coordination.

Therefore, after spending years of efforts and tens of millions of dollars to remove the co-channel microwave stations from half of the band, the computer industry could have as little as 2 megahertz of usable bandwidth due to adjacent channel interference concerns, as opposed to its absolute minimum starting point of 10 megahertz, which will not actually last us very long in the age of mixed data, images of full-motion computer communication.

Turning the clearing process itself, the Commission should take additional steps to ensure that an adequate amount of the unlicensed data band will be cleared promptly on a nationwide basis.

The Commission has tentatively designated UTAM as the entity responsible for clearing the entire unlicensed band. While UTAM says it's committed to relocating all incumbents from the unlicensed band as mandated by the Commission, in practice UTAM's primary focus is clearly the early

deployment of coordinatable voice systems in advance of band clearing.

What Apple has become aware of from attending UTAM meetings and from reviewing its public statements is apparent from UTAM's statements before this PCS Task Force. All of UTAM's financing is key to the early deployment of coordinatable devices, seed money from the manufacturers of voice equipment and money through clearing fees. This inevitably places Data-PCF at the end of the line since there can be no Data-PCS clearing revenues until the last link problem is completely solved.

The Commission must take steps to ensure that UTAM becomes and remains focused on its primary band clearing obligation, which explicitly includes clearing the unlicensed asynchronous band for nomadic Data-PCS devices as promptly as possible and otherwise fairly represents the interest of all users of the unlicensed band.

Nomadic computing is the driving, unlicensed PCS application for data users. If the

Commission provides voice PCS 140 megahertz of usable spectrum, but grants the computer industry only a fatally incumbered 20 megahertz, it will have failed to provide for the needs of the U.S. education community and other customers of the U.S. computer industry who needed high speed Data-PCS services, and it will have lost the opportunity to create a truly new PCS technology.

MR. STANLEY: Thank you very much. Ms. Abramson, please continue.

MS. ABRAMSON: Good morning. My name is Sandy Abramson, and I'm manager of Wireless Regulatory and Standards Affairs for AT&T NCR, as well as president of UTAM, Inc.

Before I begin I would like to take this time to publicly thank the 30 to 40 small companies, PCS, computer and telecommunications industry associations, the microwave industry associations, as well as the incumbents in what seems thousands of work hours spent in building the industry consensus positions on the UTAM plan for funding and deploying unlicensed PCS.

I also want to applaud the Commission's treatment of unlicensed PCS in the second report and Order as well as its recognition of the importance of the unlicensed PCS industry.

UTAM strongly supports the decision to provide unlicensed PCS with a full 40 megahertz allocation necessary to meet the enormous demands for unlicensed products. UTAM also agrees with the Commission that the allocation of the more lightly loaded spectrum of 1890 to 1930 megahertz is absolutely critical to the potential success of unlicensed PCS. UTAM further endorses the FCC's evenhanded approach in deciding that lightly loaded spectrum one half to asynchronous, mostly voice products, and one half to asynchronous which are mostly data products. This is imperative for securing financing for band clearing and ensuring that all segments of the unlicensed PCS industry have the opportunity to successfully market their products. Any changes in these fundamental decisions will at least delay and likely preclude the deployment of unlicensed PCS systems and

devices.

Before I address these points in greater detail, I want to tell you a little bit about UTAM itself.

UTAM is a nonprofit corporation formed by unlicensed PCS manufacturers. Membership in UTAM is open to all the parties with an interest in unlicensed PCS, including representatives of the microwave licensees and other potentially affected industries.

UTAM's current members represent the full range of small too large future providers of data and voice unlicensed PCS products. The FCC has conditionally designated UTAM as frequency coordinator for the unlicensed spectrum and has charged UTAM with the responsibility for preparing a plan for funding and managing the relocation of incumbent microwave licensees from those frequencies. This is a daunting task even under the current rules. Almost 2,000 microwave links will have to be relocated at a cost of some 300 to 500 million dollars, but the task cannot be

avoided because unlicensed PCS products are expected to be freely available and very portable and, therefore, require clear spectrum in which to operate.

The absence of exclusive spectrum rights means that an entity such as UTAM, which can spread the cost burden across the entire industry, is essential to accomplishing band clearing. I strongly believe that the expense and effort will be worth it. Unlicensed PCS promises to bring a wealth of benefits to consumers and businesses. Products such as wireless PBXs and LANS, advance cordless phones and personal digital assistance will be available to anyone anywhere without burdensome licensing procedures or the expense of air time charges.

