

focus groups conducted by EMCI on behalf of PageNet, in fact, many of the participants indicated that their interest in VoiceNow stemmed from the greater information content available with voice paging as compared to other types of paging services. See EMCI Report Addendum, attached hereto as Exhibit A.

Dial Page echoes MTel's refrain. It notes that, in its own experience, it has found a "significant decline in the number of subscribers that want tone and voice service." Dial Page Comments at 14, n.27. According to Dial Page, its own tone and voice service subscription has declined from 65% of its subscriber base in 1985 to 10 percent today. Id. Dial Page attempts to use its own experience as a predictor for lack of demand for VoiceNow. However, Dial Page's current conventional tone and voice service offerings bear no relationship to VoiceNow, and thus have no bearing on VoiceNow's potential demand.

On behalf of PageNet, EMCI conducted a survey of 18 of Dial Page's markets. See Exhibit A. Each of these markets offered conventional tone and voice service, with no storage and often only "local only" coverage. The mean price for these services was \$26.09; its average price for digital display in these markets was \$21.10. In five of these markets, Dial Page has introduced tone and voice service with limited message storage capability, for an

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attached hereto as Exhibit C ("Dial Page Registration Statement"). Rather than being transmitted in analog form, its numeric display paging service uses digital technology. It "charges less to provide this service than to provide tone-plus-voice service because of the brief period of time required to transmit digitized information . . . ." Dial Page Registration Statement at 48.

average charge of \$31.70 per month. Thus, Dial Page's rates reflect precisely the difference VoiceNow Services are designed to solve. That is, analog voice paging services are highly spectrally inefficient, and require carriers to spread their costs over significantly fewer customers, resulting in higher rates. VoiceNow, on the other hand, incorporates substantial storage capability, and wide area coverage. It can be offered at about one half the price for which Dial Page offers its analog, simulcast voice paging service, because of the spectral efficiencies which underline it.

Echo attempts to impeach PageNet's premise that there is consumer demand for advanced voice paging services, claiming among other things that voice mail and answering machines already provide services equivalent to VoiceNow. See Echo Reply Comments at 11. But it is clear even to the casual observer that these services are not equivalent. One of the features which sets these services apart is that VoiceNow sends the voice message to the pager, simultaneously alerting the paged party that a message has been sent and is available for playback. All the person paged need do is press a button on his pager in order to hear the message. Neither voicemail nor answering machines provides the same instant access to messages. Even with voicemail services used in conjunction with a paging service, the person paged is alerted that a message has been left for him, but he has to interrupt what he is doing to place a telephone call to the voicemail box in order to retrieve the message. Answering machines, and voicemail systems not integrated with paging

services do not even offer that level of functionality. Neither alerts the person for whom a message is delivered of that fact. The only way the person knows whether messages have been sent is to continually call, by telephone, to the voicemail box or answering machine.

Echo also claims that cellular and PCS will satisfy demand for voice paging. Echo Reply Comments at 11. This statement ignores the fact that one-way and two-way voice services are very different services with very different price points. Users of paging services are looking for low cost services, typically in the range of \$10 to \$25/month inclusive of both monthly access and unlimited messaging capability. No one has suggested that cellular, the monthly bills for which average at least \$85/month, or PCS, will meet those price points in the foreseeable future, if ever. These services have different infrastructure costs, reflecting the cost differences in providing two-way versus one-way services, so one would not expect cellular or PCS to be priced as low as voice paging, a truly one-way service.<sup>12/</sup>

In sum, consumers want voice paging services. With PageNet's innovative development of VoiceNow, they can have them almost as soon as the Commission allocates the spectrum necessary to provide the service.

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<sup>12/</sup> In addition to being far less costly than two-way services, VoiceNow provides a unique value to the user -- call screening. Just as people use answering machines and secretaries, mobile consumers will use VoiceNow to prevent interruptions and decide which calls are truly important.

