with a computer, a modem, and the Internet, participants may be able to access the delivery of distance learning curriculum.
>
> The full panoply of high-speed, broadband, real-time, and interactive capabilities make the ideal of State, regional, national, or global "universities" a reality, wherein the importance of the proximate location of students and instructors is rendered almost meaningless. That should revolutionize education.[54]

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[52] *Id. see also* "Study Public Higher Education Embracing Virtual Classrooms" (Sept. 15, 2000), *at* http://www.cnn.com/2000/tech/computing/09/15/index.elearning/elearning.sidebar/index.html (last visited Feb. 21, 2001) ("In 1997-98, 91% of public two-and four-year institutions either offered or planned to offer distance learning courses in the next three years. . . .").

[53] *Web Commission Report* at iii (emphasis added).

[54] Remarks of Michael K. Powell, Chairman, Federal Communications Commission, before the North Dakota Telecommunications Technology Symposium, Fargo, North Dakota, (May 5, 1999), *at* http://www.fcc.gov/Speeches/Powell/spmkp904.html/.

B. MDS/ITFS Operators are Aggressively Deploying Systems Using the 2.1 and 2.5 GHz Bands to Deliver New Fixed Wireless Broadband Services to Unserved and Underserved Markets and to Compete With DSL and Cable Modem.

MDS/ITFS fixed wireless broadband service in the 2.1 and 2.5 GHz bands is now fulfilling the promise of wireless systems as "full-fledged competitors in the provision of local telecommunications services."[55/] While there are today approximately four dozen systems that utilize MDS/ITFS to deliver fixed broadband services, that is just the proverbial "tip of the iceberg." In fact, the Commission itself has cited a Strategis Group study which predicts that there will be 1.2 million residential and 300,000 business MDS/ITFS broadband subscribers within two years.[56/] All totaled, it has been estimated that the number of fixed wireless broadband subscribers will increase to nearly 10 million by the year 2005, and that 70% of those subscribers will be served via MDS/ITFS.[57/] Not surprisingly, the Commission has found that

> nationwide deployment of [MDS/ITFS] systems will provide Americans with another option for high-speed access, which may include digital subscriber line (DSL), cable modem, or satellite-based service provided by the incumbent telephone company, cable operators, or satellite operators. *Indeed, in rural or otherwise underserved markets in the country, ITFS/MDS may be the sole provider of broadband service.*[58/]

The ability of MDS/ITFS technology to meet the burgeoning demand for broadband services is directly attributable to the favorable propagation characteristics of the 2.1 and 2.5 GHz bands,

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[55/] *Hatfield VTC Address* at 4.

[56/] *FCC Interim Report* at 21 n.26 (citing Jarich and Mendelson, "U.S. Wireless Broadband: LMDS, MMDS and Unlicensed Spectrum," The Strategis Group, Inc. (Feb. 17, 2000).

[57/] Smith, "Wireless Rides to the Rescue," *Wireless Week*, at 16 (Feb. 7, 2000).

[58/] *FCC Interim Report* at 22 (emphasis added).

which facilitate timely, cost-efficient delivery of MDS/ITFS fixed wireless broadband service in large and small markets alike. As the Commission has recognized:

> [MDS/ITFS] transmissions have a greater radius than upperband fixed wireless service, generally 35 miles versus three to five miles for upperband services. This is partly due to the fact that [MDS/ITFS] signals are less attenuated by rain and other severe weather conditions. [MDS/ITFS's] larger radius makes the service well-suited for not only residential customers, but customers in rural, underserved, and unserved areas as well.[59/]

As the Commission reported to Congress last year, the "authorization of two-way MDS operations will speed the deployment of advanced services by permitting service providers to offer a variety of fixed wireless high-speed services more rapidly."[60/] The data provided in the *FCC Interim Report*, as supplemented by the comments being filed today by Sprint, WorldCom, Nucentrix and others, reaffirm that MDS/ITFS operators have invested enormous financial, human and technical resources towards making fixed wireless broadband service in the 2.1 and 2.5 GHz bands a reality for consumers, educators and students in unserved and underserved markets. For example:

- Sprint's MDS licenses alone cover a total of 30 million households in 83 markets. Its fixed wireless broadband service, Sprint Broadband Direct, is capable of delivering downstream speeds of 1 Mbps with burst rates of 5 Mbps. It has already

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[59/] *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1983; Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Radio Services*, FCC 00-289, Appendix E at 8 (rel. Aug. 18, 2000) (the "*Fifth Annual CMRS Report*"); "Deploying Broadband More Broadly: Working Together to Roll-out Access in America's Small Cities and Rural Areas," Remarks of Commissioner Gloria Tristani to the New Mexico Communications Network Symposium, Albuquerque, New Mexico (Nov. 10, 1999), *at* http://www.fcc.gov/speeches/Tristani/spgt919.html (Feb. 21, 2001) ("A multitude of fixed wireless broadband services are currently being deployed or are in the planning stages. While some are more targeted to an urban environment, others provide the necessary range and technical capability for deployment in rural areas. One example is [MDS/ITFS] or wireless cable. It offers the potential to provide broadband access to underserved markets.").

