

the band clearing process.¹⁵ The plan must be equitable to all prospective unlicensed device manufacturers and facilitate the implementation of nomadic devices, especially data PCS devices, as promptly as possible. It must also include estimated timetables and priorities for clearing significant portions of both sub-bands of the 1910-1930 MHz unlicensed band.

In sum, UTAM is responsible for:

- relocating incumbent microwave systems consistent with the requirements established in ET Docket 92-9;
- addressing concerns from fixed microwave systems about interference from unlicensed PCS;
- determining in the first instance which unlicensed PCS devices and systems are coordinatable;¹⁶
- managing the deployment of coordinatable unlicensed PCS systems and devices prior to full band clearing;¹⁷ and
- expediting the deployment of nomadic equipment, especially data PCS.

¹⁵ Memorandum Opinion and Order, App. A at 6 (to be codified at 47 C.F.R. § 15.307(a)).

¹⁶ Id., ¶¶ 220-21.

¹⁷ Id., App. A at 6 (to be codified at 47 C.F.R. § 15.307(a)).

In addition to assigning these responsibilities to UTAM, the FCC:

- established equipment authorization criteria for unlicensed PCS;¹⁸
- prescribed additional requirements for devices to qualify as "coordinatable;"¹⁹
- mandated that all applicants for equipment authorization for unlicensed PCS devices and systems be participants in UTAM; and
- provided that UTAM will have no further responsibilities and cease operation when the Commission determines that interference to incumbent microwave systems is no longer a concern.²⁰

III. DESCRIPTION OF UTAM

UTAM, Inc., a Delaware corporation, was formed on July 20, 1993. It is a non-profit corporation formed to serve as frequency coordinator for the unlicensed PCS industry. A copy of UTAM's corporate charter and bylaws are appended hereto as Attachments B and C.

Membership in UTAM is open to any companies, associations, or other entities with a material interest in the manufacture, sale or distribution of unlicensed PCS devices,

¹⁸ Second Report and Order, 8 FCC Rcd at 7739-40; 47 C.F.R. § 15.305.

¹⁹ Memorandum Opinion and Order, App. A at 6 (to be codified 47 C.F.R. §§ 15.307(d) and (e)) (Coordinatable devices must incorporate: (1) measures to assure that they cannot be activated until installation at an authorized location verified by UTAM and (2) an automatic mechanism for disabling operations if they are moved outside of the coordinated area.)

²⁰ Id., App. A at 6 (to be codified at 47 C.F.R. §15.307(a)).

entities engaged in the manufacture, operation, planning engineering or installation of microwave systems, users of unlicensed PCS products or systems and incumbent licensees.

Voting membership is available to any individual, partnership, corporation or other entity planning to manufacture, sell or distribute unlicensed PCS products or systems.²¹ Entities shall be eligible for voting membership once they have either:

- (a) made an initial advance payment of fees to UTAM in an amount to be established by the Board of Trustees (currently set at \$10,000);
- (b) delivered an unconditional letter of intent to make an advance payment of fees and no more than one general or special meeting of the membership has occurred since such delivery; or
- (c) begun paying fees to UTAM in connection with the marketing or sale of unlicensed PCS devices or systems.

The \$10,000 voting membership fee will be treated as an advance against the clearing fees which manufacturers will be required to pay UTAM in order to deploy products in the unlicensed band. Manufacturers who have not paid the \$10,000 fee will nonetheless automatically become voting members of UTAM, Inc. upon payment of their first clearing fees to UTAM.

²¹ Voting member companies are: AT&T, Ericsson, Motorola, Northern Telecom Inc., Omnipoint, PCSI, ROLM, SONY. The current Board of Trustees has eight members: President Sandy Abramson (AT&T); Vice President Steve Sivitz (PCSI); Treasurer Jerry Leonard (Motorola); Secretary Ron Cross (Northern Telecom); Peter Douma (SONY); Peter Kozdon (ROLM); Peter Murray (Ericsson); and Brian Stout (Omnipoint).

