wireless cable services, this is not the factor that was to guide OET at this stage of the analysis. OET was simply to consider whether existing licensees of the target spectrum could be relocated to alternative media or other spectrum with a minimum of cost and disruption of service, irrespective of the present allocation schemes. The cost-benefit analysis of actually relocating these systems, and any possible reallocations or rule changes that would be necessary, would then be undertaken at the next stage of study, presumably with an opportunity for public participation.

The fact is that there are other media and spectrum with compatible operational and technical characteristics to which the various wireless cable services could be relocated. For example, the ITFS and MMDS licensees that would have to be relocated, as well as new wireless cable systems, could operate in portions of the 3.7-4.2 (4 GHz), 5.925-6.425 (6 GHz), 10.7-11.7 (11 GHz), 11.7-12.2 (11.7 GHz), 12.2-12.7 (12 GHz) 12.7-13.25 (13 GHz), 17.7-19.7 (18 GHz), 21.2-23.6 (23 GHz), and 27.5-29.5 (28 GHz) GHz microwave bands.[18/]

[18/] The 12 GHz band is currently allocated to Direct Broadcast Satellite (DBS). However, in the nearly ten years since its allocation DBS has yet to offer service. Moreover, since wireless cable would in large part serve the same needs and audience as DBS, a co-primary allocation to these two services as a video distribution band would let the marketplace decide which service is more viable. The average consumer does not care whether video is delivered via satellite or microwave. Similar satellite/terrestrial distribution modes have been suggested for Digital Audio Broadcasting.

In addition to the OET Study, the NPRM cites the fact that there are currently 24,000 applications on file with the Common Carrier Bureau for new MDS facilities as an additional justification for not considering the 2.5 GHz band as the spectrum reserve.[19/] This fact, however, is largely irrelevant because facility applications are not a reflection of the level of actual operations or investment in a band.

The Commission also argues against the use of the 2.5 GHz band as the spectrum reserve because wireless cable is a developing industry.[20/] This argument implies that the public interest would be better served by disrupting a congested band used for a vital and proven service, such as 2 GHz point-to-point microwave, than to disrupt a speculative service that has not yet experienced substantial investment -- and all for the prospective allocation of spectrum for services that are yet to be identified or defined.

[19/] The NPRM is not specific as to whether the 24,000 pending applications are for MDS licenses in the 2.15-2.16 GHz band or MMDS facilities in the 2.50-2.69 GHz band. UTC assumes the latter. See NPRM, para. 18 - n.14.

[20/] NPRM, at para. 18.

2. 2.45-2.50 GHz Band

Another alternative to the use of the 2 GHz band as the spectrum reserve that the NPRM and the OET Study did not adequately address is the 2.45-2.50 GHz band which is allocated for use by Industrial, Scientific, and Medical (ISM) equipment. The Study found the ISM band unsuitable because it only has 50 MHz of spectrum. This response, however, appears to be at odds with a number of the new technology proponents which have claimed that they could operate their new systems with less than 50 MHz of spectrum. Moreover, the ISM band need not be looked at as an all-or-nothing proposition; it could provide some portion of the spectrum reserve and the remainder could come from some other band(s). Since the services that will occupy the spectrum reserve have not yet been identified, it is premature to state that any band would be insufficient.

The other explanation that OET listed for its decision against further consideration of the ISM band is that there is no replacement band that offers the same physical characteristics for existing ISM operations. This analysis ignores the fact that in addition to ISM equipment, the 2.45-2.50 GHz band is also available for use by non-licensed low-powered RF devices regulated by Part 15 of the Commission's Rules and would therefore accommodate a number of the emerging technologies being proposed for the spectrum reserve. For example, Rockwell/PCN

America recently submitted an "Amendment" to its pending request for a Pioneer's preference in which it claimed that its PCS system could operate on an unlicensed non-interference basis in the ISM band.[21] Apple Computer's Data-PCS proposal is also designed to operate on an unlicensed Part 15 basis. Thus, until the Commission decides what services are deserving of spectrum and examines the technical characteristics of those services, the Commission is unable to state that the current use of the 2.45-2.50 GHz band would be incompatible with these emerging technologies.