[60/] *Second Section 706 Report* at ¶ 263.

launched the service in a dozen markets (Phoenix, Tucson, Colorado Springs, Denver, Detroit, Houston, San Francisco/Oakland/San Jose, Fresno, Salt Lake City, Melbourne (FL), Oklahoma City, and Wichita), and plans to have service launched in additional markets by the end of this year.[61] In the Commission's August 2000 MDS/ITFS two-way filing window, Sprint filed applications to offer two-way service in a total of 45 markets, which will enable it to deliver service to its first two million customers.[62]

- WorldCom's MDS licenses cover more than 31 million households in 160 markets. WorldCom is currently providing commercial fixed wireless broadband services in Jackson, MS; Baton Rouge, LA and Memphis, TN. WorldCom plans to provide service in 30 markets by year-end 2001, including some of the following mid-sized and smaller markets: Chattanooga, TN; Springfield, MA; Norfolk, VA; Buffalo, NY; Bakersfield, CA; and Charleston, WV. During the August 2000 MDS/ITFS two-way filing window, the company filed over 380 applications to offer two-way fixed wireless broadband service in more than 60 markets. WorldCom plans to file two-way applications for its remaining markets during later filing windows.

- Nucentrix holds MDS/ITFS spectrum rights in over 90 markets covering an estimated nine million households throughout Texas and the Midwest; approximately two-thirds of Nucentrix's markets have less than 100,000 households. The company already offers two-way MDS/ITFS fixed wireless broadband service in Austin and Sherman, TX, and is running a trial of the service in Amarillo, TX.[63] During the August 2000 filing window, Nucentrix filed applications to offer two-way fixed wireless broadband service in a total of 70 markets.[64]

- There are a number of smaller, independent MDS/ITFS operators that are or will soon be offering MDS/ITFS fixed wireless broadband service in rural and smaller

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[61] *See* "Sprint Introduces New Broadband Wireless Service to Fresno's residential and Small Business Customers," *at* http://www.sprintbbd.com/prsite/pr/2001/0123-Fresno.html (Jan. 23, 2001) (last visited Feb. 21, 2001). In addition, Sprint has been granted special temporary authority to test and initiate Sprint Broadband Direct in Seattle, WA and Omaha, NE, and plans to initiate full-scale launches in those markets in the near term. *See* Barthold, "Sprint Entices Wireless B-band Customers," *Cable World*, at 14 (Oct. 16, 2000). Sprint has applied for similar STAs in four additional markets: Cincinnati, OH; St. Louis, MO; South Bend, IN; and Spokane, WA.

[62] *FCC Interim Report* Appendix 3.3 at A-41; *see also* "Sprint Files for Two-Way MMDS Licenses on 45 Major Markets," *at* http://www.sprint.com/pr/CDA/pr_cda_press_releases_detail/1,1694,2004,00.html (last visited Feb. 21, 2001).

[63] *Id.* at A-41.

[64] *Id.* at A-41-42.

> markets in, *inter alia*, Alabama, Louisiana, Pennsylvania, Tennessee, Virginia, California, Colorado, Florida, Oregon, Wyoming, South Dakota, Michigan, Utah, Alaska, Arizona, Iowa, Maryland, Maine, Ohio, Idaho and Montana.[65/] As in the case of Sprint, WorldCom and Nucentrix, these operators have filed numerous applications during the August 2000 filing window to effectuate their plans for introducing or further developing MDS/ITFS fixed wireless broadband service in their respective markets.

Moreover, as detailed in the comments being filed today by NIA and CTN, the emergence of MDS/ITFS fixed wireless broadband service also serves the broader federal interest in promoting the use of the Internet for educational purposes. The Commission observed as much in the *FCC Interim Report*, noting that "[t]wo-way systems will provide schools with Internet access at speeds far in excess of that available with dial-up service, as well as allow other users in the community to access a wide variety of educational materials that ITFS licensees and other educators can make available over the World Wide Web."[66/] That promise is becoming a reality. For example, in his State of the State Address last month, Texas Governor Rick Perry applauded a program under which Nucentrix donated a broadband wireless network to a high school in Austin, Texas that provides high-speed connectivity to over 400 personal computers, and recognized the role that this MDS/ITFS service can play in elevating "at risk" schools to exemplary status:

> Technology is already transforming the classroom. A few months ago I visited Travis High School on the south side of Austin. A school with an 80 percent minority enrollment, many of the children coming from disadvantaged homes. [T]hrough the vision of a dedicated administration, technology coordinator, and corporate sponsors, more students at Travis High are succeeding due to the wonder

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[65/] *FCC Interim Report* Appendix 3.3 at A-42-43.

[66/] *Id.* at 20.

of leading technologies such as the wireless Internet, multimedia and teleproduction.[67]

C. 3G SYSTEMS CANNOT UTILIZE THE 2.1 AND 2.5 GHz BANDS WITHOUT SEVERE INTERFERENCE TO AND FROM CO-CHANNEL MDS AND ITFS STATIONS.

The *NPRM* solicits comment generally on the potential for "sharing . . . the frequency bands [that are the subject of this proceeding] to facilitate the implementation of advanced wireless systems"[68] and, more specifically, on the conclusion reached in the *FCC Interim Report* that "large separation distances between 3G and ITFS/MDS systems are needed to allow co-channel sharing."[69] While WCA will leave for others to address whether 3G systems can be implemented in bands other than the 2.1 GHz and 2.5 GHz bands without adversely affecting incumbent users, there is no doubt that co-channel sharing between separate 3G and MDS/ITFS fixed wireless broadband systems is not possible.