Associate membership is also available to other parties eligible for membership.²² Associate membership requires a \$500 annual fee which contributes to recovery of administrative costs. Associate members participate in committee and member meetings but are eligible to vote only in committees. UTAM also has many participating companies who have joined committees but have not yet become UTAM members. UTAM committee and member meetings are open to all interested parties.

A. Organization

In order to fulfill its responsibilities, UTAM will require an administrative staff. Initially, UTAM plans to employ a Managing Director and a Financial Officer who will be solely responsible for UTAM operations. UTAM's Managing Director will be responsible for: managing outside administration and engineering resources suitable for relocation goals and directing the relocation implementation

²² Associate members currently include: Alcatel Network Systems, American Personal Communications, American Association of Railroads, Andrew Corporation, BellSouth Wireless, Cellular Holding, Inc., Columbia Spectrum Management, CTP Systems, Digital Microwave Corporation, Digital Wireless Corp., Harris Corporation, Hitachi, Industrial Telecommunications Association, Inc., LOCATE, Metrocall, Moffett, Larson & Johnson, Inc., NABER, NEC America, North American Telecommunications Association, Pacific Bell, Personal Communications Industry Association, PTI Communications, Rockwell International, Southwestern Bell, SpectraLink, Sprint, Thomson Consumer Electronics, Utilities Telecommunications Council, Wise Communications, Inc. A complete list of UTAM Members is appended hereto as Attachment A.

plan to facilitate the clearing of the band. The Financial Officer will be expected to assist the Managing Director and oversee UTAM's financial performance together with its outside accountants. For support staff services, UTAM is considering several options to provide administrative resources and support personnel on a part time and full time basis.

To assist its own employees, UTAM expects to engage the services of several independent contractors. UTAM has retained a frequency coordinator to conduct an initial interference study prior to beginning the relocation and coordination processes. In addition, BIS Strategic Decisions has completed an unlicensed PCS demand study on UTAM's behalf. UTAM may also use one or more frequency coordinators to review site specific coordination studies necessary for the deployment of some coordinatable devices.

B. UTAM Committee Structure

Committees are open to both voting and associate members. Committees are established by the Board as deemed advisable and strive to operate on a consensus basis. When necessary, votes may be taken, with a majority of those participating needed to carry an action item. All committee members vote regardless of whether or not they have UTAM membership status, but all decisions must be ratified by the Board. Notwithstanding the results of any such vote, every

effort will be made to accommodate minority views where possible. The following committees are now active:

Finance Committee. The Finance Committee oversees the development of a funding plan and proposals for the system for clearing fees to be paid into the relocation fund. In order to determine a sound basis for establishing clearing fees and estimating future income to UTAM, the Finance Committee commissioned a study by BIS to determine the demand and price sensitivity of unlicensed PCS products. The number of products expected to be sold within given price ranges provides grounds for determining the fees that are necessary to raise the funds to finance UTAM's clearing and coordinating operations.

The financial plan has been reviewed internally and by financial experts to ensure that the financial plan will succeed in raising the needed funds. The Finance Committee has also obtained commitments for start-up funds from several companies to finance UTAM's first year's expenses and begin the microwave process.

Deployment Committee. The Deployment Committee has been developing coordination procedures and methods for expediting early deployment of non-coordinatable systems and devices. To this end, it has developed analyses to determine the extent to which coordinatable devices can be deployed without causing interference to microwave operations. The Committee has also compared different clearing strategies to determine

which will result in the greatest revenue and thus the fastest clearing of the entire spectrum. It has further arranged for the preparation of a comprehensive microwave link database so that the relocation process can begin immediately after approval of the financing and band clearing plan.

Adjacent and Co-Channel Interference Committee. The Adjacent and Co-Channel Interference Committee has been conducting studies to examine interference potential and coordination procedures as well as the feasibility of using guardbands to permit early deployment of non-coordinatable systems and devices.²³ The Committee's members have done extensive testing to determine the extent of interference to microwave links in adjacent channels from PCS operations. Committee participants and microwave industry associations are members of TIA and have contributed substantially to Bulletin 10-F.

Structure Committee. The Structure Committee has been developing an organizational plan for UTAM. In addition, its members have been interviewing candidates for the Managing Director position and negotiating for administrative support services.