3. 1.99 - 2.11 GHz Band

Finally, the NPRM and the OET Study gave short shrift to consideration of the 120 MHz located in the 1.99-2.11 GHz (broadcast auxiliary) band as a possible home for the spectrum reserve. The primary use of this band is for electronic news gathering (ENG) by broadcasters and cable operators. In determining not to consider the 1.99-2.11 GHz band as the home for the spectrum reserve, the OET Study reported that "interviews" with licensees in the band indicated that this band is necessary to meet all of their operational requirements during major news events and other periods of heavy demand.[22]

---

[21] See PCN America's "Amendment" filed on April 30, 1992, in GEN Docket 90-314.

[22] OET/TS 91-1, p. 10.

UTC, while not questioning the veracity of the broadcasters' comments, is at a loss to understand why the concerns of broadcasters were given more weight then those of the utility, public safety, petroleum and railroad industries. Further, while existing 2 GHz users have been told to consider the use of alternative technologies such as fiber optics to meet their internal fixed communications needs, neither the OET Study nor the NPRM mention the fact that many broadcasters are increasingly using satellite systems to meet ENG requirements. UTC further understands that FCC licensing records are not a true depiction of actual use of this band since licensees will routinely apply for licensing on multiple frequencies, even though they only intend to operate on a single channel at a time. Thus, closer examination of the actual extent of usage of this band should have been undertaken in the OET Study, and as UTC has suggested in its May 1, petition, should be made the subject of a further notice of proposed rulemaking in this docket.

The OET Study also acknowledges that industry groups are currently pursuing research into video digital compression systems.[23/] The development of this technology should allow for greater use of the 6.875-7.125 GHz auxiliary band as possible replacement spectrum for displaced 1.99-2.11 GHz operations. A

[23/] OET/TS 91-1, p.10, n.15.

designation of the 1.99-2.11 GHz band may actually hasten the development and implementation of this technology.

C. Proposed Reallocations

1. Other Bands Would Be Better Choice For The Spectrum Reserve

Under an objective analysis, the 2.5-2.69 GHz, 2.45-2.5 GHz and the 1.99-2.11 GHz bands satisfy all of the Commission's initial selection factors, and should be considered as candidates for the spectrum reserve. Therefore, prior to adopting any final reallocation rules, the Commission should conduct a thorough cost/benefit analysis regarding the use of these bands as the spectrum reserve. The cost/benefit analysis should consider the financial, operational and societal impact of locating the spectrum reserve in these bands as opposed to the 2 GHz band.

a. Comparison Of 2.5 GHz Band To The 2 GHz Band

From a true cost/benefit analysis point-of-view the 2.5 GHz band would appear to be a much more suitable location for the spectrum reserve. According to the OET Study, there are over 29,000 licensed private and common carrier facilities in the 2 GHz band. In contrast, there does not appear to be more than

2,500 licensed ITFS, MMDS and OFS stations in the 2.5 GHz band.[24/] Moreover, the Wireless Cable Association indicates that there are only 94 fully constructed and operational MMDS/MDS systems. Thus, at present, in comparison to the 2 GHz band, the 2.5 GHz band is very lightly loaded.

While the number of operating MDS/MMDS systems in the 2.5 GHz band does not indicate the number of existing ITFS stations in the band, it should be noted that the Commission has already contemplated moving ITFS systems licensed on channel groups E and F to other bands. In its Second Report and Order in Gen. Docket No. 90-54, FCC 91-302, the FCC adopted an involuntary migration plan under which ITFS licensees can be compelled to relocate to another band by MDS/MMDS operators. Thus, arguments that existing ITFS facilities cannot or should not be relocated have already been rejected by the Commission. In adopting the Second Report and Order in GEN Docket No. 90-54, the Commission specifically suggested the 7, 13, 18 and 23 GHz bands as possible replacement bands for displaced ITFS systems.[25/]

[24/] The "XFS" database used by the OET staff indicates there are only 2,257 distinct call signs/stations in the 2.5-2.69 GHz band, operating on 5,307 channels. It should be noted that the actual frequency count in the database is 6,462; however, this overstates the actual channel usage by at least 1,132 channels due to the practice in the Common Carrier Bureau of separately licensing the visual and aural carrier frequencies of MMDS stations.

[25/] Second Report and Order, GEN. Docket 90-54, FCC 91-302, para. 32.

