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LAW OFFICES
LEVENTHAL, SENTER & LERMAN P.L.L.C.
SUITE 600
2000 K STREET, N.W.
WASHINGTON, D.C. 20006-1809

ORIGINAL

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CHRISTOPHER J. SOVA
PHILIP A. BONOMO
JUAN F. MADRID

OF COUNSEL
MARLA R. WOLFE

TELEPHONE
(202) 429-8970
TELECOPIER
(202) 293-7783

WWW.LSL-LAW.COM

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

WRITER'S DIRECT DIAL
202-416-6744

WRITER'S DIRECT FAX
202-429-4601

WRITER'S E-MAIL
NLEVENTHAL@LSL-LAW.COM

VIA HAND DELIVERY

Ms. Magalie Roman Salas
Secretary
Federal Communications Commission
The Portals
445 Twelfth Street, S.W.
Washington, DC 20554

Re: **EX PARTE PRESENTATION OF THE ICO USA SERVICE GROUP**
ET Docket No. 95-18

Dear Ms. Salas:

BT North America Inc., Hughes Telecommunications and Space Company, Telecomunicaciones de Mexico and TRW Inc. (together, the "ICO USA Service Group" or "IUSG"),¹ by their attorneys, hereby direct the Commission's attention to a significant aspect of a report prepared by the National Telecommunications and Information Agency ("NTIA")² that

¹ The IUSG is comprised of established communications-oriented companies that are investors in ICO Services Limited ("ICO"), and that may also be providers of ICO mobile satellite services ("MSS") in the United States. ICO has filed a Letter of Intent to provide MSS at 2 GHz in the United States.

² See "Spectrum Reallocation Final Report: Response to Title VI -- Omnibus Budget Reconciliation Act of 1993," Appendix A: Examination of Transition Options and Costs for the 1710-1755 MHz Band, NTIA Special Publication 95-32 (continued...)

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thoroughly validates the approach that the IUSG has long advocated for the relocation of incumbent licensees in the 2 GHz bands.

The NTIA Appendix takes the same positions with regard to the relocation of incumbent licensees from the 1.7 GHz bands that the IUSG has taken with regard to 2 GHz incumbents in the instant proceeding.³ As the NTIA notes, the 1710-1755 MHz band is being reallocated to the Federal Government and non-Federal sector for mixed use. The NTIA Appendix examines a

²(...continued)

(February 1995) ("NTIA Appendix"), attached hereto.

³ In its Comments in this proceeding, the IUSG urged, *inter alia*, that the Commission adopt with respect to 2 GHz incumbent terrestrial licensees a modified version of the general relocation and cost recovery policies established in its Emerging Technologies proceeding (ET Docket No. 92-9) and its Microwave Relocation/Cost Sharing proceeding (WT Docket No. 95-157). *See* Comments of the ICO USA Service Group, ET Docket No. 95-18 (filed February 3, 1999) ("IUSG Comments") at 14 *et seq.* Thus, the IUSG requested that the Commission mandate relocation of such incumbents -- including actual relocation, the replacement or modification of equipment, and simple retuning -- only where harmful interference with MSS systems cannot be avoided. *See id.* at 21-23, 40-41. The IUSG asked the Commission to provide that relocation of 2 GHz terrestrial incumbents can be accomplished without the wholesale, simultaneous removal of incumbents from existing frequency bands, and also urged that MSS licensees be allowed to select the least expensive alternative means of achieving such relocation. *See id.* at 16-21, 30-33, 44. In addition, the IUSG proposed that MSS licensees should not be required to provide reimbursement to an incumbent licensee in a sum greater than the present value of any equipment of that incumbent that is to be replaced, using depreciation as a guide. *See id.* at 33. The IUSG included with its Comments a step-by-step transition plan that would free 2 GHz MSS spectrum gradually for MSS use while relocating 2 GHz BAS incumbent licensees to other bands only where absolutely necessary to avoid harmful interference. *See id.* at 23-26 & Exhibit 1. The IUSG's Reply Comments and its two subsequent *ex parte* filings in this proceeding supported and elaborated on these same positions. *See* Reply Comments of the ICO USA Service Group, ET Docket No. 95-18 (filed March 5, 1999); Ex Parte Letter from Norman P. Leventhal to Magalie Roman Salas, ET Docket No. 95-18 (filed June 21, 1999) ("June 21 Letter"); Ex Parte Letter from Norman P. Leventhal and Juan F. Madrid to Magalie Roman Salas, ET Docket No. 95-18 (filed August 4, 1999).