**B. PageNet Accurately Predicts Consumer Demand for VoiceNow**

In another futile attempt to undermine the consumer acceptability of VoiceNow predicted by PageNet, MTel attacks PageNet's use of focus groups in support of its conclusions that substantial demand exists for VoiceNow. MTel Formal Opposition at 32. MTel correctly states that the Report submitted to PageNet by EMCI notes that "the results of these focus groups are not statistically projectable." Id. PageNet does not disagree, nor has it attempted to statistically extrapolate from the results of the focus groups a universe of demand. MTel conveniently omits, however, to note that the results of the focus groups are "indicative of general behavioral trends among the specific segments tested." EMCI Study at 1. They do illustrate a general indication of consumer interest and behavior. Id. at 3. As EMCI notes, the focus groups indicated "a high degree of interest and excitement" for VoiceNow. Id. at 1. They further indicated "a strong preference for VoiceNow over existing paging services, even at higher prices." Id. at 13.

MTel also claims that even a cursory review of the market study causes one to question its methodology and conclusions, making the bare assertion that the study was based on an "atypical" focus group. MTel Formal Opposition at 32. MTel does not explain why the focus groups are atypical; it merely describes their makeup, and incorrectly so, at that.<sup>13/</sup> Its challenge to

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<sup>13/</sup> PageNet suggests that MTel did indeed only give the EMCI  
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EMCI's methodologies and conclusions are therefore fallacious.

V. VOICENOW IS TECHNICALLY FEASIBLE

A. **Most of the "Deficiencies" of Which  
MTel Complains are Directed at a  
Mythical Proposal**

MTel goes to great lengths to portray PageNet's request for a pioneer's preference as deficient, first in its Reply Comments responding to criticisms aimed at MTel, see MTel Reply Comments at 16-17, and again in its Formal Opposition to PageNet's request for a Pioneer's Preference. See MTel Formal Opposition. However, MTel's criticisms are off-base. Likely as not, MTel takes PageNet to task for "deficiencies" which are not and never were part of PageNet's VoiceNow proposal.

For example, regarding cell hand-off,<sup>14/</sup> MTel states that PageNet "purport[s] to be able to handle significant message lengths at only 4800 bits/sec." MTel Reply Comments at 16. The

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study a cursory review, as its conclusion that the focus groups were comprised only of PageNet subscribers is just flat wrong. The study describes in detail the composite of the four focus groups conducted by EMCI. Two groups consisted of non-users of paging services. See EMCI Study at 1, 2, 13, 20, 22. Two groups were comprised of subscribers to PageNet's service. See also Exhibit A, description of focus group selection criteria, and discussion of the reasonableness of these criteria.

14/ MTel claims, without support, that PageNet has not demonstrated the feasibility of cell hand-off. In making its claim, MTel apparently forgets that VoiceNow will compress its voice messages into lengths of approximately two seconds duration. Cell hand-off is simply not a factor with messages of this short duration.

signalling rate of 4800 bits/sec is mentioned nowhere in the VoiceNow proposal. In fact, PageNet achieves its phenomenal spectral efficiencies in part through advanced modulation and signalling techniques on the messaging channels which permit potential throughput up to 80 kb/sec.

MTel states that PageNet "[has not] attempted to evaluate the capacity of the signalling links they utilize to control the remaining 8 data channels." Id. at 16-17. However, in PageNet's Engineering Report, this is discussed at length, resulting in an estimated capacity on the simulcast channel in excess of 300,000 subscribers. See PageNet Petition, Exhibit 3 at 16-17.

MTel states that "PageNet indicate[s] that they will utilize 4,800 baud simulcast transmission for at least the 'polling channel'. . . ." MTel Reply Comments at 17. As stated above, nowhere in this proceeding has PageNet ever mentioned a signalling rate of 4800 baud. In fact, PageNet's Engineering Report clearly specified ERMES as the signalling protocol of the simulcast channel, PageNet Petition, Exhibit 3 at 17, which operates at an effective bit rate of 6,250 bits per second, based upon a transmission rate of 3,125 baud, and which is already anticipated as an element of the next-generation North American standard.

