Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	ET Docket No. 00-258
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, Including Third Generation Wireless Systems	)	
	)	
Petition for Rulemaking of the Cellular Telecommunications Industry Association Concerning Implementation of WRC-2000: Review of Spectrum and Regulatory Requirements for IMT-2000	)	RM-9920
	)	
Amendment of the U.S. Table of Frequency Allocations to Designate the 2500-2520/ 2670-2690 MHz Frequency Bands for the Mobile-Satellite Service	)	RM-9911
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COMMENTS OF THE ASSOCIATION OF AMERICA'S PUBLIC TELEVISON STATIONS

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COMMENTS OF THE ASSOCIATION OF AMERICA'S PUBLIC TELEVISON STATIONS

The Association of America's Public Television Stations ("APTS") hereby submits its comments in response to a Notice of Proposed Rulemaking[1] in the above captioned proceeding. APTS is a nonprofit organization whose members comprise the licensees of nearly all of the nation's 352 noncommercial educational television stations. APTS represents public television

[1] See In the Matter of 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, Including Third Generation Wireless Systems; Petition for Rulemaking of the Cellular Telecommunications Industry Association Concerning Implementation of WRC-2000: Review of Spectrum and Regulatory Requirements for IMT-2000; Amendment of the U.S. Table of Frequency Allocations to Designate the 2500-2520/ 2670-2690 MHz Frequency Bands for the Mobile-Satellite Service, Notice of Proposed Rulemaking and Order, FCC 00-445 (January 5, 2001) ("NPRM").

stations in legislative and policy matters before the Commission, Congress, and the Executive Branch and engages in planning and research activities on behalf of its members.

Summary of APTS' Position

APTS opposes reallocation of the spectrum at 2500-2690 MHz for mobile digital telephony ("third generation" or "3G" telephony). Currently, 59 public television licensees operate 288 Instructional Television Fixed Service ("ITFS") channels as part of their mission to deliver educational services to their communities. This spectrum is used to deliver instructional programming to educators and students of all ages, from K-12 enrollees to those who are continuing their education through degree programs offered by colleges and universities. ITFS licensees also deliver continuing education services to professionals at remote locations who may not otherwise have access to such services. In addition, ITFS licensees frequently serve as an essential link between health care professionals and rural hospitals and clinics. And several ITFS licensees have engaged in partnerships with broadband developers to bring wireless broadband capability to rural and underserved areas. The public benefits that ITFS and its partners offer are substantial and should not be foreclosed by reallocation of the spectrum for 3G telephony.

However, if the Commission were to decide that additional spectrum within the 2500-2690 MHz band should be made available for 3G services, APTS urges the Commission to establish that ITFS licensees should be reimbursed for all costs associated with finding new spectrum. In addition, should the Commission require ITFS licensees to relocate, either within a smaller portion of the 2500-2690 MHz band or to another frequency band, it should waive its policy subjecting ITFS licensees to auctions when applying for new spectrum. If the

Commission decides that a waiver procedure is not authorized by statute, it should include the cost of bidding for new spectrum within the reimbursed relocation costs.

A. Background –3G Mobile Telephony and the Commission's Proposals

On June 2, 2000, the United Nations International Telecommunication Union's World Radiocommunications Conference ("WRC-2000") in Istanbul agreed to encourage the development of international digital mobile telecommunications, otherwise known as "third generation" or "3G" telephony.[2] WRC-2000 predicted that 160 MHz of additional spectrum would be needed world-wide in order to meet the projected requirements of 3G telephony in those areas where traffic is highest by the year 2010. WRC-2000 identified the spectrum at 1710-1885 MHz and 2500-2690 MHz as possible candidates for 3G use and agreed that while national telecommunications agencies, e.g. the FCC, could consider reallocating these bands for 3G telephony, reallocation would not be mandatory.[3]

The spectrum at 2500-2690 is currently used by educational institutions and related non-profits to deliver instructional video to schools and other locations through the Instructional

[2] Although the Commission does not believe it is necessary or desirable to define what is or is not a 3G service, the Commission notes that the ITU has set forth key features of 3G telephony. These include mobile data rates of 144 kb/s or higher in high mobility environments; 384 kb/s for pedestrian traffic; and 2 mb/s or higher for indoor traffic. NPRM, ¶¶ 17-18.