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number of feasible options for the relocation of incumbent licensees in that band, and the costs of pursuing those options. Among other things, the NTIA Appendix indicates that:

- To preclude or minimize disruption to existing services in the 1710-1755 MHz band, NTIA proposes that reallocation transition processes be implemented to reaccommodate those services.⁴
- Current fixed microwave stations operating in areas in which they are not subject to harmful interference may continue to operate on a non-interference basis until their areas of operation become urbanized and a potential threat of harmful interference exists between such stations and other communications systems.⁵
- Relocation of existing fixed microwave operations from the 1710-1755 MHz band might be accomplished most quickly and inexpensively through the retuning of incumbent licensees' equipment or a combination of retuning and actual relocation.⁶
- Assessment of the value of incumbent licensees' equipment for purposes of relocating incumbent operations to other bands requires the consideration of the depreciated costs of such equipment, calculated by taking the ratio of the equipment's remaining useful life to its total useful life and multiplying by the investment or procurement cost of the equipment.⁷

The positions taken in the NTIA Appendix clearly track the IUSG's proposal for a gradual transition process for the relocation of 2 GHz incumbent licensees; the required relocation of such incumbents only where necessary to avoid harmful interference; the use of the least-cost alternative for relocating incumbents; and the limitation on relocation reimbursements to the depreciated value of incumbent licensee equipment (or the value of the equipment's remaining

⁴ See NTIA Appendix at 1.

⁵ See *id.* at 14.

⁶ See *id.* at 1, 10.

⁷ See *id.* at 5.

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useful life).⁸ In light of the NTIA's espousal of these positions, the IUSG once again urges the Commission to adopt the IUSG's proposals for implementing the relocation of incumbent licensees from the 2 GHz bands.

⁸ In its June 21 Letter, the IUSG submitted a legal analysis (which supplemented an economic analysis prepared by Charles River Associates Incorporated ("CRA")) supporting the conclusion that 2 GHz incumbent licensees would be made whole -- as required by Commission policies -- by receiving relocation compensation equal to not more than the value of the remaining useful life of their existing equipment. The IUSG noted that a relocation compensation approach employing the depreciated value of incumbent licensee equipment, as advanced in its Comments and Reply Comments, could be employed as a surrogate for CRA's remaining useful life approach. See June 21 Letter at 2.

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* * *

Pursuant to Section 1.1206(b) of the Commission's rules, the instant original and one copy of this letter are being filed with the Office of the Secretary today for inclusion in the record of this proceeding.

Respectfully submitted,



Norman P. Leventhal
Walter P. Jacob
Counsel to the ICO USA Service Group

Enclosures

cc: Dale Hatfield
Christopher Wright
Rebecca Dorch
Julius Knapp
Geraldine Matise
Sean White
Roderick Porter
Linda Haller
Tom Tycz
Robert Ratcliffe
Keith Larsen
Jerry Duvall
Karl Kensinger
Howard Griboff
Jack Goodman
Ellen Goodman

NATIONAL TELECOMMUNICATIONS AND
INFORMATION ADMINISTRATION

SPECTRUM REALLOCATION FINAL REPORT
Response to Title VI - Omnibus Budget
Reconciliation Act of 1993

NTIA Special Publication 95-32

APPENDIX A: EXAMINATION OF TRANSITION OPTIONS AND COSTS FOR THE 1710-1755 MHZ BAND

TRANSITION PLANS AND REALLOCATION COSTS

Title VI allows Federal Government and non-Federal sector mixed use in certain bands. It also excludes from reallocation the frequencies used by the Federal power agencies (FPAs). The 1710-1755 MHz band is being reallocated to the Federal Government and non-Federal sector for mixed use. As mandated in Title VI, frequencies designated for mixed use can be partially retained for use by the Federal Government. Further, the potential use of these frequencies by the Federal Government must be substantially less, as measured by geographic area, time, or by other means, than the potential use to be made by the non-Federal sector. Consequently, implementing the sharing criteria of the bill makes the Federal Government use of these frequencies less than primary, including those that support important and critical services to both the public and the Federal Government. To preclude or minimize anticipated disruptions to these existing services, it is necessary to implement some reallocation transition processes to reaccommodate these services.

This Appendix provides a broad examination of the feasible transition options, along with the NTIA estimates of associated costs, to implement the reallocation of the 1710-1755 MHz band. It also addresses an alternative reallocation option for Federal agencies that originally opted for a specific transition process which may not be totally feasible to implement. For example, some agencies have opted to retune to the remaining portion of the band (i.e., the 1755-1850 MHz band). However, in certain geographical areas, there could be insufficient spectrum to accommodate all the fixed microwave systems being relocated. In addition, there could be cases where the transmitter/receiver (T/R) frequency separation criteria of fixed microwave systems originally planned to be retuned to the 1755-1850 MHz band could not be met. In both cases, these fixed microwave systems might have to be reallocated to other bands. There could be also fixed microwave systems that are currently operating in the 1755-1850 MHz band that might have to be retuned within the 1755-1850 MHz band or relocated to other bands as a consequence of reallocating the 1710-1755 MHz band from the Federal Government to the non-Federal sector.