²³ In this context, "guardbands" refer to reservation of spectrum to minimize the likelihood of adjacent channel interference.

IV. FINANCING PLAN

A. Overview

The UTAM financing plan consists of several basic sections. The first section sets forth the types of expenses and estimates of the costs expected to be incurred in performing the microwave coordination and relocation responsibilities. This includes the following major elements:

- band clearing expenses incurred for relocating microwave links out of the unlicensed band and the adjacent licensed bands;
- frequency coordination expenses resulting from the early deployment of coordinatable devices;
- general administrative expenses associated with UTAM's relocation and coordination activities; and
- interest credits for advance payments from members providing funds with which UTAM can begin its operations.

The second section details the sources of revenue for UTAM. Included therein is a description and explanation of:

- membership fees collected from UTAM's voting and associate members;
- advance payments of clearing fees from companies funding UTAM's initial operations;
- coordination fees collected by UTAM for the coordination of unlicensed devices before the entire band is cleared; and
- clearing fees collected on each unlicensed product sold in the band which will be used to fund relocation of the microwave systems.

The last section contains an analysis of the information in the previous sections to project the expected timing of revenues to fund coordination and band clearing and a long

term funding plan based upon market studies prepared and reviewed by expert consultants. UTAM has used this analysis to develop:

- a first year budget governing start-up and other requirements;
- the level of clearing fees that will be charged; and
- a long term budget that contemplates microwave relocation as rapidly as revenues become available to UTAM.

Initially, UTAM's financial expenditures will be limited by revenues received. UTAM has had extensive discussions with members of the financial community who have advised that UTAM might be able to borrow funds if sufficient guarantees are offered. But, although this would speed the clearing process, the high interest costs may raise the clearing fees that need to be collected. The Board therefore concluded that it was more prudent to begin the clearing process with the kick start funds from individual manufacturers and sustain the process through clearing fees.

The use of leveraged funds to expedite clearing will be reconsidered by UTAM as the unlicensed PCS market develops. Each year, UTAM will submit an annual report for the upcoming year for Commission review. UTAM's members have put significant effort into the consensus formulation of its financial plan and UTAM and its advisors believe it will be successful.

B. Cost Items

UTAM's costs fall into four basic categories:

- Microwave relocation costs;
- Frequency coordination costs;
- General administrative costs; and
- Credits/Interest on advance payments and manufacturer directed relocations.

UTAM estimates for these costs and the methodology employed to develop them are set forth below.

1. Microwave Relocation Costs

Under the Third Report and Order, UTAM must pay microwave licensees the direct costs associated with providing comparable alternative facilities in order to relocate the microwave links currently operating in the unlicensed band.²⁴ These relocation costs are expected to average \$200,000 per link. The costs represent the expense necessary to duplicate the typical microwave installation of a fully redundant duplex link. Some of the items included in these

²⁴ Third Report and Order, 8 FCC Rcd at 6603-08.

costs are listed below, although there may be additional expenses as the actual relocation process begins:

- Negotiations
- Frequency Coordination
- Engineering Design
- Filing Fees
- Preparation of Application
- Other Zoning Permits
- Cost of New 4-6 GHz Equipment
(4 transmitters and 4 receivers)
- Tower Modifications
- Antennas, feed lines, misc.
- Installation and validation

UTAM realizes that a minority of exceptional cases may result in higher costs.²⁵

Consistent with FCC regulations, UTAM is under no obligation to pay more than comparable facilities would have cost. Comparable facilities have been defined to be those that are as good as or superior to a microwave licensee's current facilities.²⁶ For example, if an incumbent has an analog link, UTAM would be obligated under the rules only to move that analog link to a new frequency. It would be the responsibility of the incumbent to pay the additional costs incurred if an upgrade to digital service is desired.

²⁵ These figures are based on an average cost of \$150,000 to \$250,000 to move each vintage analog microwave link. UTAM understands that the cost of moving digital microwave systems and tower upgrades or replacement may be substantially higher. See Creating New Technology Bands For Emerging Telecommunications Technology, Office of Engineering and Technology, OET/TS 91-1, at 31-35 (Dec. 1991) (Report filed in ET Docket 92-9).