UTC recommends the use of the same involuntary negotiation plan for the relocation of existing wireless cable and ITFS operations as was adopted in the Second Report and Order in GEN. Docket No. 90-54. Under such a plan, the designation of the 2.5 GHz band as the spectrum reserve would not significantly alter the rights of existing ITFS licensees.

Moreover, many of the currently licensed wireless cable systems are located in rural areas where there is less overall spectrum congestion and therefore little potential for interference between existing facilities and new technology licensees. It should therefore be possible for the 2.5 GHz band to remain available for licensing of ITFS and MMDS on a co-primary basis in rural areas of the country.

Finally, if the 2.5 GHz band is selected as the spectrum reserve, existing wireless cable systems should be given co-primary status on an indefinite basis, and should be allowed to make reasonable expansions and modifications to their systems on a primary basis.

In terms of the financial impact, the 2.5 GHz band would appear to be a much better location for the spectrum reserve. For example, it is estimated that a relocation of all existing users in the 2 GHz band to other bands would cost over 5 billion dollars. However, given the fact that there are only about 1/10

as many facilities licensed in the 2.5 GHz band as in the 2 GHz band, total relocation costs should be just a fraction of the relocation costs for the 2 GHz band.[26/]

Further, while the average wireless cable system is relatively small in size, many of the private microwave systems operated in the 2 GHz band are extensive and could cost millions of dollars to relocate. Therefore, if, as the NPRM proposes, the FCC adopts a transition plan whereby the costs of relocation are borne by the new technology licensees, the costs would be far more expensive for new users to relocate systems from the 2 GHz band.

Although the financial impact on existing users is an important factor, the primary consideration in the Commission's cost/benefit analysis must be the operational and societal cost of reallocating a particular band. The Commission is charged by the Communications Act with allocating spectrum in a manner which best serves the public interest. In 1982, the United States Congress codified guidelines for making choices in the allocation of spectrum, and in the accompanying Senate Report stated:

> Radio services which are necessary for the safety of life and property deserve more consideration than the services which are

---

[26/] Further rulemaking is needed to examine these cost figures, which, in any event, should have been part of the OET Study.

> more in the nature of convenience or luxury. ...The FCC should first attempt to meet the requirements of those radio users which render important services to large groups of the American public such as governmental entities and utilities, rather than the requirements of users which would render benefits to relatively smaller groups.[27/]

This clear Congressional mandate to give preference to the needs of energy utilities and other entities rendering services necessary for the safety of life and property encompasses the use of private microwave in the 2 GHz band.

The nation's utility industry places extensive reliance on private microwave systems operating in the 2 GHz band to meet critical communications needs. Nationwide, utilities operate approximately 3,700 stations licensed on over 6,000 frequencies in the 2 GHz band. As explained below, if the utility industry is forced to abandon this band, the reliability of its communications facilities will be significantly degraded which, in turn, will have a direct and adverse impact on the protection of the utility plant and reliability of utility service to the public.

Some of the daily uses for which utilities depend on 2 GHz microwave systems include:

[27/] S. Rep. No. 191, 97th Cong. 1st Sess. 14 (1981).

- Protective relaying -- the ability to remotely detect and isolate electric transmission lines experiencing "fault" (outage) situations, within milliseconds, in order to prevent further property damage or personal injury.[28/]

- Forwarding of critical telemetry data between and among a utility's substations, operations control centers, generating stations and other utilities interconnected on the electric grid.

- Controlling mobile radio base stations and other radio systems used for load control, environmental monitoring, and nuclear plant communications.

- Long and medium-haul remote data/voice communications.

The private microwave service has historically been of vital importance to the American economy and people, and remains so today. Microwave frequencies have been available to private users since 1949, although initially only to those entities that had a strong need for communications systems that could not be provided by common carrier, such as public safety organizations and right-of-way companies. In its 1959 Report and Order in Docket No. 11866, the Commission recognized the need for private microwave systems to provide for "control and flexibility" in meeting "hour-by-hour" operational needs, such as those of energy