[3] NPRM, § 4, and Provisional Final Acts of the World Radiocommunications Conference (Istanbul, WRC-2000), Resolution 223. For further information, see the International Telecommunication Union's website at <http://www.itu.int/newsroom/wrc2000/IMT-2000/2500-2690.html>; and <http://www.itu.int/newsroom/wrc2000/IMT-2000/res-COM5-24.html>. The WRC-200 also identified the frequencies at 806-960 MHz for possible use by 3G telephony. Provisional Final Acts of the World Radiocommunications Conference (Istanbul, WRC-2000), Resolution 224.

Television Fixed Service ("ITFS").[4] ITFS licensees also frequently engage in partnership leases with licensees of the Multichannel Multipoint Distribution Service ("MMDS") in this frequency band to deliver very high speed fixed wireless broadband service.[5] In its interim report on the use of the 2500-2690 MHz band,[6] the Commission considered three band segmentation plans that could provide 90 MHz of spectrum for 3G telephony while retaining 100 MHz for ITFS/MMDS use. However, it concluded that large separation distances between 3G and ITFS/MMDS services were needed to allow for co-channel sharing. The Commission found that there are few geographic areas where incumbent systems are not operating, and that segmenting the band would therefore raise technical and economic difficulties for incumbents, especially in their ability to serve rural areas, thus making spectrum sharing infeasible.[7] The Commission expects to release an additional final report in March of 2001.[8] On January 5, 2001, the Commission released its Notice of Proposed Rulemaking and Order and sought comment on its interim findings, as well as on proposals either to allow 3G services to share spectrum with

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[4] The spectrum at 1710-1885 MHz is primarily used in the United States by the Federal Government for point-to-point microwave communications, military tactical radio relay, airborne telemetry, and precision guided munitions. NPRM, ¶ 40. On October 13, 2000, President Clinton directed the Secretary of Commerce to work cooperatively with the FCC to study the spectrum needs of 3G wireless telephony and to examine the potential for reallocation of the spectrum bands identified by WRC-2000. See NPRM, ¶ 5, and William J. Clinton, Memorandum for the Heads of Executive Departments and Agencies, "Advanced Mobile Communications/ Third Generation Wireless Systems," October 13, 2000. See also http://www.ntia.doc.gov/ntiahome/threeg/3gmemo.htm. On October 20, 2000, the Department of Commerce's National Telecommunications and Information Administration ("NTIA") issued its study plan. NPRM, ¶ 6, citing NTIA, "Plan to Select Spectrum for Third Generation (3G) Wireless Systems in the United States," (October 20, 2000), http://www.ntia.doc.gov/ntiahome/threeg/3g_plan14.htm. On November 15, 2000, NTIA issued a report on the 1755-1850 MHz band. NPRM, ¶ 6, citing NTIA, "Federal Operations in the 1755-1850 MHz Band: The Potential for Accommodating Third Generation Mobile Systems," Interim Report (November 15, 2000). See http://www.ntia.doc.gov/osmhome/reports/imt2000/.

[5] NPRM, ¶ 58.

[6] See Federal Communications Commission, "Spectrum Study of the 2500-2690 MHz Band: The Potential for Accommodating Third Generation Mobile Systems," Interim Report, ET Docket No. 00-232, DA 00-2583 (November 15, 2000), ("FCC Interim Spectrum Report"), available at http://www.fcc.gov/3G/.

[7] Id., at iii.

[8] NPRM, ¶ 62.