This will hardly come as a surprise to the Commission. The *FCC Interim Report* included a substantial analysis of the potential for co-channel interference from 3G systems to MDS/ITFS operations. That analysis concluded that, regardless of which variant of 3G is deployed:

> large co-channel separation distances are needed between 3G systems and ITFS/ MDS systems to avoid causing harmful interference to ITFS/MDS systems. For example, a 3G base station, whether a high-powered 500 watt base station or a low-powered 10 watt base station, would need to be beyond the radio horizon of the

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[67] Governor Rick Perry, "State of the State Address" (Jan. 24, 2001), *at* http://www.governor.state.tx.us/Perry/75r/LtGov/pr/p01242001b.htm (last visited Feb. 21, 2001).

[68] *NPRM* at ¶ 66.

[69] *Id.* at ¶ 62.

> ITFS/MDS station or 161 kilometers (100 miles) to avoid causing co-channel interference to co-channel ITFS/MDS receivers at either hub or response stations.[70/]

Given the Commission's recognition that virtually all MDS and ITFS channels are currently being utilized in nearly major markets,[71/] permitting 3G usage distant from current MDS and ITFS operations is not likely to quiet the call from mobile operators for more spectrum – presumably they want additional spectrum in precisely those markets where MDS and ITFS are deployed.

In subsequent meetings of a government/industry informal working group on 3G access to the 2.5 GHz band (the "IWG"), two issues were raised regarding the Commission's analysis: (1) that the 45 dB D/U ratio used in the *FCC Interim Report* as the benchmark for defining interference to MDS/ITFS is overly protective of digital MDS/ITFS facilities; and (2) that the Commission did not analyze the potential for interference from MDS/ITFS facilities to co-channel 3G systems. In preparing its final report and crafting rules, WCA hopes the Commission will analyze both of these issues, for that analysis will merely reinforce the wisdom of the Commission's initial determination that co-channel sharing is not a viable option.

At the outset, it is worth noting that, the Commission acknowledges in the *FCC Interim Report* that the use of a 45 dB D/U ratio as the co-channel interference benchmark was conservative

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[70/] *See FCC Interim Report* at 41. The *FCC Interim Report* also concluded that no mobile 3G customer unit could be permitted to operate within between 100 to 161 kilometers of an MDS/ITFS cell or customer premises receiver (the exact distance varying depending upon the variant of 3G employed by the mobile unit). *See id.*

[71/] *See id.* at 42-53. Specifically, the Commission correctly found that in 49 of the 50 largest metropolitan areas, all 31 channels in the 2.5 GHz band have been licensed for MDS or ITFS use within 100 miles of the city center coordinates and that in the sole exception, applications are pending for all but one of the vacant channels. *See id.* at 43. While it has been suggested that the *FCC Interim Report* should have distinguished between stations that are licensed, but unconstructed, and those that are constructed, WCA's informal review suggests that in the 50 markets analyzed by the Commission, all but a handful of the licensed channels are actually operational.

when applied to digital MDS and ITFS stations,[72] and provides as Appendix 5.2 a study prepared by George W. Harter of MSI that specifically analyzed the potential for co-channel sharing utilizing more realistic benchmarks for situations in which the victim receiver is a digital device. The study concluded that even when the MDS/ITFS stations are operating with digital technology, "it is impossible for 3G services to coexist in the same frequency band with MMDS/ITFS fixed services" because 3G base stations would have to be located substantial distances from digital MDS/ITFS receivers to avoid interference to those receivers.[73]

The Harter study attached to the *FCC Interim Report* also considered the question of interference from MDS/ITFS systems to 3G facilities, concluding that:

> interference from MMDS/ITFS services into 3G services will be severe because of (1) the use of omnidirectional mobile receive antennas with no ability to discriminate, (2) the high power levels of the fixed services at the hub broadcast over a wide or omnidirectional area, (3) the power levels of the CPE return path transmissions and (4) the high probability that 3G services will be in close proximity to either MMDS/ITFS hub or CPE sites.[74]

To further address the issue of co-channel interference from MDS/ITFS to 3G systems, WCA commissioned Mr. Harter to prepare a supplemental study, "Interference to 3G Systems from ITFS/MDS Systems Sharing the Same Frequencies," that was submitted to the IWG for consideration. This study, a copy of which is annexed as Appendix A, concludes that regardless of which variant of 3G is used, 3G base stations and mobile units will suffer massive interference

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[72] *See FCC Interim Report* at 40.

[73] *Id.* Appendix 5.2 at A-71-74.

[74] *Id.* Appendix 5.2 at A-65.

unless located substantial distances (in most cases, beyond the radio horizon) from MDS/ITFS base stations. Mr. Harter finds that:

> These calculations prove conclusively that co-channel frequency sharing between 3G and ITFS/MDS systems is not a practical solution. MDS/ITFS systems are operating in most markets across the country, and the required separation distances would only permit 3G systems to operate without interference in the most rural areas.[75]

Without objection, the IWG agreed that this report, coupled with the information contained in the *FCC Interim Report*, demonstrated that co-channel sharing of the 2.5 GHz band is not a viable solution to any need for additional 3G spectrum.[76]

D. DISPLACEMENT OF MDS/ITFS OPERATORS FROM ANY PORTION OF THE 2.1 AND 2.5 GHZ BANDS WOULD SEVERELY DISRUPT THE NATIONWIDE DEPLOYMENT OF MDS/ITFS FIXED WIRELESS BROADBAND SERVICE AND WOULD CAUSE IRREPARABLE HARM TO THE EDUCATIONAL COMMUNITY.