In a section entitled "System Complexity Ramifications," MTel states that VoiceNow "require[s] portables to continually monitor a 'polling channel' and scan 8 other channels." MTel Reply Comments at 17. PageNet never makes any such claim. In standby mode, the pager does not scan. It is locked on the simulcast

signalling channel, and thus achieves the substantial battery-saving economy designed into the ERMES protocol. An ERMES pager is "asleep" most of the time, "waking up" less than 6% of the time to listen for messages. This is a three time improvement over existing POCSAG pagers, which must be on standby 18% of the time.<sup>15/</sup>

These significant misstatements regarding VoiceNow clearly demonstrate that MTel has barely read PageNet's proposal, let alone given thought to its analysis. Its failure to carefully read and digest PageNet's VoiceNow proposal has also resulted in further specious claims, which are answered below.

**B. VoiceNow Pagers Can be Produced  
in a Cost-Effective Manner**

MTel attempts to cast doubt on the ability of manufacturers to produce a VoiceNow pager, but this skepticism is misplaced. As discussed in PageNet's Petition, each element of functionality required in a VoiceNow pager is feasible. VoiceNow requires pagers incorporating network-controlled frequency agility, an acknowledgment transmitter, digital modulation, and voice compression. PageNet has conducted extensive exploration of the feasibility of manufacturing a pager which incorporates these capabilities. Based on its research and extensive discussions with manufacturers, PageNet has concluded that manufacture of this pager is feasible, with only modest additional size (perhaps 1

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<sup>15/</sup> See Andrei Godoroja, "ERMES & POCSAG Comparison," Glenayre Electronics, March 15, 1992.

cubic inch) and modest increased price. See PageNet Petition at 21.

MTel challenges PageNet's statements, claiming that PageNet cited no evidence to support its claim. In order to assuage MTel's concerns, however, PageNet encloses herein a letter from Motorola, Inc. which discusses the feasibility of incorporating these capabilities. See Letter to George M. Perrin from Fernando Gomez, Motorola, Inc., dated June 25, 1992 ("Motorola Letter"), attached hereto as Exhibit B. In the letter, Motorola states: "we believe such a pager to be feasible . . . . We believe that a pager can be developed to meet PageNet's requirements with reasonable costs, size and battery life. We look forward to continuing the development of your proposal." Id. Thus, MTel's comments are without merit.

### **C. Four Cell Reuse is Feasible**

In crafting a solution to the problem of limited spectrum and high cost of voice paging, PageNet strived for the cutting edge of technology. It utilized the most advanced techniques to maximize spectral efficiency and minimize cost to the consumer. MTel, unfortunately, chooses to analyze this advanced system within a 1970's analog cellular paradigm. Predictably, like naysayers 500 years ago, they have concluded that the world is flat.

MTel asserts that a four cell reuse plan is not feasible based upon the analog cellular rule-of-thumb requiring 18 dB carrier-to-interference ratio. MTel Formal Opposition at 9. It is apparently not aware that all second-generation digital

cellular systems in the world anticipate four cell reuse. The need to maximize spectral efficiency simply demands it. In Europe, it's GSM (Global System Mobile). In Japan, it's JDC (Japan Digital Cellular). The United States' cellular industry, through TIA and CTIA, have also developed a standard which permits four cell reuse.<sup>16/</sup>

While the use of 16-QAM introduces additional challenges in the application of four cell reuse, they are addressed through the intelligence contemplated in the network. The worst-case C/I conditions, where 16-QAM may not be optimal, will exist at the edge of a cell. Unlike the mathematical hexagons of an introductory textbook, the boundaries are actually quite fuzzy with multiple cells being capable of serving a given area. The combination of PageNet's Predictive Propagation Modeling and Dynamic Frequency Reallocation will resolve most cases of questionable performance prior to the assignment of a channel. In the event of a message transmitter assignment which cannot reach the pager, the handshake extended on the message channel will result in no acknowledgment from the pager. The network may respond by trying another cell or by dropping to 4-QAM to function in the impaired environment. This is another area where the store-and-forward nature of VoiceNow permits greater freedom than that allowed in the provision of real-time interactive voice communications. A re-transmission attempt in these rare cases

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<sup>16/</sup> See Raith & Uddenfeldt (Ericsson) IEEE Transactions of Vehicular Technology Vol. 40, No. 2, May 1991.

would not even be noticed by the user as any degradation in service.