ITFS/MMDS licensees or to reallocate either a portion or the entirety of the 2500-2690 MHz spectrum for 3G telephony.

B. Reallocation of the 2500-2690 MHz Band Would Threaten the Ability of Public Television Stations to Deliver Educational Services to Their Communities over ITFS

The Commission has asked what effect reallocation or relocation would have on distance learning and the overall educational mission of ITFS licensees.[9] For the past 40 years, more than 1200 educational and nonprofit entities, including public television stations, have held well over 2,000 ITFS licenses to provide distance education and other critical educational services to millions of students and teachers in over 70,000 locations throughout the nation.[10] Currently, 59 public television licensees operate 288 ITFS channels.[11] Public television stations use their ITFS licenses to further their educational mission by providing distance learning, professional development and telemedicine to rural communities and underserved citizens. Any reallocation of the 2500-2690 MHz spectrum, either in whole or in part, would severely hamper the ability of ITFS licensees to serve their educational mission.

For instance, public television stations WHRO in Norfolk, Virginia, uses its ITFS network to provide K-12 educational programming to more than two dozen school districts and 14 colleges, as well as operating an extensive telemedicine network for medical practitioners in

[9] NPRM, ¶ 64.

[10] See Comments of the National ITFS Association, ET Docket No. 00-258, RM-9920, RM-9911 (February 22, 2001), p. 3. See also FCC Interim Spectrum Report, p. 18.

[11] ITFS stations are licensed to accredited educational institutions, governmental organizations engaged in the formal education of enrolled students, or nonprofit organizations, such as public television stations, whose purposes are educational and include providing educational and instructional material to accredited educational institutions and governmental organizations. 47 C.F.R. § 74.932(a).

rural areas of Virginia, Maryland and North Carolina.[12] In addition, public television station WLRN in Miami, Florida, uses its ITFS licenses to deliver instructional programming to 366,000 elementary and secondary school children in the Miami-Dade public school system, and has invested approximately $10 million to outfit schools with the necessary reception capability. WLRN also provides distance learning opportunities for students enrolled at Florida International University and addresses the needs of its substantial Latino community by providing an educational Spanish-language channel on its ITFS system.[13]

Moreover, WITF, a public television station in Harrisburg, Pennsylvania, uses its ITFS licenses to provide distance learning opportunities for over 200 students enrolled in nursing studies at York College, as well as a vital doctor's information exchange and telemedicine service for medical practitioners at the Pennsylvania State University Hershey Medical Center, York Hospital and Chambersburg Hospital. It also provides health education programs over ITFS to the Pennsylvania Department of Health and delivers chemistry courses to area business as well. In addition WITF also uses its ITFS spectrum to distribute continuing legal education courses for Pennsylvania lawyers to keep current in their field.

In addition to the above examples, many additional public television stations use their ITFS licenses in innovative and creative ways to deliver critical educational services to their communities in accordance with their mission. For example:

- KLVX in Las Vegas maintains its ITFS channels to serve Las Vegas, Boulder City, and Parhump, Nevada. KLVX delivers over fifty hours of ITFS programming per channel to over 170 schools each week. This programming includes foreign language, math, science, adult continuing education, professional development, high school completion ("GED") programming,

[12] For a detailed description of these services, the Commission is referred to Appendix A of this comment.

[13] For a detailed description of these services, the Commission is referred to Appendix A of this comment.

English as a second language classes, basic literacy, technology assistance, classroom management, support staff training, and distance learning courses.[14]

- In Washington State, the Boeing Company trains graduate engineers at their work sites through a partnership with public television station KCTS, Seattle. KCTS manages an ITFS channel and Boeing helps pay for the delivery system so it can receive engineering training from Stanford University. And KWSU offers distance degree programs though Washington State University on its ITFS system.

Additionally, several state public television systems have substantially invested in and maintained state-wide ITFS systems to deliver educational services to their citizens.