As flexible and cost effective extension for the information super highway, the capabilities and efficiencies that unlicensed PCS products bring will have a broad range of important business, consumer, education and health applications for the office, home and classroom

and hospitals. They will also result in job creation for both the unlicensed industry and businesses making use of unlicensed products, as well as to maintain the U.S. global leadership role in telecommunications technologies.

But these benefits cannot be enjoyed unless UTAM is successful in meeting the serious challenges now before it. Foremost among them is the need to raise hundreds of millions of dollars to clear the entire unlicensed bands right down to that the very last link. The principal source of revenue for funding the band clearing process will be fees assessed on sales of coordinatable, unlicensed PCS systems and devices. These revenues simply will be insufficient if the current frequencies are relocated in a manner there -- where the total relocation costs or reduces the opportunities for coordinated deployment by increasing the number of incumbent microwave systems.

In sum, to make unlicensed PCS a reality, existing regulatory uncertainties must be resolved

as quickly as possible.

First, the current allocation of at least 40 megahertz of spectrum should be reaffirmed because it is essential to meet consumers' needs for unlicensed PCS. The record before the Commission confirms the enormous demand for these products.

Second, the current allocation of the frequency at 1890 to 1930 megahertz must be retained because it is critical to the economic feasibility of the industry. Other potential frequency bands such as 2.1 gigahertz simply contain too many microwave links and would increase the cost of band clearing from 500 million to 2 billion dollars, which is far beyond the ability of the industry to afford.

Third, request to allocate the lightly populated frequencies at 1910 to 1930 solely to data products should be denied. Data has already been favored by an allocation of contiguous 20 megahertz block. The current equal division is necessary to afford meaningful opportunities for

both voice and data products and to permit the deployment of sufficient numbers of coordinatable systems and devices in order to generate the fees required to the band clearing process.

And finally, the Commission should proceed promptly to resolve all other outstanding issues involving unlicensed PCS and to establish expedited procedures for reviewing an approval of the UTAM's Financing and Relocation Plan so UTAM and the industry can move forward.

These four simple steps can resolve uncertainties and facilitate the fastest possible deployment of a broad family of new unlicensed PCS systems and devices. In contrast I want to emphasize that any material change in the unlicensed PCS allocation at this late date will place at risk to tens to hundreds of millions of dollars and hundreds of thousands of industry resources that have already been devoted to the development of unlicensed PCS based on reliance to the current rules and likely will jeopardize the future of unlicensed PCS itself. Thank you.

MR. STANLEY: I thank you very much. Mr. Rosenblatt, please.

MR. ROSENBLATT: I would like to thank the Commission for allowing me the opportunity to represent some of our thoughts and experiences that we've had over the last several years. I'm the vice president of the wireless group of Comsearch, and Comsearch, as many of you know, has been involved in wireless telecommunications via satellite, microwave, cellular and now PCS issues over the last 15 years. And one of the more significant aspects of the PCS allocation has to do with microwave, and the coexistence of microwave with PCS.

We've been involved with that particular area since the beginning; since the early stages of broadening CDMA and the coexistence capabilities of that technology with microwave. And based upon those experiences, we would like to offer some -- what we feel is some technical insight into the microwave issue.

Now, I will caveat that by saying that with

every technical issue there's a related economic and political issue that we won't necessarily comment on and they have probably been addressed in the previous panels that have been presented.

The success of PCS systems coexisting with microwave incumbent operators depends critically upon the outcome of many complex issues. Perhaps the most prevalent among these is the spectral bandwidth of the microwave filters themselves. In virtually all instances in the 1.9 gigahertz band the receive bandwidths are equal, and in some cases greater, than 20 megahertz allocation that is described at least in Block C of the current channel plan.

Therefore, considering the proposed PCS allocation of four 20 megahertz allocations, a single microwave receiver could impact the use of PCS spectrum within a complete PCS block.

We have looked at some situations where a single microwave receiver could effectively block out the capability of providing service in a large portion of a particular market.

The best way to avoid interference into incumbent microwave is to relocate all the microwave paths in the market. Of course this is impractical in day one, thus the best way to avoid interference is to engineer around them. And this is a means that Comsearch has been involved in over the last 15 years of engineering around other microwave receivers, satellite receivers and other kinds of technology.

In order to engineer around a particular microwave receiver, there needs to be enough spectrum room to do that. PCS spectrum allocations that are as wide as the occupied microwave bandwidth leave no room to work around a particular microwave receiver. Instead, a PCS operator with these allocations would be faced with the predicament on day one of more than likely relocating all or a large percentage of all the microwave paths within a market.