**D. Dynamic Channel Reallocation is Feasible and Effective**

MTel further challenges the VoiceNow proposal by questioning the effectiveness of dynamic channel reallocation. It states that "PageNet has failed to address fundamental design issues related to cellular radio networks." MTel Formal Opposition at 20. However, this concept is already a part of the Digital European Cordless Telephone (DECT) standard,<sup>17/</sup> and "capacity gains of up to 50% are claimed for large systems . . ."<sup>18/</sup> In its drive to achieve the maximum spectral efficiency, PageNet has made this a part of its system design, and efforts are ongoing to identify the optimum algorithm for packetized, store-and-forward voice transmission. However, because of the difficulty in quantifying the increased throughput, PageNet has conservatively calculated its own capacity and costs without any assumption of improvement. Thus, the spectral efficiencies which PageNet has demonstrated can be achieved, even without this technique.<sup>19/</sup>

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<sup>17/</sup> See European Telecommunications Standards Institute, "Radio equipment and systems digital European cordless telecommunications common interface," prETS 300 175, August 1991.

<sup>18/</sup> See Geoff Varall, Roger Belcher, Data Over Radio 124 (1992).

<sup>19/</sup> PageNet does, however, anticipate improved spectral efficiency and performance through the utilization of Dynamic Frequency Reallocation.

**E. PageNet Accurately Forecasts Capacity  
on Its Simulcast Channels; It Will  
Serve Over 330,000 Subscribers Per MSA**

MTel claims that PageNet's simulcast channel cannot support the 330,600 users PageNet predicts. MTel surmises that PageNet's system design would result in "a large number of colliding subscriber acknowledgments at the receiver thus requiring numerous re-transmissions that threaten to reduce significantly the actual capacity of the simulcast system." MTel Formal Opposition at 16. However, there will not be the number of collisions which MTel predicts. As described below, any calculation of the number of potential collisions must consider only the number of acknowledgments per cell, not acknowledgments on a system-wide basis.

MTel's criticism of the VoiceNow acknowledgment channel capacity considers the issue without regard to the benefits of frequency reuse. In its original Petition, PageNet stated estimated capacities of approximately 19,200 pagers per cell and 330,000 per simulcast channel. PageNet Petition at 14, 17. This means that even the busiest cell in Manhattan or Los Angeles would be serving less than 6% of the total system's capacity. When one considers that the coverage of a single ack receiver will serve a pager population even smaller than this, it is apparent that the ack capacity should be considered within each cell and not throughout the entire system. Thus, a slower signalling rate on this return link will provide the robustness required to

compensate for the low powered transmitter, while still providing proportional capacity to the signalling channel.

**F. PageNet's System Will Be Able to Determine the Best Message Channel**

PageNet demonstrates that a system which selects the best messaging channel on which to send a voice page is feasible. Nonetheless, MTel again takes issue with this demonstration, claiming that PageNet neglects to consider the need to measure received power over 20 to 40 wavelengths in order to get an accurate estimate of the received channel strength. MTel Formal Opposition at 24. MTel claims that 3.5 seconds are needed to accomplish this. Id. However, this is not the only means of determining receive channel signal strength. PageNet's system design yields similar accuracy by combining measurements from multiple receivers made at different points in time. This technique is commonly used.