- The South Carolina Educational Television Commission has established an extensive ITFS system across the state at a cost of $28 million. Through its ITFS system, it provides instructional television to 723 of its public schools, development courses for teachers, college credit courses, medical education courses, adult literary courses, early childhood instructional programming, professional development seminars, law enforcement in-service training courses, and continuing legal education courses.

- The Wisconsin Educational Communications Board maintains a state-wide system of ITFS channels that distributes high school courses, technical college courses and courses through the Department of Corrections.

- Mississippi ETV participates in a state-wide consortium, known as "Ednet," which is licensed to operate twenty statewide ITFS channels. Mississippi ETV provides instructional and children's programming over its ITFS channels to the citizens of Mississippi.

As these examples illustrate, public television stations across the nation are fully using their ITFS licenses to provide critical educational services to their communities. Reallocation of

[14] In addition, KUAT in Tucson, Arizona, WFYI in Indianapolis, Indiana WNEO in Youngstown, Ohio, and WMVS in Milwaukee, Wisconsin, all use their ITFS licenses to provide educational program and staff development services to local school districts, frequently in association with local colleges that serve these communities.

the spectrum at 2500-2690 MHZ, either in whole or in part, would therefore jeopardize the availability of these services and should be avoided as a matter of sound policy.[15]

C. Reallocation of the 2500-2690 MHz Band Would Also Stifle the Development of Broadband Access in Rural and Underserved Communities

Through cooperative industry arrangements with broadband developers such as Sprint, WorldCom, Neucentrix, and IPWireless, rural and underserved communities are already receiving wireless broadband capability now or will in the immediate future. Until recently, ITFS use consisted of the delivery of one-way wireless video services. However, the FCC has recently made it possible for ITFS licensees to provide two-way, digital wireless services, creating the opportunity for a greater interactivity in distance education, wireless high-speed Internet access, and other broadband service to rural and underserved communities.[16] In many circumstances, broadband developers have paid the costs of ITFS licensees' digital upgrades, which have increased the number of channels available and the efficiency of their use. In exchange, ITFS licensees may lease excess capacity to these companies to deliver wireless broadband capabilities

[15] The National ITFS Association has ably demonstrated in its comments how any partial reallocation, or band segmentation plan, would threaten the technical ability of ITFS licensees to deliver their educational services. See Comments of the National ITFS Association, ET Docket No. 00-258, RM-9920, RM-9911 (February 22, 2001), pp. 28-31. APTS incorporates these observations by reference.

[16] See Amendment of Parts 21 and 74 to Enable Multipoint Distribution Service and Instructional Television Fixed Service Licensees to Engage in Fixed Two-Way Transmissions, Report & Order, FCC 98-231, 13 FCC Rcd 19112 (1998) ("1998 ITFS Order"); Amendment of Parts 1, 21, and 74 to Enable Multipoint Distribution Service and Instructional Television Fixed Service Licensees to Engage in Fixed Two-Way Transmissions; Request for Declaratory Ruling on the Use of Digital Modulation by Multipoint Distribution Service and Instructional Television Fixed Service Stations, Report & Order on Reconsideration, FCC 99-178, 14 FCC Rcd 12764 (July 13, 1999); and Amendment of Parts 1, 21 and 74 to Enable Multipoint Distribution Service and Instructional Television Fixed Service Licenses to Engage in Fixed Two-Way Transmissions, Report & Order on Further Reconsideration and Further Notice of Proposed Rulemaking, FCC 00-244 (July 21, 2000).

to rural and underserved communities while at the same time delivering enhanced educational material to enrolled students.