²⁶ Third Report and Order, 8 FCC Rcd at 6603.

The 1910-1930 MHz band is home to approximately 386 incumbent microwave licensees which must be relocated. To compute the total cost of these relocations, the 386 links between 1910-1930 MHz could simply be multiplied by \$200,000, the estimated cost of relocating each link. However, UTAM believes that such a calculus likely would overstate the costs it will have to bear to clear the band.

Microwave links consist of two "paired" channels. Each end of the link transmits in a different frequency block. Microwave links are operated throughout the entire PCS spectrum allocation, and each of the links in the unlicensed band is paired with a link in the licensed PCS band. Although in some cases UTAM will need to relocate a link before the PCS licensee and, absent a cost sharing agreement, will have to pay the entire cost of moving the link, the number of links so affected should be comparable to those that the PCS licensees will need to move first. As a result, it can be expected that UTAM and PCS licensees as a whole will likely each fund one-half of the total relocation costs, or approximately \$38.6 million.

In order to prevent interference to microwave operators on channels adjacent to those frequencies, as many as 1420 microwave links located outside the 1910-1930 MHz allocation may also need to be relocated or otherwise protected. These links are in the spectrum allocated to licensed services, and it is anticipated that the majority will be relocated by the

licensee. However, UTAM is budgeting a reserve to enable it to clear 10% of those systems if the need arises. The estimated cost to UTAM of relocating these links would be \$28.4 million.

These calculations lead to a projection of approximately \$67 million in total relocation costs:

1910-1920 MHz:	193 Microwave Incumbents \$19.3 Million Relocation Costs (One-half of 193 x \$200,000)
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1920-1930 MHz:	193 Microwave Incumbents \$19.3 Million Relocation Costs (One-half of 193 x \$200,000)
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Adjacent Channels below 1910 MHz:	76 Microwave Incumbents \$15.2 Million Relocation Costs (10% of 760 links)
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Adjacent Channels above 1930 MHz:	66 Microwave Incumbents \$13.2 Million Relocation Costs (10% of 660 links)
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Approximate Total Cost for Clearing 1910-1930 MHz and Adjacent Channels:	\$67 Million (335 links)
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It is important to recognize that UTAM's ability to bear these significant relocation costs will be directly dependent upon the funds available to it. Moreover, UTAM's decisions regarding relocation cost disbursements will be affected by the plans and needs of other interested parties. For example, where a microwave system utilizes frequencies that fall in both the licensed and unlicensed bands, UTAM will work with the microwave licensee and try to accommodate its

needs. These factors may affect the actual level and timing of relocation expenditures by UTAM.

2. Frequency Coordination Costs

UTAM will be responsible for coordinating the early deployment of unlicensed PCS devices and systems. To facilitate such deployment, UTAM will include in its database the results of interference assessment analyses which identify those areas of the United States in which deployment will initially be permitted. These data will further classify the remainder of the country with respect to the risk of interference to microwave systems and the ability to conduct further coordination studies to determine if, in fact, unlicensed PCS products can be deployed.

Based upon the results of these studies and consistent with its coordination obligations generally, UTAM has identified the following coordination cost elements:

- Interference Studies
- Location Verification System
- Unlicensed PCS Deployment Database
- Coordination Subcontractor(s)
- Site Specific Coordination
- Administrative

Interference Studies. As described in more detail below, the initial general study sorts counties in the U.S. into two groups: Zone 1 or Zone 2. Deployment in Zone 1 areas poses a potential interference risk depending upon the number of unlicensed PCS systems and devices deployed in the area. Zone 2 areas will require site specific frequency

coordination of equipment locations prior to any deployment. A detailed coordination study using the guidelines from TIA Bulletin 10-F and its successors will be commissioned to define the Zone 1 areas available for deployment of coordinatable devices after UTAM's Plan is approved. The NSMA PCN process will be used to advise the affected incumbents.