---

[28/] In a September 18, 1991, presentation to the staff of the OET and the Commissioners' offices, UTC noted that utility teleprotection systems typically budget only 5-20 milliseconds for the communications component of the protection system. Further, teleprotection systems must be designed to the highest possible levels of reliability to prevent unnecessary tripping of high voltage circuit breakers, and to ensure that the teleprotection systems are available and ready to respond when needed the most; for example, during storm situations. Significantly, both the NPRM and the OET Study omit any reference to UTC's presentation.

utilities, even though common carrier facilities were available.[29/] In its basic decision on private microwave, the Commission recognized that energy utilities, such as gas, water, and electric companies, of necessity make extensive use of private microwave systems. Many of the functions for which these systems are used are unavailable from communications common carriers, either because the common carrier networks do not provide service to the remote regions where many of these utilities are located or because the common carrier network cannot provide the dedicated, reliable communications capabilities which these energy utilities require. In many cases, millions of persons, hundreds of thousands of businesses and factories, and multitudes of governmental entities are dependent upon reliable utility service. In a sense, the use of microwave spectrum to provide reliable utility service is essential to the welfare of practically every function of modern American society.

Moreover, without privately-owned microwave systems, utilities would be unable to respond quickly and efficiently to emergency conditions or natural disasters. Frequently, those same events which cause utility outages result in major disruptions of the common carrier network either because of congestion or downed systems. In such instances, were it not for

---

[29/] Allocation of Frequencies in the Bands Above 890 Mcs, 27 F.C.C. 359, 413 (1959).

the private microwave systems, utilities would be unable to respond effectively to emergency conditions at times when delays and lack of service pose serious threats to life and property.

A 1967 report of a Federal Power Commission Advisory Panel, prompted by the November 9, 1965, Northeast Blackout, recommended the use of private microwave facilities by utilities to assure a high level of reliability for communications. The report noted that all critical communications facilities used by electric utilities
should be under their complete control. If a utility does not have its own private system it must lease facilities from a common carrier. Because of the nondiscrimination provisions of the Communications Act, common carriers must establish a priority scheme for restoration.[30/] Utilities generally qualify for a maximum priority restoration assignment of three, which results in restoration only after the military, federal, state, fire and safety agencies are restored. Even with Telecommunications Service Priority ("TSP") assignments, utilities with leased facilities must wait to commence restoration of their services after the carriers restore telecommunications service to entities with higher TSP assignments. This delay in service restoration

---

[30/] Report and Order in CC Docket 87-505, 3 FCC Rcd 6650 (1988).

can result in physical and financial injury to the members of the public who rely on utility service.

Several recent incidents confirm the continuing importance of the use by utilities of private microwave facilities. During the Three-Mile Island nuclear incident in 1979, the utility was unable to secure adequate common carrier services because of an overload of the local telephone central office circuits. However, the utility was able to transmit critical information into and out of the nuclear plant using its private microwave system, which was interconnected with the public telephone network at a distant central office. Just two years ago, Hurricane Hugo and the San Francisco (Loma Prieta) earthquake demonstrated the need for utilities to have private microwave systems which enabled them to coordinate service restoration and communicate with civil defense and public safety officials without the delay or interruption which would have occurred had the utilities been forced to compete with the increased volume of non-utility traffic on the public communications networks.

In addition to the extensive use that utilities make of the 2 GHz microwave band, the band is also heavily relied upon for safe and efficient communications by public safety organizations, the petroleum and railroad industries, state and local governments and common carrier telephone companies: all of whose

operational well being is absolutely crucial to the day-to-day functioning of the nation.

The microwave systems operated by these core industries, like those of utilities, require a high degree of reliability that often cannot be provided at higher frequency bands or alternate technologies. Further, it is a difficult and complicated procedure to change-out an existing microwave system to another system at a higher band, particularly when the system in question is critical to day-to-day functions and emergency situations. It is often necessary to construct and place in parallel operation substantial portions of the replacement microwave system prior to making the actual changeover in order to allow the original system to continue to meet on-going operational requirements, particularly when a conversion from an existing analog system to a new digital microwave system is required. This is the most likely scenario, since 90% of existing 2 GHz systems are analog.