Another example is the case where bureaus or agencies have indicated their intention to relocate existing fixed microwave operations from the 1710-1755 MHz band to 7/8 GHz band. Moving to a higher band is more costly to implement because of the requirement for additional relay stations and the procurement of new systems. Because of dwindling budgets and complexity of the Federal budget process, the reallocation funding might be insufficient or not readily available to implement this option. Exacerbating the budget issue is the impact of advancing the reallocation date of the 1710-1775 MHz band from 2004 to 1999 in some major United States cities. Thus, the less costly transition option (retuning) or a combination of retuning and relocating could be a good option to implement. On this basis, various reallocation options were examined for fixed microwave systems in the 1710-1755 MHz band. These options are described below.

Fixed Microwave Systems

Four reallocation options have been examined for the fixed microwave systems in the 1710-1755 MHz band. These reallocation options are: Option I - Retuning the existing fixed microwave systems in the 1710-1755 MHz band to the 1755-1850 MHz band; Option II - Relocating the existing fixed microwave systems in the 1710-1755 MHz band to the 7/8 GHz band; Option III- Converting the existing fixed microwave systems in the 1710-1755 MHz band to commercial leased services; and Option IV - Retuning the narrowband fixed microwave systems in the 1710-1755 MHz band to the 1755-1850 MHz band, and relocating the wideband fixed microwave systems to the 7/8 GHz band. Specific transition plans and associated reallocation costs for each option are discussed in the subsequent paragraphs. The general transition plan stated in the next two paragraphs, however,

applies to all the above options.

Use of frequencies authorized on or before February 10, 1994 to the FPAs and Federal agencies whose fixed microwave systems operate in conjunction with the FPAs for power generation and/or distribution will continue indefinitely. Further, continued operations on these frequencies will be protected from harmful interference by non-Federal users. Use of frequencies authorized to Federal agencies, where the majority of use carried out at these frequencies is in support of safety-of-life operations, will continue indefinitely. However, only those safety-of-life operations that are outside a 150 km radius of the 25 most populated United States cities are eligible for indefinite continued use (see TABLE 4-3 in Section 4 for the list of the 25 U.S. cities). The list of FPAs, Federal agencies and safety-of-life fixed microwave stations that are associated with these frequencies can be found in Appendix E.

In addition, operations of fixed microwave, tactical radio relay and mobile systems authorized as of February 10, 1994 to Federal agencies at the various locations and radius of operations shown in Appendix F are provided limited continued use, except in the 1710-1755 MHz band where Federal Government operations at the specified sites will continue indefinitely. Moreover, operations at these locations will be protected from harmful interference. However, other areas of operation for these systems will cease. Finally, fixed microwave stations where the areas of operation are isolated and geographically separated from urban communities need not be reallocated immediately. Further discussion on these stations is provided in the subsequent paragraphs. The remaining mobile and fixed operations may have to be reallocated by way of either one of the reallocation options described below.

Option I: Retuning. The approximately 1,700 fixed microwave systems in the 1710-1755 MHz band not exempted by Title VI for indefinite continued use may be retuned to the remaining portion of the band (i.e., the 1755-1850 MHz). Assuming that available frequencies exist and other criteria are met in the 1755-1850 MHz band to accommodate both displaced and incumbent systems, this option provides the least time and cost to implement. Generally, a microwave system in the 1710-1850 MHz band has a back-up or "hot-standby" unit, which means that there are two transmitters and two receivers at each fixed microwave station. There are, however, fixed microwave stations that have two-way "hot standby" units (e.g., those operated by the U.S. Geological Survey, Office of Earthquakes, Volcanoes, and Engineering of the DOI). In this case, the authorized intermediate fixed microwave site has four transmitters and four receivers.

A typical cost for retuning a fixed system in the 1710-1755 MHz band is \$7,200 (i.e., \$1,300 per unit and \$2,000/site labor).[EN1] This cost is based on the agencies providing the basic labor. However, if the retuning is totally contracted to a commercial entity, the cost is \$35,000 per site.[EN2] The FAA provided a value of \$100,000 per site for in-band retuning cost for its fixed microwave systems.[EN3] Although, in general, retuning equipment involves modification of only a few components of the system (e.g., duplexers, modulators, crystals, etc.), there are other costs associated with retuning. While a system is being retuned at the manufacturer's laboratory, a "switchover" system is needed to fulfill the function of the system being retuned so that critical operations are not disrupted. The "switchover" system must be procured by the affected agency. Other costs that may be involved in retuning are logistical in nature. For example, the costs to contract technical assistance to augment limited staff personnel and hire transportation during site visits. Several Federal agencies included these logistical costs in their estimated reallocation costs.