The *NPRM* solicits comment on a variety of issues that would be raised were the Commission to relocate some or all MDS/ITFS use from the 2.1 GHz and 2.5 GHz bands to other spectrum in order to clear the bands for 3G.[77] WCA's position, in a nutshell, is that (i) there is no comparable replacement spectrum available to which MDS or ITFS licensees can be relocated, (ii) any reduction in the spectrum available in the 2.1 and 2.5 GHz bands will have a devastating adverse

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[75] Appendix A at 3.

[76] The fact that substantial co-channel separation is required between 3G and fixed broadband systems poses a difficult challenge were the Commission to attempt to develop rules that would allow mobile use of the MDS/ITFS bands. *See NPRM* at ¶ 64. Simply put, the Commission would have to craft rules that assured fixed users protection from co-channel interference by mobile services in neighboring markets, and vice versa. The effect of those rules, as a practical matter, would be to preclude mobile use within 100 miles or more of any pre-existing or proposed co-channel fixed use. Thus, even assuming the Commission could craft appropriate rules to permit mobile use (a process which will certainly take substantial time), most MDS and ITFS licensees would be foreclosed from even considering mobile uses because of co-channel interference protection obligations to pre-existing co-channel MDS and ITFS licensees.

[77] *See NPRM* at ¶¶ 55, 65.

impact on both the deployment of the fixed broadband services that Section 706 obliges the Commission to promote and on the Commission's efforts to promote ITFS through interdependent relationships with commercial operators, and (iii) clearing the 2.1 and 2.5 GHz bands for 3G cannot be squared with the Commission's prior auctioning of those bands and would compromise future spectrum auction efforts.

1. There Is No Comparable Replacement Spectrum To Which MDS/ITFS Can Be Relocated.

As the Commission's former Chief Technologist observed:

> Of course, simply reallocating spectrum from one use to another on either a voluntary or involuntary basis does not increase the total aggregate amount of spectrum available. Thus, as spectrum use intensifies, it is becoming increasingly difficult to find a new home for licensees/users displaced as a result of involuntary relocations. Long-term reallocation works when there are large blocks of under-utilized spectrum, but those are no longer easy to find. While there may well be some remaining outright reallocations that are economically and socially beneficial, we cannot count on them for solving the spectrum scarcity problem in the long term.[78/]

The present situation evidences the wisdom of those remarks. It is telling that neither the Cellular Telecommunications Industry Association petition for rulemaking on implementation of WRC-2000,[79/] the *FCC Interim Report*, nor the *NPRM* identifies any particular band to which MDS/ITFS could be relocated in whole or in part.

WCA is not surprised that no specific replacement spectrum has been suggested. As noted above, the ability of MDS/ITFS-based broadband systems to serve the unserved and the underserved

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[78/] *Hatfield VTC Address* at 5.

[79/] Petition for Rulemaking of Cellular Telecommunications Industry Association ("CTIA"), RM-9920 (filed July 12, 2000).

is directly related to the favorable propagation characteristics at 2.1 and 2.5 GHz.[80] Just as the mobile industry must use spectrum below 3 GHz to economically offer service, so too must the MDS/ITFS broadband industry. WCA has carefully scoured the Commission's Table of Frequency Allocations and has failed to identify any bands comparable to the 2.1 and 2.5 GHz bands that are today unused or could be readily cleared of existing users to make way for MDS/ITFS.

That is not just WCA's view – it is a view shared by the Commission and by WRC-2000. Not long ago the Commission, in its *Emerging Technologies* docket, attempted to identify spectrum to which incumbent MDS licensees from just the 2.1 GHz band could be relocated. Significantly, the Commission was unsuccessful in that effort, finding that *"there are no frequency allocations above 3 GHz that could readily support the requirements of MDS, which are wide-area and point-to-multipoint in nature."*[81] More recently, Resolution 223 of the Final Acts of WRC-2000 reaffirmed the importance of maintaining MDS/ITFS-like services below 3 GHz, recognizing that such services are in operation in the 2.5 GHz band around the globe and concluding that *"for technical reasons, the existing applications in the bands identified for [3G] require spectrum below 3 GHz."*[82] In short, there is no spectrum other than spectrum below 3 GHz which is comparable to the current

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[80] *See supra* note 59 and accompanying text.

[81] *Redevelopment of Spectrum to Encourage Innovation in the Use of New Telecommunications Technologies*, 7 FCC Rcd 6886, 6889 (1992) (emphasis added). Indeed, the Commission has recently re-affirmed that spectrum above 3 GHz is not equivalent to that in the 2 GHz band, and found that far more spectrum above 3 GHz is required to compensate for the differences in propagation characteristics between the two bands. *See, e.g., Amendment of the Commission's Rules with Regard to the 3650-3700 MHz Government Transfer Band; The 4.9 GHz Band Transferred from Federal Government Use*, ET Docket No. 98-237 and WT Docket No. 00-32, FCC 00-363, at ¶ 19 (rel. Oct. 24, 2000).

[82] Final Acts of the World Radiocommunication Conference (WRC-2000), Resolution 223 at 2 (emphasis added).

MDS/ITFS spectrum allocation. And, of course, any available spectrum below 3 GHz is spectrum that can just as readily be utilized for 3G applications, without any need to relocate MDS/ITFS.

2. Any Reduction In Spectrum Available For MDS/ITFS-Based Broadband Systems Will Preclude The Deployment Of Service To Unserved And Underserved Areas.