On the other hand, the operational cost of clearing the 2.5 GHz band is practically non-existent, since as discussed above the wireless cable operations for which this band is presently allocated are minimal, and while they play an important role in some rural communities, they cannot be said to be more important that the functions supported by the private microwave systems operating in the 2 GHz band. In fact, the FCC recently began a

proceeding to attempt to limit the rampant speculation that is an on-going occurrence in wireless cable licensing.[31/] Surely any temporary disruption in the additional entertainment services that MDS/MMDS might provide would be easier to overcome than the loss of America's backbone fixed microwave systems in the 2 GHz band. As noted above, UTC advocates allowing existing wireless systems to stay in the 2.5 GHz band on a co-primary basis, and relocation of existing facilities should be under the provisions of the Commission's ITFS involuntary license modification procedures.

Furthermore, while there are numerous, existing and potential, video entertainment services that would more than adequately compensate for the loss of the possible development of MDS/MMDS in the 2.5 GHz band, there is no adequate wholesale replacement for the loss of the 2 GHz microwave band. As indicated above, additional wireless cable service needs could be met at higher bands such as the 4, 6, 7, 11, 11.7, 12, 13, 18, 23 or 28 GHz bands. In fact, the FCC recently granted authority to Hye Crest Management, Inc. to operate a wireless cable service in the 28 GHz band, and rulemaking has been requested to routinely authorize such systems in this band.[32/]

[31/] See Notice of Proposed Rulemaking in PR Docket No. 92-80, FCC 92-173, released May 8, 1992.

[32/] See Hye Crest Management, Inc., 6 FCC Rcd 332 (1991). Also, RM-7872, filed September 23, 1991, by Suite 12 Group,

(continued...)

In looking at the benefit side of the analysis, the 2.5 GHz band would appear to offer essentially the same benefits as a potential home for the spectrum reserve as the 2 GHz band. The bands are only separated by 300 MHz and have similar propagation characteristics. If anything, the 2.5 GHz band would appear to be a more attractive location for a spectrum reserve, since only a relatively small number of existing facilities would actually have to be relocated. Therefore, the amount of time actually needed to implement new technologies would be relatively brief. Further, since many of the existing wireless cable systems are located in rural areas, and since it is claimed that much of the emerging technologies will first serve urban areas, new technologies could be introduced immediately into many of the major metropolitan areas. In contrast, the 2 GHz microwave band is congested throughout large parts of the country including many urban areas, and it would take a number of years to relocate all of the private microwave systems in the 2 GHz band. Finally, the 2.50-2.69 GHz band would afford up to 190 MHz of contiguous spectrum, whereas the 220 MHz suggested for reallocation from the 2 GHz band would yield, at most, 140 MHz of contiguous spectrum.

UTC understands that some PCS proponents have opposed consideration of the 2.5 GHz band as the spectrum reserve because

---

[32/](...continued)
proposes the 28 GHz band be used to provide a multichannel local distribution service.

of: (1) the difficulty in manufacturing equipment for this band; (2) inconsistency with international allocations for PCS; and (3) the Commission's commitment to fostering competition in the video marketplace. All of these arguments are flawed and somewhat disingenuous.

Arguments that equipment cannot be manufactured for use by emerging technologies in the 2.5 GHz band contradict OET's determination that the upper limit of current state-of-the-art components and manufacturing capabilities is 3 GHz. Moreover, recent PCS pioneer's preference requests have indicated an ability and a preference to operate at 2.5 GHz and higher frequencies, up to and including the millimeter wave band to gain advantages in smaller feature size of handsets. Appended hereto as Attachment A is a recent article from Microwave Journal (March 1992) which discusses the advantages and ready availability of higher frequency silicon technology up to 20 GHz through the use of coplanar line line-unified-FETs and the future merging of photonic and microwave technologies at these higher frequencies for cost effective multiservice personal communications systems. Rockwell/PCN America have also stated that their PCS system can operate in the range 1.70-2.59 GHz, and American Telephone and Telegraph claims success in developing a PCS system in the 6 GHz

band.[33/] Thus, the technology exists for emerging technology services to use the 2.5-2.69 GHz band.

The argument that the 2.5 GHz band is not a suitable location for the spectrum reserve because international allocations for PCS are in other bands is misleading. As discussed above, there is no compelling reason for the U.S. to follow the allocation scheme of Europe and Japan. Moreover, designation of the 2.5 GHz band as the spectrum reserve would not be inconsistent with international allocations to emerging technologies. In the recent 1992 World Administrative Radio Conference (WARC) the 1700-2690 range of frequencies was allocated worldwide on a primary basis to mobile services. In fact, 40 MHz of the 2.5 GHz band was allocated to Mobile Satellite Service (MSS) which is itself an emerging technology.