Larger PCS spectrum allocations will allow some spectral space to permit deployment and allow for the PCS operator to become viable before being

forced to contend with the immediate relocation of all microwave incumbents. A larger spectrum allocation will allow for interference avoidance, thus permitting less costly systems to be deployed in the early stages of PCS.

Another aspect of with regard to the microwave issue is that of negotiations, a necessary evil, if you will, in order to relocate all the microwave paths. Comsearch has been involved within the technical realm of mobile engineering, and we feel well-qualified to comment on the technical aspects of this perceived process. Our experience, especially with private microwave indicates that the problems associated with negotiation and relocation are very complicated and they tend to be exacerbated by FCC rules.

The 80 megahertz separation of the frequency blocks were conceived to be coincident with the 80 megahertz transmit/receive separation of the existing microwave frequency band. Unfortunately, the problems born by this attempt

to provide the PCS operator some flexibility in designing their systems are many. The 80 megahertz separation is only -- is not in use by 100 percent of the microwave paths in existence. So a PCS operator may have to pay to relocate the microwave path that is only one half in his area; the other half having to be relocated by somebody whose block that microwave path occupies.

This could create some inequity in terms of who pays for what and also exasperates and complicates the particular negotiation of that microwave path.

In addition, due to the wide nature of the microwave receive filters, adjacent channel interference may tend to play a substantial role in the spectral availability within a particular market. Comsearch has done some analysis in a few markets and has determined at least on the limited basis that we've analyzed it, that an adjacent channel could cause up to 50 percent of the relocations required for a particular block.

All the industry segments will be -- within

the microwave industry will be inundated with the demand to relocate microwave paths. Within the band allocated to PCS, there are approximately 12,000 licensed microwave paths. To relocate this magnitude of microwave paths within a reasonable amount of time will tax the resources of practically every segment of the industry.

By comparison there were fewer than 350 new microwave paths licensed in the 6.7 gigahertz band during all of 1993, and this particular microwave band is looked at as a relief band for the currently occupied 1.9 gigahertz band. We're optimistic that the industry can meet this challenge. However, the critical aspect in meeting that will be the additional time constraint. Thank you.

MR. STANLEY: Thank you very much. Well, we've certainly heard a variety of opinions on, I guess, some of the more complicated issues that we're facing. I would like to take a 15-minute break, but before we do, I'm going to poll the panel on, I guess, one of the principal questions

that was aired widely yesterday and that's the-- I'll call it the technical and economic viability of the smaller lots of spectrum.

So if I could sort of start with you Limond, just to comment on the technical economic viability of the spectrum in terms of say 10 and 20 megahertz blocks? Are they feasible?

MR. GRINDSTAFF: Yeah, they are feasible. With the new digital technologies capacity is not the constraint, and I think with -- when you look at a PCS operator, you have to -- as a being a PCS operator you have to ask yourself what your service is going to be, and not all PCS operators are going to do the same thing. And I don't think that's what the Commission is looking for. No one is looking for a whole new seven more entries, PCS entries that look just like cellular.

In providing the different scopes of blocks, different size blocks, you can stimulate difference service concepts and different services in each of those blocks. A 10 megahertz block, a 20 megahertz block, a 30 megahertz, a 40 megahertz

block all can do the same type of -- technically can all do the same type of services. They can also do different types of service depending on the PCS operators business plans. And I think that's a key critical issue that PCS the operator have a business plan or a scope of business that he'll tailor his business to.

MR. STANLEY: Thank you. Lex.

MR. FELKER: I think -- I tend to agree that PCS isn't going to be a clone of what cellular is today. However, on a going forward basis I tend to agree with some of the other comments I heard this morning. PCS is going to embrace a wide range of wireless applications and will compete with today's cellular, compete with today's wireline services, offer a variety of nonvoice services and whatnot.

I think given the difficulty or the importance of entering the market as soon as possible and the difficulties posed by the microwave-sharing issue and the importance of maintaining infrastructure costs, at least on par

with other wireless competitors, suggests to me that the 10 megahertz is probably going to be a disaster. 20 megahertz is likewise potentially unusable and that at a minimum we've got to have at least 30 megahertz and hopefully 40 megahertz assigned to them.

MR. STANLEY: So technically feasible; economically infeasible?

MR. FELKER: Certainly economically infeasible.

MR. STANLEY: Mr. Murray.

MR. MURRAY: I think that the 10s and 20s are technically and economically feasible, but I think they're more economically and technically feasible if there are no 30s and they're all 20s and 10s.

MR. STANLEY: Chuck.

MR. JACKSON: I guess there's the distinction between technical and economic feasibility and there's -- that very term "feasible" has to be defined.