The estimated number of equipment and reallocation costs for each major user in the 1710-1755 MHz band are presented in TABLE A-1. Whenever an agency did not provide the number of its fixed microwave sites, the number of fixed microwave assignments in the Government Master File (GMF) for the 1710-1755 MHz frequency range was used as the number of fixed microwave sites. Note that some fixed microwave stations operated by the Army, DOI, USCG and FAA, and all of the FPAs fixed microwave stations are exempted from reallocation and, thus, reallocation costs are projected accordingly for these entities. Also, note that DOJ's retuning cost only accounts for the 90 INS fixed microwave sites since FBI started converting their 427 fixed microwave stations to commercial

leased services about 3 years ago.

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TABLE A-1: 1710-1755 MHz In-Band Reallocation Costs Analysis for Fixed Microwave

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Agency (See Key)	Estimated# of Sites[b]	Estimated # of Equipment[c]	Retuning Costs	
			[(XX)/(YY)] (Millions) [d][e]	Added Costs (Millions)[f]
A	532*	2128	3.8/18.6	0.4
AF	65	260	0.5/2.3	0.06
Ar/ACE	259	1036	1.9/23.0*	0.2
CG	41[g]	164	0.3/1.4	0.04
DOE	30*	120	0.2/1.1	0.03
FAA	85[g]	340	0.6/8.5[h]	0.08
FPA[j]	314	1256	not applicable	not applicable
DOI	97	516[j]	0.9/8.0*	0.09
DOJ	517*	2068	0.7/3.2[k]	0.08[j]
N	54	216	0.4/2.0	0.05
T	10[g]	40	0.07/0.4	0.02
TOTAL	2,004	8,114	9.4/68.5	1.1

Key: A - Agriculture, DOE - Energy, DOJ - Justice, AF - Air Force,
 FAA - Federal Aviation Administration, FPA - Federal Power Agency,
 N - Navy, T - Treasury, Ar/ACE - Army/Army Corps of Engineers,
 CG - Coast Guard, DOI - Interior, * - Agency input

[a] The cost provided by an agency was used when appropriate. The computed retuning costs are based on the assumption that all affected fixed microwave systems will be retuned, unless otherwise stated.

- [b] If data is unavailable, the total number of the agency's fixed microwave frequency assignments in the 1710-1755 MHz band was used to determine the number of fixed sites.
- [c] It is assumed that fixed microwave stations include a "hot-standby" unit (i.e., two transmitters and two receivers). However, there are fixed microwave stations that have two-way "hot standby" units (e.g., those operated by the U.S. Geological Survey, Office of Earthquakes, Volcanoes, and Engineering of the DOI).
- [d] A cost of \$7,200 per site or \$1,300 per unit and \$2,000 per site for labor was used to estimate the retuning cost, assuming that basic labor will be provided by the agency.
- [e] A cost of \$35,000 per site was used to estimate the retuning cost, assuming that labor will be contracted to commercial institution.
- [f] Includes cost of \$9,000 to purchase a set of "hot-switchover" units for changeout while retuning is taking place and site visits for \$800.00 per site.
- [g] Fixed microwave stations supporting safety-of-life operations that are outside a 150 km radius of the 25 most populated U.S. cities are exempted from reallocation. Thus, they are not included in the count.
- [h] FAA provided a value of \$100,000 per site for in-band retuning cost.
- [i] FPA includes the Tennessee Valley Authority, the Bonneville Power Admin., the Western Area Power Admin., the Southwestern Power Admin., the Southeastern Power Admin., and the Alaska Power Admin. FPA assignments are exempted from reallocation.

[j] It is assumed that one-third of the DOI's fixed sites uses two-way "hot standby" units (see footnote number c).

[k] Projected cost is for the 90 INS fixed microwave sites only. The 427 FBI fixed microwave sites are currently being converted to leased commercial services.

Option II: Reallocation to the 7/8 GHz Band. Fixed microwave stations in the 1710-1755 MHz band that are not exempted by Title VI for indefinite continued use may be reallocated to the 7/8 GHz band. Given the current congestion in the remaining portion of the 1710-1850 MHz band, particularly in certain areas of the United States, this option is worth considering. However, it is expensive because reallocating to a higher band will necessitate additional intermediate relay stations. This involves but not limited to the following: site engineering to determine viable locations of additional relay stations; procurement of new systems and land; and construction of relay stations. An estimated 25% of existing fixed microwave stations will require additional relay stations.[EN4] In addition to this requirement, the old stations need to be refurbished to operate in the higher frequency bands.