Location Verification System and Database. To ensure that all coordinatable devices are deployed in areas where they will not cause interference, UTAM is obligated to develop a system for verifying and recording the deployment location for each coordinatable PCS system or device as well as any subsequent relocation. As stated in the recent PCS order, UTAM can verify the location of installed systems in several ways, including through reports from licensed installers.²⁷ Fulfilling these responsibilities will require an administrative mechanism to receive the verifications and an Unlicensed PCS Deployment Database to record them. UTAM has budgeted substantial funds for these activities and will either develop this database on its own or use a subcontractor who will work under UTAM's direction to manage the coordination activities.

Site Specific Coordinations/Subcontractors. Deployment of products in Zone 2 areas will require a site specific coordination. UTAM will most likely select one principal

²⁷ Memorandum Opinion and Order, ¶¶ 212, 217.

entity to develop its coordination database. Site specific coordinations can be done by any coordinator, but that coordinator will have to work with the principal subcontractor for final deployment approval. When a site specific coordination is submitted, UTAM will review the study before allowing deployment. The costs of these coordination activities will be dependent upon the subcontractors' fees, plus an additional element to cover UTAM's associated expenses.

Administration. It follows that all of these coordination activities can be expected to generate significant administrative costs for UTAM, although it is difficult to estimate them at this time. Some of these costs, such as the deployment database, will be recovered as general overhead. Other expenses that are not included in the General Administrative Costs discussed below will be recovered in the coordination fee structure.

3. General Administrative Costs

To manage the early deployment process and microwave relocation efforts, UTAM will need an administrative structure and employees dedicated solely to carrying out these responsibilities. UTAM has estimated that its administrative costs will be approximately \$1 million during its first year

in operation. The major line items (in addition to certain of the coordination costs discussed above) which are included in this total are set out below:

- Salaries and Benefits
- Office Expenses
- Travel Expenses
- Legal Fees
- Management Fees
- Microwave Consulting
- Miscellaneous Consulting
- Recruiting
- Toll Free Number Fees
- Other Communications Expenses

**4. Credits for Advance Fee Payments and
Manufacturer Directed Clearing**

Although UTAM expects to finance the clearing of the unlicensed band primarily through the sale of unlicensed PCS devices and systems, those funds will not immediately be available. Therefore, an alternative source of funds is required to establish UTAM as a functioning entity and to initiate the relocation and coordination processes. Several manufacturers have agreed to provide this important initial funding in the form of advance fee payments.

Contributing manufacturers will be entitled to a credit on future clearing fee payments of the amount of their advanced funds plus interest at the prime rate plus four percent. While these credits will be recorded as of their deposit date, they can only be used gradually so as not to deprive UTAM of needed revenue streams. During the first four years of UTAM's operation, manufacturers who have contributed funds can, at their discretion, collectively

utilize credits totaling no more than 15% of UTAM's annual revenues from clearing fees net of administrative costs. Starting in Year 5, the percentage will be raised to 30%. The capped credits would be available to manufacturers on a pro rata basis.

C. Revenue Sources

In order to fulfill its responsibilities to fund the relocation of the microwave licensees currently operating in the unlicensed PCS band, UTAM will manage the deployment of coordinatable devices and collect clearing fees on each coordinatable device deployed. To support its early deployment and band clearing activities, UTAM will receive revenues from four primary sources: membership fees; advance clearing payments or manufacturer directed band clearing; frequency coordination fees; and clearing fee payments. Each of these basic funding sources is discussed below.

1. Membership Fees

UTAM has both voting and nonvoting members. Voting membership is limited to businesses or entities planning to manufacture, sell or distribute unlicensed PCS products or systems. To be admitted to voting membership, the entity must either pay \$10,000 in advance clearing fees or begin paying fees to UTAM in connection with the actual sale of unlicensed PCS devices or systems. An associate nonvoting membership is available to any interested party for an annual fee of \$500, which covers administrative costs. To date,

approximately \$100,000 has been collected in total membership fees.

2. Advance Clearing Fees or Manufacturer Directed Band Clearing

The advance clearing fees expected from several manufacturers will permit UTAM to begin operations. As noted above, these companies will receive credits against future clearing fees equal to their contributions plus interest at the prime rate plus four percent.