In reviewing the process of delivering a voice message, one can recognize that the signal strength is sampled at several different points over time and space. Each ack transmission from a pager will be received and measured by more than one ack receiver to provide the space diversity. Time diversity is provided by the series of acks that make up each transaction. The first ack transmission follows the original alert. The second follows the frequency change command. Finally, to confirm the correct message transmitter selection, the pager is addressed through the message transmitter on the chosen frequency. Only

after it acknowledges this transmission is the message actually sent. MTel's suppositions are thus again meritless.

**G. VoiceNow's Message Channel  
Throughput is Feasible**

**1. Digital Voice Compression**

Next, MTel suggests that PageNet proposes to encode speech using linear predictive coding and that use of this technology is not feasible. In making this suggestion, MTel has conveniently ignored the fact that PageNet indicated it was considering either LPC at 2400 bits per second, or CELP at 4800 bits per second. See PageNet Petition, Exhibit 6.

Initially, PageNet found LPC at 2400 bits per second the most appealing because it offered such phenomenal capacity improvements. However, experimental evaluation in the past month has indicated, unfortunately, that the voice quality resulting will not be acceptable for VoiceNow. PageNet's present direction is to use half-rate voice coding (4800 bps VSELP or a similar form of CELP as determined by the TIA) to achieve the optimum combination of spectral efficiency and voice quality. An added benefit of this standard will be compatibility with the next generation of digital cellular handsets and the potential for greater economies of scale in the production of pagers.

It should be noted that PageNet's capacity estimates initially were based upon this standard, therefore no revision of the numbers is required. PageNet hoped that those conservative

capacity estimates could ultimately be exceeded, however, through the use of 2400 bps encoding.

## 2. 16-QAM

MTel and PageMart go to great lengths to challenge the feasibility of 16-QAM modulation. PageMart criticizes PageNet's use of 16-QAM in large part because no 16-QAM equipment is currently in place, and "will not be commercially available in the near future." PageMart Comments at 7. For PageMart to take this position is understandable; it is seeking a preference for using off-the-shelf technology. See PageMart Request for Pioneer's Preference in ET Docket 92-100, filed March 19, 1992 (PP-40). PageNet has taken a different tack. It is experimenting with very advanced and innovative technologies in order to obtain the maximum possible capacity for its systems.<sup>20/</sup> The fact that 16-QAM is not yet commercially available in a paging environment is evidence of PageNet's unique application, not of its inappropriateness in the mobile environment.

MTel challenges the use of 16-QAM, claiming that PageNet's modulation scheme will likely be "fraught with entirely unacceptable error rates." MTel Formal Opposition at 13. MTel's analysis of bit error rate correctly quotes its referenced article, MTel Formal Opposition at 13, but fails to note that no forward error correction was included in those estimates; forward error correction on the most important speech bits is a standard

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<sup>20/</sup> PageNet's capacity calculations, for purposes of its Pioneer's Preference Request, however, are conservative.

component in wireless digital voice transmission. In fact, there are many layers in communications above the modulation which contribute to robustness. The use of pilot symbols or Trellis Coding are but two potential companions to 16-QAM in the VoiceNow application. Interleaving data frames over time will also improve immunity to fading. Moreover, a certain number of missed frames can be tolerated in a voice message, where the pager's vocorder can simply fill the space by repeating the previous frame upon playback.

PageNet is optimistic that the challenges inherent in the application of 16-QAM to VoiceNow can be overcome. Nonetheless, as stated in PageNet's original petition, should 16-QAM not succeed, Voice Now can still be provided in a highly spectrally efficient and cost-effective manner using other modulation methods. See PageNet Petition, Exhibit 3 at 18. The DQPSK modulation proposed for digital cellular in North America, for example, provides a throughput of 40 kilobits per second, and could serve as the modulation method for VoiceNow's messaging channels. The reduction in throughput would require additional cells in congested areas in order to achieve the throughput associated with 16-QAM, but should not materially affect the total system cost. In any event, PageNet was extremely conservative in its cost calculations and can absorb substantial increased costs without modifying its rate to consumers.