Another aspect of the reallocation process to other bands is consideration of the depreciation costs incurred for the existing equipment. Theoretically, if the reallocation will take place in the year 2004, equipment procured on or after 1983 will incur a depreciation cost. On the other hand, equipment procured before 1983 will be totally depreciated and, therefore, has no residual investment cost. In this report, the estimated residual investment cost (values after the equipment incurred depreciation) is calculated by taking the ratio of the remaining useful life to the total useful life of a piece of equipment and multiplying by the investment or procurement cost of the equipment. Federally owned fixed microwave systems in the 1710-1850 MHz band have a useful life of 15 to 20 years.[EN5] [EN6] Since the task of identifying the specific procurement date of all relevant pieces of equipment in the Federal Government inventory would be extremely burdensome, an average procurement date for each Federal agency was determined and used to established the average remaining life of the equipment. The average remaining life of existing pieces of equipment was established for the years 1999 and 2004 since the 1710-1755 MHz band will be reallocated for Federal and non-Federal mixed use in the years 1999 and 2004. TABLE A- 2 shows the estimated costs per major user of the 1710-1755 MHz band for the different reallocation requirements to the 7/8 GHz band.

TABLE A-2: 1710-1755 MHz Out-of-Band Estimated Reallocation Costs Analysis for F

Agency	# of	equipment avg. remaining life (years)		estimated residual costs (millions) [c]		replacemen new station
		5-yr plan	10-yr plan	5-yr plan	10-yr plan	

(See Key)	sites[b]	1999	2004	1999	2004	(millions)
A	532*	5	0.00	13.3	0.00	48.1*
AF	65	8	3	2.6	1.0	7.3
Ar/ACE	259	10	5	13.0	6.5	230*
CG	41[f]	4	0.00	0.8	0.00	10.6*
DOE	30*	7	2	1.1	0.3	2.4*
FAA	85[f]	11	6	4.7	2.6	96*
FPA[g]	314	7	2	0.00	0.00	0.00
DOI	97	11	6	5.3	2.9	13*
DOJ	517*	8	3	3.6[h]	1.4[h]	10.3[
N	54	10	5	2.7	1.4	6.2
T	10[f]	8	3	0.4	0.2	1.3
TOTAL	2,004	Avg=8	Avg=3	47.5	16.3	419.2

Key: A - Agriculture, DOE - Energy, DOJ - Justice, AF - Air Force,
 FAA - Federal Aviation Administration, FPA - Federal Power Agency,
 N - Navy, T - Treasury, Ar/ACE - Army/Army Corps of Engineers,
 CG - Coast Guard, DOI - Interior, * - Agency input

[a] It is assumed that the reallocation band is the 7/8 GHz band.

[b] If data is unavailable, the number of fixed microwave frequency assignments in the 1710-1755 MHz band was used to determine the number of fixed microwave sit

[c] The operational life of Federal Government fixed microwave systems in this ban is 20 years. The estimated residual investment cost analysis is based on a \$100,000/site investment.

[d] If data is unavailable, a value of \$250,000 per new site development and \$50,000 per site conversion to 7/8 GHz band was used to compute the replacement and new station costs. Also, it is assumed that 25% of existing stations need new rela

[e] Includes cost of \$9,000 to purchase a set of "hot-switchover" units for change while relocation is taking place and site visits for \$800.00 per site. It also includes a 15-year recurring operational and maintenance cost (i.e., \$3,000 per site per year).

[f] Fixed microwave stations supporting safety-of-life operations that are outside 150 km radius of the 25 most populated U.S. cities are exempted from reallocat

[g] FPA includes the Tennessee Valley Authority, the Bonneville Power Admin., the Western Area Power Admin., the Southwestern Power Admin., the Southeastern Power Admin. and the Alaska Power Admin. FPA assignments are exempted from rea

[h] Projected cost is for the 90 INS fixed microwave sites only. The 427 FBI fixed microwave sites are currently being converted to leased commercial services.

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As before, whenever an agency did not provide the number of its fixed microwave sites, the number of fixed microwave assignments in the GMF was used as the number of fixed microwave sites. This GMF data was also used to determine the number of new relay stations. Values of \$250,000[EN7] [EN8] and \$50,000[EN9] were used to compute the costs for new relay and refurbishing of old stations, respectively. The \$250,000 per new site includes costs for land acquisition, facility construction and equipment procurement. For the residual investment costs, the values are directly proportional to the remaining life of the equipment (i.e., the more recently bought equipment has the least depreciation cost and, therefore, has more residual investment cost value), as can be seen for the 5-year and 10-year plans in TABLE A- 2. For the 5-year Plan (1999), the average remaining life of Federal equipment ranges from 4 to 11 years, with USCG having the lower range and both FAA and DOI having the upper range. An annual recurring cost of \$3,000 per site per year,[EN10] which includes maintenance and operational costs, is used to calculate the added cost for each major user of the band.