UTAM also anticipates that some manufacturers may wish to provide funds to UTAM at various times conditioned upon their expenditure for relocation of specific microwave links or clearing of specific frequencies or geographic areas. UTAM will consider all offers of funding with due regard to UTAM's clearing plan and resources and enter into agreements when appropriate. Although a manufacturer, PCS licensee, or microwave licensee may relocate links independently, it would not be entitled to credits unless it has first reached an agreement with UTAM that has been approved by the Board of Trustees.

3. Frequency Coordination Fees

No specific coordination fee will be charged for the deployment of products in Zone 1. The cost of updating the deployment database is included in UTAM's administrative costs. Separate frequency coordination fees will, however, be charged on coordination activities in Zone 2 areas. These

fees will be set at subcontractor costs, with an additional amount added to cover administrative overhead. This would essentially provide recoupment of expenses incurred on behalf of the party requesting site specific coordination for unlicensed systems or devices. There will also be charges for coordination information packets to cover the costs of producing and distributing those materials.

4. Clearing Fees

Clearing fees will be the primary funding mechanism for UTAM relocation expenses. According to FCC Rules, each application for equipment certification must be accompanied by an affidavit from UTAM, Inc. certifying that the applicant is a participating member of UTAM. Any manufacturer who does not fulfill the obligations attendant to its participation in UTAM, such as the payment of clearing fees, will be subject to FCC administrative sanctions.²⁸ UTAM intends to rely upon this requirement together with contractual provisions to enforce its clearing fee collection responsibilities.

UTAM has spent considerable time and resources developing a formula for the fair and equitable assessment of clearing fees. The fee structure must treat all sizes and types of devices and different technologies equitably, but also be easy for manufacturers to apply and for UTAM to enforce. Members who represent numerous facets of the

²⁸ Memorandum Opinion and Order, App. A at 6 (to be codified at 47 C.F.R. § 15.307(b)).

industry--both large and small--were further concerned that the fee not be set so high that it would price particular products or sizes or types of manufacturers out of the market. While no manufacturer enjoys the prospect of adding such fees to its products, it was recognized that band clearing could not proceed without generating a substantial revenue stream to cover relocation costs.

In developing its proposed fee structure, UTAM considered several approaches before developing a consensus proposal.²⁹ The consensus clearing fee structure was

²⁹ The approaches considered and the reasons they were accepted or rejected are outlined below.

Fixed percentage of price. Under one proposal considered by UTAM, the clearing fee would be a fixed percentage of the invoice price. Although this approach has the benefit of being equitable to different technologies and to products that may vary widely in costs, it is difficult to apply and enforce. Many companies bundle their equipment with other products such as software packages, making it uncertain what portion of the price should be subject to the fee. It would also be difficult for UTAM to determine which parts of a system would be subject to the invoice percentage. This approach would give manufacturers an incentive to design their products to minimize the amount of clearing fees, such as by separating the wireless portion of the device from the rest of the system.

Market share. A fee based on the market share of the manufacturer was also contemplated. This approach was found unusable because of the difficulty in defining what constitutes the market and in tracking market share. It also would involve UTAM in gathering highly sensitive, competitive information.

Spectrum usage. Another rejected approach involved assessing the fee on the basis of the number of MHz occupied by the product. This was judged unfair to broadband devices and systems because they would bear the largest portion of

(continued...)

developed over several months with input from companies manufacturing both voice and data products. After consideration of all the proposals, UTAM determined that one fixed charge per device requiring a Part 15.311 FCC label is the best choice of fee structure. The fee is easy to calculate, it will not be difficult to administer and will not require excessive enforcement resources. In addition, UTAM will only need to monitor the number of products deployed, rather than the manufacturer's cost; revenues, or other confidential information. Finally, as shown below, it can be set at the modest level of \$20 to generate the revenues necessary to reasonable timing expectations for clearing.³⁰

²⁹(...continued)

the clearing fees. Basing the fee on either the number of MHz per fraction of second use capacity or the number of MHz per bits per second transmitted by the device were abandoned for the same reason and because of their complexity.