I look at those 10s in the higher band

where I think the technology is going to develop slower and where there are more microwave incumbents per license to remove, although they're narrower band incumbents, and I guess I now try them to channel 50 or something like that at the time of the sixth report in order in television, UHF television was technically feasible but its economic feasibility grew over time. And I think that the same thing would be true for those upper licenses. With the current scheme I think that they wouldn't be big money makers the first year and they might not go for very much in the auction.

MR. STANLEY: John Battin.

MR. BATTIN: Well, we believe that there are many technologies that can used on the 10 megahertz band that have a viable business. The biggest problem is the microwave clearing issue and the timing issuing.

Also the way it looks now is that there will be many requests for dual mode -- most of any one operator may get a 20 megahertz license, a

20 -- a 30 megahertz license and also a 10 megahertz license of a two dot one. And so, therefore, we will be building subscriber units that try to span all of those frequencies. And I agree with Irwin; that that's a 20 or 25 percent premium.

So it's not just an issue of, hey, I have a 10 megahertz license. If you're in this business on a pretty wide scale basis, you may have a 30, a 20, a 10, and so you have to build both those subscriber units that can cover all of those frequencies.

MR. STANLEY: Irwin?

DR. JACOBS: Yes. I think an interesting business could be carried out in a clear 10 or 20 megahertz band. I think there's enough capacity, et cetera, to pull some interesting possibilities.

The separation is a problem. If you're limited at the upper end and then many of the users, particularly the larger bands at the lower end. So there's a cost implication that I think

will -- can hurt you.

It's interesting, however, that initially when you start to watch these services your main concern is going to be coverage and not capacity; thus, you're going to have to build up subscribers slowly, and then no matter what bandwidth you have, you're probably going to be using less than 10 megahertz when you -- for quite a period of time.

MR. STANLEY: David.

DR. NAGEL: For the -- the Data-PCS application, of course, the question of operating efficiency is not really a relevant issue. The main issue for us is one of band clearing.

All the studies that we've done show that the absolute minimum of 10 megahertz would be required to provide Data-PCS services that would be useful to the customers that we've studied so 10 megahertz would certainly be a minimum band; 20 megahertz begins to get services that are -- provide adequate levels of performance.

MR. STANLEY: Sandy?

MS. ABRAMSON: As far as UTAM is concerned, the way that we see this as relevant to us is the issue of microwave clearing, and as I said earlier, the number of links in the 2.1 gigahertz band is about 7,000 links, and that would up the cost of our relocation from the 1890 to 1930 band from 300 to 500 million dollars to upwards of 2 billion dollars, and that would also be overlooking the hundreds of millions -- and let's say 100 to 200 million that we have in some cost on products based on the second report Order.

As far as UTAM is concerned, those are the major issues.

MR. STANLEY: Okay, thank you. Jeff.

MR. ROSENBLATT: I would tend to agree with a lot of the other panelists in that if you had 10 megahertz of cleared spectrum with today's digital technology that would provide enough capacity to serve all kinds of niche and, actually, fairly broad-based traffic requirements.

However, with the incumbent microwaves occupying that spectrum, the smaller bandwidths

are going to be at a significant disadvantage in cases over the broader allocations of spectrum.

Though I might add that in the 2.1 megahertz band it's a slightly different issue. In the 2.1 gigahertz band there is less spectrum available. 40 megahertz has been allocated. However -- and there's more microwave paths, also. There's, let's say, two to one number of microwave paths relative to the 1.9 gigahertz band. However, the microwave filters occupy almost an order of magnitude less spectrum. They're generally 800 kilohertz to 1.6 megahertz in bandwidth.

So coexistence is better. When you flip side them, you've got more microwave paths to move out so it's going to be -- the relocation is going to be more costly; sharing is a little more effective.

MR. STANLEY: Okay. Well, thank you very much. I guess -- Ralph, did you have any comments before we broke?

MR. HALLER: No. Let's take about a

15-minute break and be back here at twenty minutes of eleven for the discussion.

(Thereupon, a recess was taken and then the proceedings continued as follows at approximately 10:40 a.m.:)

MR. HALLER: I think almost everyone is back and we'll go ahead and get started to the interesting part of today's panel and that will be, hopefully, a spirited debate that we have between all the experts that sitting here before us. Tom.

MR. STANLEY: Let me start off with a softball question to Limond. Someone from the audience had asked how can a 12-day old company like Airtouch have such extensive PCS experience. Would you respond to that, please.

MR. GRINDSTAFF: It was all inherited from our old days of being PacTel.

MR. STANLEY: Let me start the questions in the area of microwave relocation. Jeff had mentioned, I guess, at least -- I guess John Battin had mentioned the statistic that it's