Given the lack of any comparable spectrum to which MDS/ITFS can be relocated, it is not surprising that the *NPRM* solicits comments on "the potential for . . . segmenting the [MDS/ITFS] frequency bands to facilitate the implementation of advanced wireless systems."[83/] Unfortunately, the Commission cannot have its cake and eat it too – the 2.1 and 2.5 GHz bands simply are not large enough to host both 3G and viable fixed broadband services. Any segmenting of the MDS/ITFS allocation would have just the opposite of the intended effect of "facilitat[ing] the implementation of advanced wireless systems" – it would sound the death knell for many of the advanced fixed wireless systems that are bringing broadband access to the unserved and underserved.

A reduction in the amount of 2.1 and 2.5 GHz spectrum available to broadband system operators would effectively preclude the offering of service in many of the areas that are most in need. The *FCC Interim Report* correctly recognizes that:

> [I]t is evident that if the total amount of spectrum available to an MDS licensee is reduced, that licensee, to continue providing an acceptable grade of service to its customers, must reduce the cell size. As cell size is reduced, the licensee must then make a business decision to continue operating the site with reduced coverage thereby reaching fewer customers or to add new sites to maintain the same coverage as it had prior to the reduction in available spectrum. The consequences of either of these options are clear. Either the licensee ceases to provide service to its customers in the outlying areas of its coverage area (most likely rural and underserved areas) or it must build and maintain additional transmit sites to cover these areas.... Either option has adverse effects. Namely, the MDS operator either incurs a significant

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[83/] *NPRM* at ¶ 66.

> economic cost to build additional sites to continue serving its current customer base or the customers in outlying areas will cease to be able to receive service.[84/]

In an effort to quantify these adverse effects, WCA retained HAI Consulting, Inc. ("HAI") to prepare an analysis of the implications of a segmentation on the order of the 90 MHz segmentation discussed in the *FCC Interim Report*. A copy of that report, "MDS/MMDS/ITFS Two-Way Fixed Wireless Broadband Service: Spectrum Requirements and Business Case Analysis" (the "HAI Study") is annexed as Appendix B. For purposes of analysis, HAI has prepared a engineering-economic model that assumes a broadband system with 158 MHz (approximately twenty-six 6 MHz channels) available for the distribution of broadband services to subscribers,[85/] and examines the economic impact upon the system were the Commission to adopt a segmentation plan that reduces the available spectrum by 90 MHz (fifteen 6 MHz channels). Specifically, the model calculates capital investment requirements, operating expenses and revenue projections for five sample markets (one in each quintile based on BTA size) under each scenario of spectrum availability.

The results of the HAI Study demonstrate beyond peradventure the enormous financial implications of a reduction in spectrum. For example, for the market in the first (or largest) quintile, the number of cells required to provide a similar level of service to a similar number of subscribers with 90 MHz less spectrum increases almost three-fold, while in markets in the third and fourth quintile, the number of cells increase 22-fold and 15-fold, respectively.[86/] This translates into

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[84/] *FCC Interim Report* at 61.

[85/] That is a reasonable assumption – despite the fact that there are thirty-two or thirty-three 6 MHz channels nominally allocated to the two services – because as a practical matter not all of these channels are available in every market for the distribution of broadband services to subscribers. *See infra* at 34-35.

[86/] *See* HAI Study, at Table V-6.

enormous increases in the investment necessary for each subscriber. In the largest market, the investment more than doubles, while in the markets in the third and fourth quintiles, per-subscriber investment increases more than six-fold.[87/] Annual operating expenses also increase materially as a result of the increased number of facilities needed to accommodate reduced spectrum availability.[88/] To demonstrate the overall effect of increased capital and operating expenses, the HAI Study presents internal rate of return calculations for each market, assuming 26 and 11 available channels. *For each of the markets, the internal rate of return drops to below 0% when only 11 channels are available for providing broadband service to subscribers.*[89/] Based on these considerations, HAI concludes that "even after ten years of operation and accounting for the value of the operation, no market can viably operate with only 11 channels" and that "any marked reduction in usable spectrum would eliminate MMDS/ITFS carriers from the broadband access market."[90/]

As the Commission considers the possibility of segmenting the MDS/ITFS spectrum allocation along any of the lines suggested in the *FCC Interim Report*, it must come to grips with what has evolved into one of the most complex licensing schemes in the annals of the agency. There are several factors that the Commission must consider as it examines any segmentation plan:

- Not all channels are available in every market for broadband use. First, due to co-channel interference considerations, some channels may not be licensed in one market in cases where they are licensed to a different, nearby market. Second, even where all thirty-three channels are licensed, they are licensed to multiple licensees (often more than ten in a market) and one or more may choose not to lease their

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[87/] *See id.* at Table V-7.

[88/] *See id.* at Table V-8.

[89/] *See id.* at Table V-9.

[90/] *Id.* at 28.

capacity to the broadband system operator and instead utilize that capacity for other purposes.[91] Third, in some cases, certain channels may be retained for the transmission of video programming on behalf of an ITFS licensee who chooses to utilize some or all of its capacity for broadcasting instructional programming to schools and other educational receive sites.[92] Or, fourth, ITFS licensees may be entitled to utilize a portion of the capacity of the shared MDS/ITFS broadband network in exchange for leasing their channel capacity. Since discrete channels are not usually reserved for the exclusive use of the ITFS licensee, as a practical matter bandwidth equal to some number of channels is effectively unavailable for commercial traffic because it is being used by the ITFS licensee. And, fifth, in some cases it may be necessary to set aside bandwidth to serve as a guardband between upstream and downstream use, and to separate the edges of the MDS/ITFS bands from neighboring allocations to protect against inter-service interference. The channels actually being used to provide a broadband service will differ from market to market, as the reasons why a given channel would be unavailable are all market-specific. The net result is that, while system operators attempt to hew to model band plans along the lines of those presented in the *FCC Interim Report*,[93] actual band plans vary greatly from market to market.[94] Thus, segmenting away any given channels from the 2.1 and 2.5 GHz MDS/ITFS allocation is certain to adversely impact large numbers of systems.