Fixed charge per device. In the face of the inherent complexity and difficulty of application of these alternatives, several companies recommended that UTAM use a per device charge. Most members agreed that there are several advantages to this approach. First, a fixed charge per device is fair to all types of products, regardless of the technology used. Second, enforcement by UTAM will require few administrative resources. Third, manufacturers can easily calculate fee payments without unbundling their software package prices or revealing internal pricing schemes to UTAM. Finally, a single charge per device will remove incentives for manufacturers to structure their products to minimize payments -- the same fee will be assessed no matter how the device is configured.

³⁰ UTAM recommends that this fee be separately identified by manufacturers and distributors in the sale of any unlicensed PCS products, much like the \$5 license fee was identified in the initial sales of CB radios. This would
(continued...)

D. UTAM Financial Plan

1. BIS Unlicensed PCS Demand Study

BIS Strategic Decisions was retained by UTAM to develop an independent assessment of the scale and timing of demand for unlicensed PCS systems and devices for in-building applications in order to provide a baseline for the financing plan.³¹ BIS conducted in-depth telephone interviews with a representative sample of telecommunications and MIS managers culled from four Site Size categories and eight Industry Sectors. The Site Size categories were 1-19 employees; 20-99 employees; 100-499 employees; and 500+ employees. The eight Industry Sectors were:

- Manufacturing (including discreet manufacturing and process manufacturing);
- Wholesale;
- Retail;
- Finance, Insurance, Real Estate and Legal;
- Health;
- Government;
- Services (business and personal); and
- Other (mining, construction, communications and utilities).

³⁰(...continued)
ensure that the public is fully aware of this cost component of all such products, and it could still be apportioned by manufacturers in a consistent manner.

³¹ As summary of the BIS study is appended hereto as Attachment H.

In designing its research program, BIS identified three categories of wireless in-building functionality and proceeded to test for: (1) the perceived importance of such functionalities, (2) willingness to pay and elasticity measures for voice and data solutions based on those functionalities, and (3) the likely scale and timing of site adoption and employee adoption of these wireless solutions at a range of price points. The three categories tested were:

- Wireless LAN: New wireless data capabilities which provide the ability to connect portable data systems such as notebook computers, terminals, and personal digital assistants in the manner of local area networks, thus allowing wireless LANs to provide performance comparable to Ethernet or Token Ring LANs;
- Wireless Messaging: New wireless messaging capabilities offering the ability to provide in-building paging and messaging using special alphanumeric pagers or via portable computers such as personal digital assistants, notebook computers, or even electronic organizers, which could include the capability both to receive and to transmit messages; and
- Wireless Voice: New voice systems tied into a firm's PBX, Key System, or Centrex Service which would allow employees to have cordless telephone capabilities anywhere in their building or campus area, thus allowing them to answer incoming calls and keep them in touch anywhere at the served location.

In addition, the program tested for the above factors with respect to a combination of voice and data functionality, i.e., cordless voice and messaging as well as cordless voice and wireless LAN.

BIS then took the data gathered from its telephone surveys and employed a five step methodology for developing demand and revenue forecasts for the in-building wireless market. Those steps are as follows:

- Quantify the site and employee populations across the four Site Size categories and eight Industry Sectors covered by the research program;
- Determine site propensity to adopt in-building wireless solutions by size and industries within each size classification;
- Determine in-building wireless diffusion as percent of employees within adopting sites over an appropriate time window;
- Determine the mix of wireless functionality adopted within each Site Size classification and industries within each size category; and
- Calculate revenue streams for in-building wireless solutions based on three alternative assumed price points reflecting investment for wireless functionality per equipped user.

2. Projection of Revenues Available for Clearing

In order to establish an appropriate level for the clearing fee, UTAM has used the demand data derived from the BIS Study to project potential revenues over a roughly 10 year timeframe. The BIS Study employed three different scenarios that used different equipment price assumptions. The demand under Scenario 1 is for approximately 60 million unlicensed PCS units within the 10 year period. The demand under Scenario 3 in the same timeframe will be about 4.5 million units. These estimates cover a broad array of known unlicensed PCS products, but can be considered conservative