The National ITFS Association has described the advantages of these cooperative arrangements to the American public in its comments, and it notes, as does the Commission, that 25 companies are already providing high-speed Internet access services in at least 43 markets, with more than 2000 applications pending before the Commission.[17] As the Commission has recognized, the investment in this critical infrastructure has amounted to several billion dollars and provides "a significant opportunity for further competition with cable and digital subscriber line[s]" in urban areas while delivering broadband capabilities to rural areas for the first time.[18] The Commission also correctly notes that these newly developed systems will also enable ITFS operators to bring a wide variety of broadband services to educational users in accordance with their educational mission.[19] In addition, the Commission has recognized that the broadband roll-out associated with ITFS partnerships is expected to "grow substantially over the next 3 to 5 years."[20] Reallocating the 2500-2690 MHz band, either in whole or in part, would undermine these cooperative arrangements and substantial investments to the detriment of the public interest.[21]

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[17] NPRM, ¶ 60; FCC Interim Spectrum Report, p. 21; Comments of the National ITFS Association, ET Docket No. 00-258, RM-9920, RM-9911 (February 22, 2001), p. 11.

[18] FCC Interim Spectrum Report, pp. 17-18, 21.

[19] Id. at p. 18.

[20] Id., pp. 21-22. The FCC has also stated that these broadband services are expected to increase from $767 million in 1999 to $7.4 billion by 2003, and that the total number of fixed wireless broadband subscribers is predicted to increase from 200,000 this in 2000 to 9.4 million in 2005. Id., p. 22.

[21] The National ITFS Association has ably demonstrated in its comments how any partial reallocation, or band segmentation plan, would threaten the technical ability of ITFS licensees to deliver their wireless broadband services. See Comments of the National ITFS Association, ET Docket No. 00-258, RM-9920, RM-9911 (February 22, 2001), pp. 28-31. APTS incorporates these observations by reference.

D. When Considering Reallocation of the 2500-2690 MHz Band, The Commission Should Carefully Balance the Public Benefits of ITFS Educational Services and ITFS/MMDS Broadband Partnerships Against the Apparent Spectrum Needs of 3G Telephony

In light of the above discussion, the educational benefits that ITFS offers to the public are quite substantial, as are the benefits of the wireless broadband roll-out associated with ITFS/MMDS broadband partnerships. In considering whether to reallocate the spectrum at 2500-2690 MHz, the Commission should carefully balance these benefits against the apparent spectrum needs for 3G telephony. However, questions have been raised regarding the spectrum needs for 3G telephony. For instance, the National ITFS Association has raised doubts about the need for additional spectrum, about the ability to deliver the data speeds associated with the IMT-2000 standard, and about the current and future consumer demand for 3G telephony in the United States.[22] It has also noted that even if additional spectrum were necessary for 3G telephony, 160 MHz of spectrum may be available from sources other than the 2500-2690 MHz band.[23] Given these questions, the Commission should bear in mind the compelling public benefits associated with ITFS educational services and ITFS/MMDS wireless broadband partnerships before considering reallocation of the 2500-2690 MHz band either in whole or in part.

[22] Comments of the National ITFS Association, ET Docket No. 00-258, RM-9920, RM-9911 (February 22, 2001), pp. 17-21.

[23] Comments of the National ITFS Association, ET Docket No. 00-258, RM-9920, RM-9911 (February 22, 2001), pp. 21-24.

E. If ITFS Licensees Are Forced to Relocate, All Expenses Must Be Reimbursed and ITFS Applicants Should be Exempted from Spectrum Auctions

The Commission asks how incumbent ITFS licensees could be accommodated in other frequency bands and how incumbents should be reimbursed for the costs of relocation if relocation is required.[24] If the Commission were to decide that additional spectrum within the 2500-2690 MHz band should be made available for 3G services, APTS urges the Commission to establish that ITFS licensees should be reimbursed for all costs associated with finding and relocating to new spectrum. Such costs would include, but not be limited to, the costs of new transmitters, combiners, feed lines, antenna, receive equipment and any additional costs, such as staff time costs, licensing costs, and the cost of commissioning propagation and interference engineering studies.