- Even if a given channel is available, it likely will be used in a wide variety of different ways in different markets. The Commission has afforded MDS/ITFS licensees the flexibility to utilize their spectrum for downstream (network-to-subscriber) communications, for upstream (subscriber-to-network) communications, or for both (subject solely to compliance with the Commission's interference protection rules).[95] No particular portion of the 2.1 or 2.5 GHz band is reserved for upstream or for downstream use. In some markets, a given 2.5 GHz band channel may be used as part of a channel pair combined with another 2.5 GHz band channel,

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[91] *Two-Way Report and Order*, 13 FCC Rcd at 19161, 19172.

[92] Although historically ITFS video programming has been transmitted utilizing analog modulation, most leases today provide for the use of digital compression. As broadband systems are deployed, the system operator typically will apply digital compression technology as needed to make more bandwidth available for broadband data services.

[93] *See FCC Interim Report* at 55-56.

[94] Thus, the Commission was correct in concluding that "[b]ecause of the regulatory flexibility that the Commission has allowed in this band and the licensing differences between each geographic area, conclusions cannot be made regarding the implementation of a typical ITFS/MDS system. *Id.* at 55.

[95] *Id.* at 25.

while in other markets the same channel may be paired with a 2.1 GHz band channel. In some cases, a given channel may be used to transmit video programming to ITFS receive sites, while in others it may be part of an integrated broadband system. Thus, segmenting away any particular channel or channels would have substantially different impacts on different systems.[96/]

- Although it is convenient to generally refer to channels A1-A4, B1-B4, C1-C4, D1-D4 and G1-G4 as the "ITFS channels" and to channels 1, 2/2A, E1-E4, F1-F4 and H1-H3 as the "MDS channels," that shorthand can be misleading. In fact, as the *FCC Interim Report* and *NPRM* correctly recognize, the Commission allows "channel swapping" under which MDS and ITFS licensees can exchange channel assignments.[97/] In addition, the Commission has long allowed MDS licensees (including MDS auction winners) to apply for vacant ITFS spectrum in areas where ITFS demand is limited.[98/] The net result is that any one of the so-called "ITFS channels" can, in a particular market, be licensed to an MDS licensee and that any of the "MDS channels" can be licensed to an ITFS licensee. Thus, were the Commission to decide to segment particular "ITFS channels" for 3G use, that segmentation would undoubtedly also result in a loss of spectrum licensed to MDS licensees (including MDS licensees who purchased their rights to "ITFS channels" at auction).

- The leasing of ITFS channel capacity for commercial broadband operations is pervasive. The *FCC Interim Report* concludes that "[t]oday, most ITFS licensees lease excess capacity to MDS operators," and elsewhere the Commission has found that up to 95% of all ITFS licensees engage in leasing.[99/] This leasing reflects the fact that most, if not all of the available spectrum in the 2.1 and 2.5 GHz bands must be available in order for a broadband service to be viable. This leasing generally leads to the development of highly-integrated networks that are shared for

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[96/] While it is generally true that channels in the 2.5 GHz bands are used for a variety of applications, it is becoming increasing less true with respect to MDS channels 1 and 2/2A in the 2.1 GHz band. As discussed *infra*, those particular channels are routinely being deployed as the initial upstream capacity in most broadband systems, and consequently any relocation of that spectrum would have a devastating impact on the system operator.

[97/] *See NPRM* at ¶ 61; *FCC Interim Report* at 26; *Two-Way Report and Order*, 13 FCC Rcd at 19162-71; *Two-Way Reconsideration Order*, 14 FCC Rcd at 12790-91.

[98/] *FCC Interim Report* at 24 & n.35; *NPRM* at ¶ 61 & n.114.

[99/] *FCC Interim Report* at 25; *see also Request for Declaratory Ruling on the Use of Digital Modulation by Multipoint Distribution Service and Instructional Television Fixed Service Stations*, 11 FCC Rcd 18839, 18870 n.86 (1996).

> commercial and educational purposes.[100/] Again, the result of the development of these shared networks is that the "ITFS channels" are used extensively for commercial broadband services, and the "MDS channels" are used in part to provide educational materials.[101/] Any effort by the Commission to segment away "ITFS channels" will have just as devastating an effect on the network as if the Commission were to segment away "MDS channels."[102/]

None of this is news. The *FCC Interim Report* is correct in determining that:

> because of the complex licensing scheme present in this band due to the mix of auction winners, incumbent ITFS and MDS licensees and the channel swaps and lease agreements that have been implemented, blanket statements as to the effect of segmentation on any specific market area cannot be made. To fully understand the implications of any segmentation plan on the ITFS/MDS service, each geographic area would need to be analyzed individually.[103/]

Yet, within the IWG process, it was strongly suggested by certain representatives of the mobile community that for the 2.5 GHz band to be of value for 3G, the same frequencies would have to be available for 3G nationwide.

[100/] While the Commission's Rules require that ITFS licensees transmit certain required quantities of educational materials, the Commission has afforded licensees the flexibility to "channel shift" those transmissions onto any channel in the system. Thus, where the ITFS licensee utilizes a portion of the broadband capacity of the shared network to comport with its minimum educational requirements, its bits may be delivered over any of the channels in the system (including MDS channels).