Option III: Employing Leased Commercial Services. This option is the most expensive of all the options examined. For example, DOJ/FBI provided a conversion cost estimate of over \$121 million for its off-the-shelf fixed microwave systems, which support land mobile radio-communications operations, if converted to leased commercial services. This value includes the following: personnel costs (e.g., temporary hiring of engineers to design and implement the system changes); material and

supply costs (e.g., installation/optimization services and miscellaneous hardware for installing wireline equipment and adapting radio equipment to wireline operations); and other attributable costs like installation of wirelines to sites without existing wireline service, procuring wirelines to remaining lines, removal of existing microwave equipment and returning radio sites to acceptable condition. DOJ indicated that FBI is currently pursuing this option and had started implementing the conversion process 3 years ago.

Leasing commercial services is not a practical option for the majority of the Federal agencies to adopt. The majority of fixed operations by the Federal agencies in the 1710-1755 MHz band require high reliability and cannot afford even the slightest down time. In addition, numerous Federal Government fixed microwave sites are in rural areas where commercial services are not and will not be available for a long time. As such, the majority of the Federal agencies did not provide costs data for employing leased commercial services.

Because of insufficient data to evaluate the other agencies' total cost for this option, the estimated values shown in TABLE A-3 are based on the recurring leased line costs of \$27,630 per site per year.[EN11] Other costs, such as design and implementation, personnel, material and supply costs cannot be quantified for each of the major users. However, additional costs are calculated for each agency. These costs include a \$5,000 per site removal of existing microwave equipment and returning radio sites to acceptable condition. The costs also include a \$6,900 per site procurement and installation of wirelines[EN12] and \$800 per site visits.[EN13]

TABLE A-3: Costs Analysis for Fixed Microwave Systems in the 1710-1755 MHz Band
Employing Leased Commercial Services[a]

Agency (See Key)	# of Sites[b]	estimated recurring leased line costs (millions) [c]			procure & install wirelines (millions) [d]	added costs (millions) [e]
		5years	10 years	15 years		
A	532*	73.5	147.0	220.5	3.7	3.1
AF	65	9.0	18.0	27.0	0.5	0.4
Ar/ACE	259	35.6	71.2	106.8	1.8	1.5
CG	41[f]	5.7	11.4	17.1	0.3	0.3
DOE	30*	4.2	8.4	12.6	0.2	0.2
FAA	85[f]	11.7	23.4	35.1	0.6	0.5
FPA	314[g]	0.00	0.00	0.00	0.00	0.00
DOI	97	13.4	26.8	40.2	0.7	0.6
DOJ[h]	517*	59.0	118.0	177.0*	3.0*	2.5

N	54	7.5	15.0	22.5	0.4	0.3
T	10[f]	1.4	2.8	4.2	0.07	0.07

TOTAL	2,004	221	442	663	11.3	9.5

Key: A - Agriculture, DOE - Energy, DOJ - Justice, AF - Air Force,
 FAA - Federal Aviation Administration, FPA - Federal Power Agency,
 N - Navy, T - Treasury, Ar/ACE - Army/Army Corps of Engineers,
 CG - Coast Guard, DOI - Interior, * - Agency input

- [a] The calculated values reflect only the conversion of existing fixed microwave stations that are operating in the 1710-1755 MHz frequency range to leased commercial services.
- [b] If data is unavailable, the number of fixed microwave assignments in the 1710-1755 MHz frequency range was used to determine the number of fixed microwave sites.
- [c] The calculated values were based on a recurring cost of \$27,630 per site annually to leased commercial wirelines.
- [d] The calculated values were based on a \$6,900 per site for procurement and installation of wirelines to existing fixed microwave sites.
- [e] The calculated values were based on: (1) \$5,000 per site for removal of existing microwave equipment and restoring sites to acceptable conditions; (2) site visits at \$800 per site; (3) \$9,000 to procure a set of "hot-switchover" unit to fulfill the system's function while conversion is taking place.

[f] Fixed microwave stations supporting safety-of-life operations that are outside a 150 km radius of the 25 most populated U.S. cities are exempted from reallocation.

[g] FPA includes the Tennessee Valley Authority, the Bonneville Power Admin., the Western Area Power Admin., the Southwestern Power Admin., the Southeastern Power Admin. and the Alaska Power Admin.. FPA assignments are exempted from reallocation.

[h] The FBI started converting its 427 fixed microwave sites in 1991. The INS 90 fixed microwave sites will not be converted to leased commercial services.

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Option IV: Retuning and Relocating. This option involves two reallocation processes: first, retuning the fixed narrowband systems (i.e., ≤ 5 MHz emission bandwidth) operating in the 1710-1755 MHz band to the 1755-1850 MHz band; and second, relocating the wideband systems (i.e., > 5 MHz emission bandwidth) operating in the 1710-1755 MHz band to the 7/8 GHz band. As stated earlier, the congestion in the 1755-1850 MHz band makes this option more attractive. In addition, this option will easily accommodate the T/R frequency separation requirement that is inherent in existing 1710-1850 MHz fixed microwave systems.