The argument that the 2.5 GHz band cannot be designated as the spectrum reserve because of the Commission's commitment to encouraging competition in the video marketplace assumes that the 2.5 GHz band is the only viable location for "wireless cable." As discussed above, there are numerous replacement bands and alternate technologies that can provide similar, if not superior,

---

[33/] See PCN America's "Amendment," filed April 30, 1992, and AT&T's Pioneer's Preference Request, filed May 4, 1992, in GEN Docket No. 90-314.

video services. In any event, the FCC has available a more direct method of controlling rising cable television prices: it can adopt new cable regulations.

b. Comparison Of 2.45-2.5 GHz Band To The 2 GHz Band

Like the 2.5 GHz band, a cost/benefit analysis regarding the use of the 2.45-2.5 GHz ISM band as the spectrum reserve should be conducted. In many respects the ISM band would appear to be an ideal candidate for the spectrum reserve. The band is already available for operation of Part 15 devices and therefore could accommodate those emerging technology proposals that would operate on an unlicensed basis without forcing the existing users of the band to relocate. While many of the systems operating in the ISM band are important, there are also many systems that are not; e.g., hair removal equipment. Possible interference to these systems would appear to be of less consequence overall than a disruption to the backbone communications links of the nation's core industries and public safety services.

c. Comparison Of 1.99-2.11 GHz Band To The 2 GHz Band

As mentioned above, consideration of the 1.99-2.11 GHz auxiliary broadcast band was given short shrift as a possible location for the spectrum reserve. The financial cost of relocating existing users of the 1.99-2.11 GHz band would be

significantly lower than the cost to relocate the private and common carrier microwave operations in the 2 GHz band. According to the "XFS" database used in the OET Study, there are less than 3,300 licensed stations in the 1.99-2.11 GHz band. According to the National Association of Broadcasters, the total broadcast industry investment in the 1.99-2.11 GHz band is approximately $158 million.[34/] One broadcaster has indicated that it is three times as expensive to convert ENG operations from microwave to satellite.[35/] Thus, under a worst-case scenario, with all facilities in the 1.9 GHz band converting to satellite operation, the total relocation cost of 1.99-2.11 GHz broadcast facilities would be less than $500 million. This figure is substantially less than the estimated $5 billion dollar industry investment that would be required to relocate the 29,000 existing 2 GHz microwave facilities.[36/] Moreover, not all of the systems licensed in the 1.99-2.11 GHz band would have to be replaced by satellite since, a large number of these systems are fixed and could be relocated to other microwave bands at lower cost.

[34/] See Report on the NAB 2 GHz Auxiliary Facilities Survey, January 7, 1992.

[35/] See WJZ13 ENG Operations Overview, submitted in response to OET's request for information on the 1.99-2.11 GHz band as part of its feasibility study.

[36/] On a cost-per-Megahertz basis, clearing the 1.99-2.11 GHz band would cost only $4.17 million/MHz, whereas clearing the 1.85-1.99, 2.11-2.15 and 2.16-2.20 GHz bands would cost over $22.7 million/MHz. Even if the OET's cost estimates were used (See OET Study, p. 33), the cost to clear the 1.8 and 2.1 GHz bands would be as much as $12.5 million per Megahertz.

The comparative operational impact of relocating existing users of the 1.99-2.11 GHz band must also be explored. The OET Study claims that licensees in this band require real-time frequency coordination to relay video back to their stations using ENG vans.[37/] UTC, however, questions why the half second or full second delay of a satellite signal is intolerable for the transmission of voice and video communications. The broadcasters' excellent on-the-spot coverage of the Persian Gulf crisis via satellite transmissions clearly demonstrates the viability of satellite as an alternate medium for ENG requirements.

The OET Study attempts to demonstrate the importance of the broadcasters' use of the 1.99-2.11 GHz band by citing the fact that ENG operations are often used during fast-breaking news events such as accidents, fires, and natural disasters. Yet the OET Study fails to recognize that it is precisely during these "news events" that use of the 2 GHz microwave band is crucial to the public safety and public service entities that are attempting to deal with these emergencies.