[101/] Even in those situations where the ITFS licensee retains the ability to "broadcast" video programming (in addition to or instead of receiving capacity on the broadband system), that video programming is not necessarily transmitted over "ITFS channels." As is reflected by the model band plans incorporated into the *FCC Interim Report*, in those situations where the separation band between 2.5 GHz upstream and downstream channels is used for transmitting video programming from a central site, those transmissions often will be over the E or F Group MDS channels.

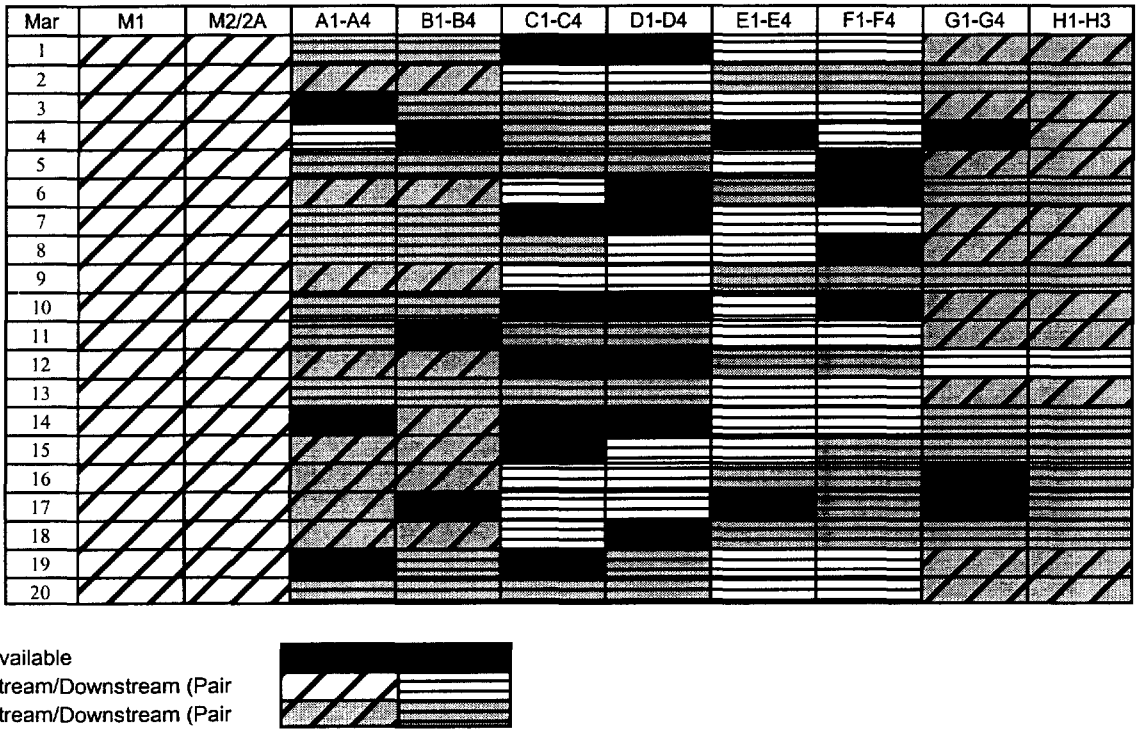
[102/] Of course, any segmenting away of the ITFS channels would have another effect – it would make those channels unleasable to MDS system operators. As a result, ITFS licensees relegated to balkanized replacement spectrum would find themselves without access to the broadband network and unable to develop their own facilities because they no longer have the financial, technical and operational support of the MDS industry.

[103/] *FCC Interim Report* at 62.

To illustrate the devastating impact that a nationwide segmentation could have, WCA has examined the deployment plans by one operator in twenty markets and the impact on those plans were the Commission to adopt any of the segmentation options set out in the *FCC Interim Report*. The following table illustrates the channels that are or are expected to be available in each of the markets, and the manner in which each channel is expected to be used:[104/]

[104/] In cases where downstream channels are immediately adjacent to upstream channels, it will be necessary to set aside a guardband from the spectrum shown as available. Note also that the table does not identify spectrum that will be used for educational purposes. In some cases, channels indicated as being used for downstream communications will be used for downstream video broadcasting of digitized ITFS educational material, while in others the ITFS licensee will use a portion of the bandwidth of the entire system for broadband applications. In addition, in some cases (particularly where one set of interleaved channels is unavailable), channels shown as being used for downstream may only be available for transmissions from the existing supercell transmission site and cannot be utilized in a multicell configuration. Moreover, channel availability does not reflect compromises to system design that may be necessary on a given channel in order to provide interference protection to adjacent markets. Finally, in some cases downstream channels indicated as being paired with either the 2.1 GHz band or the 2.5 GHz band may actually be used with both sets of upstream channels.

TABLE I



From this Table, the implications of the 90 MHz segmentation plans set out in the *FCC Interim Report* become clear:

- Were the Commission to adopt Option 1 and take the A, B, E and F Group channels, the operator would be left with only 49 MHz (assuming only a 6 MHz 3G-to-MDS/ITFS guardband requirement, which may be unduly conservative)[105/] from which to satisfy its own needs, those of its ITFS affiliates and any necessary internal system guardbands in Market 1 (which is one of the five largest BTAs in the country), Markets 7, 10 and 12 (all of which are top 25 markets), and Market 14 (a top 30 market), and would be left with only 70 MHz in Markets 6, 15, 16, 17, 18 and 19 (all of which are top 50 markets). The operator believes, and the HAI Study confirms, that the economic viability of a broadband wireless service to residential, commercial and educational users in these markets would be devastated in these and similar markets by adoption of Option 1.