Relocation to other spectrum would be expensive. For instance, WITF, a public television ITFS licensee in Pennsylvania with 16 ITFS channels, has calculated that the total costs associated with relocation would amount to $420,500.[25] This substantial cost is far beyond the ability of most non-profit organizations to absorb without assistance. Fundamental principles of fairness therefore dictate that new entrants should reimburse incumbents for all of the reasonable costs associated with relocation, should relocation be required.

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[24] NPRM, ¶ 65.

[25] The costs are estimated as follows:

- Replacement transmitters: $16,000 x 16 = $256,000
- Replacement combiners: $10,000 per site x 4= $40,000
- Replacement feed lines (4 sites installed) = $49,500
- Replacement antenna: $15,000 x 4 sites = $60,000
- Replacement receive equipment: $500 x 30 = $15,000.

Moreover, this policy is consistent with the Commission's own stated policy encouraging the development of new telecommunications technologies for the new millennium and its most recent application of this policy in the 2GHz proceeding. The policy states that the emerging technology service provider must guarantee payment of all relocation expenses, build the new facilities at the relocated frequencies, and demonstrate that the new facilities are comparable to the old as follows:

> (1) The emerging technology service provider must guarantee payment of all relocation costs. This includes all engineering, equipment, site and FCC fees, as well as any reasonable, additional costs that the relocated fixed microwave licensee may incur as a result of operation in a different fixed microwave band or migration to other media.
>
> (2) The emerging technology service provider must complete all activities necessary for implementing the new facilities, including engineering, frequency coordination and cost analysis of the complete relocation procedure. This also includes identifying and obtaining, on the incumbents' behalf, new microwave frequencies or other facilities where applicable.
>
> (3) The emerging technology service provider must build the new microwave system (or alternative) and test it for comparability to the existing 2 GHz system. The 2 GHz microwave licensee would not be required to relocate until the comparable alternative facilities are available to it for a reasonable time to make adjustments and ensure a seamless handoff. If within one year after the new facilities are in operation, they are demonstrated by the 2 GHz microwave licensee to be not comparable to the former facilities, the emerging technology service provider must remedy any deficiencies or pay to relocate the microwave licensee back to the former 2 GHz frequencies.[26]

Should relocation be required, the Commission should afford ITFS licensees the same level of protection provided to licensees in the 2 GHz band.

[26] See Redevelopment of Spectrum to Encourage Innovation in the Use of New Telecommunications Technologies, First Report & Order, ET Docket No. 92-9, 7 FCC Rcd 6886, ¶ 24 (1992); and Amendment of Section 2.106 of the Commission's Rules to Allocate Spectrum at 2 GHz for Use by the Mobile-Satellite Service, Second Report & Order and Second Memorandum Opinion & Order, FCC 00-233, ET Docket No. 95-18, ¶ 108 (July 3, 2000).

In addition, if the Commission were to require ITFS licensees to relocate, either within a smaller portion of the 2500-2690 MHz band or to another frequency band, it should waive its rules subjecting mutually exclusive ITFS licensees to spectrum auctions when applying for new spectrum.[27] Without a spectrum auction waiver, many ITFS licensees, given their non-profit status and limited financial means, would not be able to relocate, even with reimbursement for relocation costs, because of the high prices associated with auctioned spectrum. However, if the Commission decides that an auction waiver procedure is not authorized by statute, it should include the cost of bidding for new spectrum within the costs of reimbursable relocation costs.