The OET Study also indicates that while demand for ENG frequencies is high during major news events, at other times ENG

[37/] OET/TS 91-1, p. 10.

facilities are not used for long periods of time.[38] This does not appear to be the most efficient use of spectrum. Moreover, since a number of broadcast and cable companies are affiliated with the entities seeking to develop emerging technologies, it may well be possible to closely coordinate the operations of new services and ENG systems so as to give priority to ENG requirements when necessary.

Thus, from a true cost/benefit analysis that considers the financial, societal, and operational impact of the various bands, the 2.5 GHz, 2.45-2.5 GHz, and 1.99-2.11 GHz bands are all more appropriate locations for the spectrum reserve than the 2 GHz band.

2. The NPRM Does Not Provide Adequate Replacement Spectrum

If, despite the foregoing cost/benefit analysis, the 2 GHz band is ultimately selected as the location for the spectrum reserve, the Commission must take steps to ensure that there is appropriate and adequate replacement spectrum with equivalent reliability to the 2 GHz band *in place*, for use by displaced users prior to making any actual reallocation of the band.

---

[38] *Id.*, p. 10.

As UTC pointed out in its March 31, 1992, "Petition for Rulemaking,[39]" the Commission's present relocation proposals are wholly inadequate. In its NPRM, the FCC proposes only to "make available" all fixed microwave bands above 3 GHz, in both common carrier and private bands, for reaccommodation of displaced 2 GHz systems. The sum and substance of the Commission's proposal is as follows:

> To provide for this reaccommodation, we propose a "blanket" waiver of the eligibility requirements in these bands for existing 2 GHz fixed microwave users. Specifically, we propose that all existing 2 GHz common carrier and private microwave operations be eligible for relocation to any of the higher frequency fixed microwave bands. The technical rules and coordination procedures currently applicable to each of the higher frequency bands, however, will apply. Existing 2 GHz fixed operations that relocate to the common carrier bands will be subject to the coordination procedures of Section 21.100 and 21.706, and those that relocate to private operational fixed bands will be subject to the coordination procedures of Section 94.63. We will encourage licensees moving from the 1.85-2.20 GHz band with path lengths of under 10 miles to reaccommodate their operations in frequency bands above 10 GHz to preserve the general availability of spectrum in the lower bands for longer path links not feasible at the higher frequencies.

The Commission also requested comment on the "feasibility" of making available a portion of the federal government band at 1.71-1.85 GHz for relocation of some 2 GHz operations.[40]

---

[39] On May 1, 1992, the Commission issued a Public Notice designating UTC's petition as RM-7981, and solicited interested parties to file comments and reply comments by June 1, and June 16, 1992, respectively.

[40] NPRM in ET Docket No. 92-9, at paras. 20-21.

The above relocation proposal is based in large part on the OET Study's conclusion that there is adequate capacity in the 3.7-4.2 GHz and 5.925-6.425 GHz common carrier bands, and the 6.525-6.875 GHz private microwave band to accommodate all 29,000 existing 2 GHz microwave stations.[41/]

A fundamental flaw in this proposal is that it assumes that all microwave systems are fungible. This is not correct. Prior to implementing a microwave system, a thorough engineering analysis is undertaken in order to determine the most suitable band. In many cases higher frequency microwave bands do not provide the same degree of reliability as 2 GHz microwave. While it is difficult to generalize on path lengths and reliability, given the number of factors (such as topography and climate) that will bear on a frequency coordination, the OET Study suggested 35-miles as the cut-off between "long" and "short" paths. The OET Study indicates that 10 percent of all existing 2 GHz paths are greater than 35 miles long.[42/] With 29,000 licensed stations in the 2 GHz band, this translates to 2,900 microwave stations that cannot be relocated to higher bands.[43/] Moreover,

---

[41/] See OET/TS 91-1, pp. 17-18 and 24-25.

[42/] Id., p. 17.

[43/] Significantly, the number of 2 GHz stations supporting "long" paths, and which would therefore be difficult to relocate, exceeds the total number of licensed stations in the 2.5-2.69 GHz band. This is further evidence that the 2.5 GHz band would be a preferable band for a spectrum reserve.