The approximately 700 fixed microwave wideband systems in the 1710-1755 MHz band have a T/R frequency separation greater than 40 MHz and as wide as 110 MHz. Because of this operational characteristic, the fixed stations supporting wideband operations in the 1710-1755 MHz band, and possibly including those in the 1755-1850 MHz band, may have to be reallocated to the 7/8 GHz band. It is possible, however, for these wideband systems to either remain or retune elsewhere in the band. The process may require employing better filters, special duplexers and/or high performance antennas to reduce the T/R frequency separation to within 40 MHz or less. However, a manufacturer of these systems has indicated that modifying these components might not be cost effective. Thus, reallocating the wideband systems to the 7/8 GHz band is a more practical and economical solution. This is in agreement with the recommendation provided by USDA.[EN14]

A typical narrowband system in the 1710-1755 MHz band generally has a T/R frequency separation of 40 MHz or less. There are approximately 1,100 fixed microwave stations supporting narrowband systems in the 1710-1755 MHz band that are not exempted from reallocation. Some narrowband systems in the 1755-1850 MHz band may also have to be reallocated because of the "domino effect." This is particularly the case when one or more hops of a link that is made-up of numerous hops fall in either the 1710-1755 MHz or 1755-1850 MHz frequency range. For the purposes of this report, however, it is assumed that all the links of the fixed microwave stations in the 1710-1755 MHz band are contained in this band segment.

Although there may be other options that could be undertaken for the narrowband systems (e.g., retuning to the 2200-2290 MHz, 932-935/941-944 MHz, or 1700-1710 MHz band), especially those with T/R frequency separation of much less than 10 MHz, the cost estimates considered for this report deal only with the wideband systems operating in the 1710-1755 MHz band being relocated to the 7/8 GHz band and the narrowband systems in the 1710-1755 MHz band being retuned to the upper portion of the band (i.e., 1755-1850 MHz). The process used in computing the costs is a combination of options I and II. The retuning cost per site, however, is based on commercial contract (i.e., \$35,000 per site). As before, the reallocation costs for agencies whose fixed microwave systems are exempted for reallocation are adjusted accordingly, as noted in TABLE A-4.

TABLE A-4: 1710-1755 MHz In-Band and Out-of-Band Reallocation Costs

Analysis for Fixed Microwave Systems[a]

Agency (See Key)	# of sites[b]	Wideband Stations	Narrowband Stations	wideband stations	narrowband stations
				relocation costs (7/8 GHz) (millions) [c]	retuning costs (1755-1850 MHz) (millions) [d]
A	532*	5	527	0.8	18.9
AF	65	12	53	2.1	2.0
Ar/ACE	259	72	187	12.2	6.8
CG	41[e]	3	38	0.60	1.30
DOE	30*	21	9	3.5	0.3
FAA	85[e]	0.00	85	0.00	8.5
FPA	314[g]	142	172	0.00	0.00
I	97	7	90	1.3	3.3
J[h]	517*	428	89	0.4	3.2
N	54	13	41	2.1	1.4
T	10[e]	4	6	0.7	0.2
TOTAL	2,004	707	1,297	23.7	45.9

Key: A - Agriculture, DOE - Energy, DOJ - Justice, AF - Air Force,
FAA - Federal Aviation Administration, FPA - Federal Power Agency,
N - Navy, T - Treasury, Ar/ACE - Army/Army Corps of Engineer,
CG - Coast Guard, DOI - Interior, * - Agency input

- [a] The cost data provided by an agency was used whenever appropriate, otherwise the retuning and relocation costs were calculated as before (see Tables A-1 and A-2, respectively).
- [b] If data is unavailable, the number of fixed microwave frequency assignments in the GMF for the 1710-1755 MHz frequency range was used to determine the number of fixed microwave sites.
- [c] The calculated values include the following: (1) \$250,000 per additional relay station and \$50,000 per site refurbishment; (2) 15-yr. recurring cost (i.e., \$3,000 per site per yr.); (3) site visits at \$800 per site; and (4) \$9,000 to procure a set of "hot-switchover" units to fulfill the system's function while relocation is taking place.
- [d] It is assumed that retuning of systems will be contracted to commercial entities. The calculated values include the following: (1) \$800 for site visit (i.e., two visits at \$400 per site visit) and (2) \$9,000 to procure a set of "switchover" units to fulfill the system's function while retuning is taking place.
- [e] Fixed microwave systems supporting safety-of-life operations (i.e., only those outside the 150 km radius of the 25 most populated U.S. cities) are exempted from reallocation.
- [f] FAA provided a value of \$100,000 per site for in-band retuning cost for its fixed microwave systems.

[g] FPA includes the Tennessee Valley Authority, the Bonneville Power Admin., the Western Area Power Admin., the Southwestern Power Admin., the Southeaster Power Admin. and the Alaska Power Admin.. FPA assignments are exempted from reallocation.