Conclusion

APTS opposes reallocation of the spectrum at 2500-2690 MHz for 3G mobile telephony, because it is currently used by ITFS licensees to deliver valuable educational services to their communities. In addition, ITFS licensees have engaged in cooperative industry arrangements with broadband developers to bring wireless broadband capability to rural and underserved communities. It would therefore be unwise to wholly abandon a forty year commitment to educational services in the ITFS band, so that additional spectrum can be made available for 3G telephony. However, if the Commission were to decide that additional spectrum within the 2500-2690 MHz band should be made available for 3G services, APTS urges the Commission to establish that ITFS licensees should be reimbursed for all costs associated with relocating to new spectrum. Additionally, the Commission should either waive the use of spectrum auctions for

[27] See 47 C.F.R. § 73.5000 and Implementation of Section 309(j) of the Communications Act—Competitive Bidding for Commercial Broadcast and Instructional Television Fixed Service Licenses, First Report & Order, MM Docket No. 97-234, FCC 98-194, ¶ 197, et seq. (1998) (competing ITFS license applications are subject to spectrum auctions).

displaced ITFS licensees or require reimbursement for auction costs if a waiver mechanism is not utilized.

Respectfully Submitted,

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APPENDIX A

WHRO Center for Public Telecommunications

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Summary:
WHRO, a PBS and NPR affiliate in Norfolk, VA, provides a variety of traditional educational programming to more than two dozen school districts and 14 colleges and universities located in the Hampton Roads area via their ITFS system. In addition to educational programming, WHRO operates an extensive telemedicine network using the ITFS spectrum, reaching medical professionals in Virginia, Maryland, and North Carolina.

Current Capacity:
WHRO is a public broadcasting station providing television and radio broadcasting to the Hampton Roads area. Owned by a consortium for 13 school divisions, WHRO provides a wide range of ITFS-based educational programming to k-12 school districts, private schools, junior colleges, four year colleges, universities, and the community. Thanks to their partnership with an MDS provider, WHRO was one of the first digital systems in the country, and currently provides 6 channels of programming over its spectrum. Through its broadcast facilities, WHRO reaches from Williamsburg, Virginia to North Carolina's Outer Banks, and to Maryland's Eastern Shore. The vast majority of this broadcast area is relatively sparsely populated.

In the mornings, WHRO provides 3 channels of educational programming to k-12 institutions. This programming reaches 27 districts and private schools in the area, and in addition to regularly scheduled programming, WHRO provides on-demand programming for teachers with specific needs. In the afternoon, these 3 channels broadcast higher education programming to members of the Virginia Tidewater Consortium for Higher Education, a group of 14 colleges and universities (public and private) in the area. Overall, educational programming is received at more than 150 sites, including k-12 schools, corporations, hospitals and other health care facilities, and college campuses.

In addition, on their fourth channel, WHRO broadcasts college courses that are rebroadcast to area cable subscribers, giving almost half a million cable subscribers the opportunity to take or audit college courses from home. Much of this programming is provided live, allowing home-viewers to interact with professors in real time. The fifth channel is used for a local weather channel, which is also rebroadcast by local cable companies.

In addition to the traditional educational programming, the system is used for extensive professional development by almost a dozen school districts and a local private school. By broadcasting over the ITFS system, these districts remove teachers from the classroom for shorter periods of time, cutting back the need for substitute teachers and saving the districts significant resources. As this system is modernized for two-way broadcasts, the teachers from

all over the region will be able to share educational materials, best practices, and other resources with one another with ease.

Cutting Edge Application

WHRO's final ITFS channel is used for an exciting telemedicine project that networks doctors in Maryland, Virginia, and North Carolina. Funded by the Virginia Health Care Foundation and based at the Eastern Virginia Medical School, this channel reaches 19 sites across the tri-state area, including hospitals, rural health clinics, colleges, community health centers, and private practice physicians.

This exciting telemedicine project was spurred by the goals of keeping physicians in this largely rural area connected to their peers and the need to support the training of new primary care providers in the area. This network allows residents from the medical school to practice in relatively rural and isolated areas, such as the Eastern Shore, but still talk to and interact with physicians at the medical school (which is an hour away or further by car), and allows residents to participate in Grand Rounds at the hospital even when they're practicing far from the school. The network also serves as a resource for practicing physicians who need medical continuation credits and consultations. For example, physicians on Virginia's Eastern Shore save three hours of round trip travel time for every class they take over the ITFS system, allowing them to spend more time with patients and to better allocate their extremely limited fiscal resources. It also allows these professionals to participate in a broad range of courses spanning a number of different specialties. This training over the system is widely used by doctors to keep up on the latest developments and research in the medical profession, and video-based consults have saved doctors and patients hours of time and thousands of dollars that would have been spent traveling and processing paperwork.