[105/] For purposes of this discussion, it is assumed that a 4 MHz MDS 2A, and not a full 6 MHz MDS 2, is utilized for upstream communications. However, for the reasons set forth *infra*, WCA urges the Commission to retain the full 6 MHz channel 2 allocation.

- If Option 2 were adopted and the Commission takes the A, B, C and D Group channels, the operator would be left with only 52 MHz in Market 4 and Market 17, and 76 MHz in Markets 5, 6, 8, 10 and 16 (all of which except Market 4 are top 50 markets). The operator believes, and the HAI Study confirms, that the economic viability of a broadband wireless service to residential, commercial and educational users in these markets would be devastated in these and similar markets by adoption of Option 2.

- The adoption of Option 3 and the taking of the A, B, G and H Group channels would leave the operator with 34 MHz of spectrum in Market 10 (a top 25 market), only 55 MHz of spectrum in Markets 1, 6, 7, 12 and 14, 76 MHz in Markets 4, 17, 18 and 79 MHz in Markets 5, 8, 15 and 19. The operator believes, and the HAI Study confirms, that the economic viability of a broadband wireless service to residential, commercial and educational users in these markets would be devastated in these and similar markets by adoption of Option 3.

As this establishes, the Commission was correct in concluding that any given segmentation plan is likely to have a devastating impact on some markets and that "no segmentation option appears to be significantly better than another in terms of number of licensees affected."[106/]

Because the 2.1 GHz band was not addressed in the *FCC Interim Report*, the *NPRM* has also solicited specific comment on the current and future use of those channels and the implications of any reallocation or relocation.[107/] In short, the 2.1 GHz band is playing a critical role in the deployment of two-way wireless broadband services and any reallocation or relocation would have a devastating impact on the roll-out plans of the industry.

As a general rule, MDS channels 1 and 2/2A, which occupy the 2.1 GHz band, are the first channels deployed for upstream communications when a system operator converts to two-way broadband operations. Indeed, WCA is unaware of any two-way system that does not employ the

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[106/] *FCC Interim Report* at 62.

[107/] *See NPRM* at ¶ 55.

2.1 GHz band for upstream communications. The popularity of the 2.1 GHz band for upstream can be traced to several factors.

As a practical matter it is often essential for an operator to utilize the 2.1 GHz band in order for the operator to have sufficient capacity to operate a viable system. Returning to the HAI Study, the negative implications of having fewer than twenty-six channels for providing broadband service to subscribers are clear. If broadband providers were restricted to solely the 2.5 GHz band, however, they would rarely be able to secure that critical mass of channels needed to provide a cost-effective service. The 2.5 GHz band only contains thirty-one channels and, as discussed above, some of those channels may not be available for broadband services for a variety of market-specific reasons (including co-channel interference protection restrictions or the unwillingness of the licensee to participate).

It is important to note that having access to the 2.1 GHz band not only affords the operator 10-12 MHz of additional spectrum (depending on whether the market is allocated a 6 MHz channel 2 or a 4 MHz channel 2A), but it also allows more spectrally-efficient use of the 2.5 GHz band. As noted in the *FCC Interim Report*, the transceivers utilized at subscriber premises require a separation between upstream and downstream transmissions. While the first generation of transceivers require a separation on the order of 42 MHz, the industry anticipates that this figure will be reduced to 30 MHz within the near term. Thus, the model band plans annexed to the *FCC Interim Report* as Appendix 3.4 provide a 30 MHz (five 6 MHz channel) "separation" band (the specific channels varying from plan to plan). That does not mean, however, that the "separation" band cannot be used for broadband services; to the contrary, by pairing the five "separation" channels at 2.5 GHz (and

perhaps other downstream channels) with the two channels at 2.1 GHz, the system operator can make highly-productive use of all of the 2.5 GHz band.

While any given transceiver must have a separation between the channels it uses to transmit and to receive, a system operator can deploy to different subscribers different transceivers tuned to different upstream and downstream channel pairings. Although the "separation" channels are not used by transceivers that are tuned to operate solely in the 2.5 GHz band, they can be paired in different transceivers with the channels at 2.1 GHz and used in the provision of broadband service. In other words, some subscribers would use equipment tuned solely to the 2.5 GHz band, while others would use equipment tuned to the 2.1 GHz band for upstream and capable of receiving the "separation"channels in the 2.5 GHz band for downstream. This is illustrated in Table I above, which shows pairings of 2.5 GHz downstream channels with both 2.1 GHz and 2.5 GHz upstream channels. This is highly efficient from a spectrum management view, as it makes all channels useable for broadband and puts the downstream spectrum that is paired with 2.1 GHz band upstream immediately adjacent to the downstream spectrum that is paired with 2.5 GHz band upstream, an approach which minimizes guardband requirements.

The popularity of using MDS channels 1 and 2/2A also can also be traced to the fact that it tends to be the approach that can be deployed most rapidly from a leasing perspective. More so than any other channels, the channels at 2.1 GHz tend to be licensed directly to the system operator and thus can be used for upstream communications without the need for time-consuming lease negotiations with a licensee.[108/] Because most operators are deploying supercell architectures upon

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[108/] Indeed, these channels are quite frequently licensed to the holder of the BTA authorization secured at auction. As a result, any effort by the Commission to reallocate or relocate licenses acquired by auction in