[h] Only the INS 90 fixed microwave stations are considered for the costs analysis. All but one support narrowband operations. The FBI 427 fixed microwave systems are currently being converted to leased commercial services

Mobile Systems

The mobile systems in the 1710-1755 MHz band will be retuned to the upper portion of the 1710-1850 MHz band (i.e., the 1755-1850 MHz). The estimated reallocation cost, shown in TABLE A-5, is based on the following assumptions: (1) base/repeater station supports an average of 25 mobiles/portables;[EN15] (2) the cost to retune a mobile/portable is \$350;[EN16] (3) the cost to retune a base/repeater is \$3,300;[EN17] (4) an assignment for the station classes FB, FLE, and FLEC may represent a base/repeater station; and (5) an assignment for the station classes MOEC, ML, MLP, MO, MOD and MLD may represent mobiles/portables. However, note that the estimated reallocation costs in TABLE A-5 do not include costs assessment on aeronautical or flight telemetering and aeronautical mobile systems. The number of these systems in an authorized frequency assignment is very difficult to quantify.

TABLE A-5: Estimated Retuning Costs for Mobile Systems in the 1710-1755 MHz Band[a]

Station Classes	Number of Federal Government Agency Mobile Assignments							
	Air Force	Army	Energy	Navy	NASA	Treasury	Transportation	Total
FB/ML				1				1
FLE		7						7
FLEC		1						1
FLEC/MOEC							1	1
MA		1	2	1		1		5
MAD	1							1

ML		2	6	10				18
ML/MLP		1						1
MLD	1		2					3
MO				17				17
MOEA	1	2		23	2			28
MOEB	2	1		13	2	1		19
MOD			1					1

Retuning

Cost	9K	53K	79K	248K	NA*	NA*	12K	401K
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[a] The estimated cost per agency is based on the following assumptions: (1) an assignment for the station classes FB, FLE, and FLEC represents a base/repeat station; (2) an assignment for the station classes MOEC, ML, MLP, MO, MOD and MLD represents 25 portables/mobiles; (3) the cost to retune a mobile/portable is \$350, and (4) the cost to retune a base/repeater station is \$3,300. The estimated cost per agency, however, does not include cost assessment on the agency's aeronautical or flight telemetering and aeronautical mobile systems.

*NA = Not applicable

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Special Areas of Operation

As mentioned earlier, there are cases where a fixed microwave station operates in an isolated area and is geographically separated from a metropolitan area. Stations serving in this capacity are allowed for continued use, on non-interference basis, until their areas of operation become urbanized and a potential threat of EMI exists between these stations and other communications systems that will be introduced in the locality. Such stations are usually employed by USDA, DOI and ACE for backbone microwave communications systems supporting various Federal Government requirements such as: disaster control within national parks and forests; management, maintenance and distribution of water and electric power to isolated remote areas; and control of land mobile radios supporting law enforcement. Currently, there are approximately one thousand stations in this category in the 1710-1755 MHz band.

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ENDNOTES FOR APPENDIX A

Requests for copies of references from Federal departments and agencies should be referred to the originating organization. Parts of the reference material may be exempt from public release.

1. U.S. Dep't of the Interior (DOI) Comments, at 3 (May 4, 1994), file Telecommunications and Info. Admin. (NTIA), U.S. Dep't of Commerce Preliminary Spectrum Reallocation Report, (Feb. 1994) [hereinafter all comments cited refer to this report, unless otherwise stated].
2. U.S. Dep't of the Army Memorandum for Director, Command, Control, Intelligence, Assistant Secretary of Defense, at 1 (Dec. 30, 1993)
3. Fax from D. Willis (FAA/Spectrum Planning and Int'l Division) to E Subject: Corrections to the FAA Comments to the NTIA Draft Final S Report, at 6 (Jan. 25, 1995).
4. DOI Comments, supra note 1, at 14.
5. U.S. Dep't of Justice (DOJ) Comments, at 3-4 (May 31, 1994).
6. U.S. Dep't of Agriculture (USDA) Comments, at 2 (May 11, 1994).
7. NTIA, U.S. Dep't of Commerce, NTIA Report 92-285, Federal Spectrum 1850 MHz and 2200-2290 MHz Bands, at 5-5 (March 1992).
8. Senkowski, R.M., et al., UTAM Plan for Financing and Managing 2 GH 27 (Aug.1, 1994).

9. DOI Comments, supra note 1, at 14.
10. Id. at 19.
11. DOJ Comments, supra note 5, at 3.
12. Id.
13. DOI Comments, supra note 1, at 22.
14. USDA Comments, supra note 6, at 5.
15. DOI Comments, supra note 1, at 8.
16. DOJ Comments, supra note 5, at 6.
17. DOI Comments, supra note 1, at 3.

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