In addition to serving medical professionals, the ITFS-based telemedicine network at WHRO also serves as a resource to the public. Many public health facilities run the programming over their television systems within the facility, allowing members of the public visiting a doctor an inside look at medical information.

WLRN in Miami, Florida

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Summary: WLRN delivers instructional programming to 366,000 elementary and secondary school children in the Miami-Dade Public School System. Through the ITFS on-demand system, teachers may request a specific time for a program to air, and WLRN routinely has requests for 7 hours of programming each school day. The extensive WLRN library of programming allows a concentration of expertise; no one school could have as many tapes or the staff necessary to acquire appropriate programming. This valuable program has required an enormous investment for the school system; almost $10 million in fixed costs were required to make this heavily used system universally available in the Miami schools. In addition, Florida International University (FIU) uses an ITFS channel for its distance learning program.

Bringing the World to the Classroom. The instructional videos available through WLRN allow children access to resources and information they could not acquire anywhere else. The video library's extensive holdings range from Art and Substance Abuse Education to Science and U.S. History. WLRN regularly broadcasts programs in Economics, Spanish, Health, Reading, Social Studies, Geography, French, and Career Education. About 660 new programs are available every two months, reflecting the enormous diversity of teaching needs, requests, and resources available. The catalog of programs is available on two additional ITFS channels, and teachers find the system for requesting videos easy to use, quick, and reliable.

An Irreplaceable System. To make this program universal, WLRN has spent almost $10 million to outfit schools with television sets, receivers, transmitters, and other essential equipment. Perhaps more significant is the concentration of expertise created by the ITFS system; no one school could posses an extensive library of over 6,000 videos and certainly could not afford the specialized media staff necessary to research and acquire the best and most useful programming. WLRN also realizes large cost-savings as a "bulk" buyer that could not be duplicated if individual schools were making purchases. Only 13 staff members—including field technicians to maintain the equipment—are needed to meet the needs of over 310 elementary, middle, and high schools.

Bringing Two-Way Learning to the Classroom. WLRN's dynamic program plans to expand to develop a two-way system for distance learning. After approval of the two-way license application, WLRN plans to implement interactive programs that would not be available to students otherwise. It will begin with advanced placement classes for high school students; the students qualified for these courses are too dispersed to justify a teacher in any one location. In addition, new plans for digital capabilities will allow WLRN to stream data and video over its system, providing them with invaluable speed and a back-up system to its existent wide access network.

Distance Learning at the University Level. Florida International University offers a variety of classes using one channel of WLRN's ITFS system. Among others, it offers classes for teachers allowing them to pursue certification, masters degrees, or continuing education credits. In addition, FIU has launched the "Gateway Program," which targets minority and underprivileged high school students and supports their efforts to pursue higher education in the sciences. Using the ITFS system, these students are able to overcome the enormous barriers that this dispersed, diverse, and otherwise underserved group of students face and take these challenging science and engineering classes via the ITFS system.

Serving the Community. In an area with a large Spanish-speaking population, WLRN's ITFS system provides an educational Spanish-language station that links to the major cable networks in the Miami-Dade area. In addition, using ITFS technology, WLRN broadcasts Spanish-language programming, including ESL and high quality news and entertainment programs.

Helping to Support Irreplaceable Programs. The Miami school system has recently reached an agreement with Bell South that will allow WLRN to go digital, doubling the number of channels available to the school district and giving Bell South access to the excess capacity for its customers. In exchange, Bell South will pay the school district, contributing substantially to its distance learning budget, as well as funding the conversion to digital that allows the additional channels to be created.