### **3. PageNet's Capacity Estimates are Feasible**

PageMart challenges PageNet's use of 15 second voice messages in calculating capacity, stating that "most voice mail systems permit 30-second, not 15-second voice messages which would reduce VoiceNow's capacity by PageNet in half." PageMart Reply Comments at 22. It is just such systems that PageNet operates today which provided the statistics for this estimate. It is anticipated that VoiceNow will offer 30 second maximum message length, as is the case with PageNet's PageMail service. The resulting average message length, in actual operation, is 15 seconds. Thus, using these empirical measurements, VoiceNow provides a 22-fold improvement in spectral efficiency over today's voice paging services.

## **VI. PAGENET IS ENTITLED TO A NATIONWIDE PREFERENCE**

MTel suggests that PageNet's VoiceNow Service is not an inherently nationwide service, and, as such, opposes any allocation of spectrum for VoiceNow on a nationwide basis. However, PageNet believes it is critical that the Commission grant licenses for the nationwide provision of VoiceNow Services. The licensing scheme proposed by PageNet is based not only on PageNet's own experience, but also on the Commission's continued recognition that there is increasing demand for nationwide land mobile services. This increased demand is, in effect, rendering paging an inherently nationwide service. Moreover, nationwide

assignments are a critical means of achieving greater spectrum efficiency.

Based on its own experience in paging generally, PageNet expects the needs of the public to vary over a continuum from local service to wide area and regional coverage to complete nationwide voice paging. Throughout PageNet's history, its customers have demanded greater coverage and greater functionality with each passing year. PageNet's nationwide service has been exceptionally well received. It is anticipated that this trend will continue and that the pager population will shift increasingly toward the high end of the coverage/functionality curve.

In addition to PageNet's own experience, PageNet's proposed licensing scheme takes into consideration the evolution of land mobile services generally. That evolution is best reflected in recent allocation schemes established by the Commission in the land mobile services.<sup>21/</sup> The Commission has expressly recognized the need for nationwide allocations in various contexts, including conventional private and common carrier paging<sup>22/</sup> and narrowband

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<sup>21/</sup> See, e.g., Flexible Allocation of Frequencies in the Domestic Public Land Mobile Service for Paging and Other Services, 4 FCC Rcd 1576 (1989); American Mobile Data Communications, Inc., 4 FCC Rcd 3802 (1989) (waivers to facilitate implementation of nationwide system); Specialized Mobile Radio Services, 4 FCC Rcd 8673 (1989) (proposing nationwide SMR licensing).

<sup>22/</sup> See Amendment of Parts 2 and 22 of the Commission's Rules to Allocate Spectrum in the 928-941 MHz Band and to Establish Other Rules, Policies, and Procedures for One-Way Paging Stations in the Domestic Public Land Mobile Radio Service, 89 FCC 2d 1337 (1982) ("One Way Paging") (allocating common

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technologies.<sup>23/</sup> The Commission has aptly noted that in today's highly mobile society, many users have a need for these types of communications services in more than one geographic area, specifically, on a regional or national basis. Paging Operations, 91 F.C.C. 2d at 1225.

While VoiceNow obviously differs from conventional one-way paging service in terms of its advancement and exceptional capabilities, demand for VoiceNow can be likened to demand for conventional paging services in terms of geographical coverage. Local users demand solid coverage and intense transmitter density in urban areas while regional users insist upon the broadest possible geographical coverage. Nationwide subscribers require coverage in all of the U.S. major cities. A seamless nationwide paging network will serve all three requirements, and users in each category will benefit from the infrastructure installed to serve the others. Because of its substantial added functionality, overall demand for VoiceNow services will predictably be much greater than for conventional paging services on a local,

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carrier paging frequencies for nationwide use); Amendment of Parts 2 and 22 of the Commission's Rules to Allocate Spectrum in the 928-941 MHz Band and to Establish Other Rules, Policies, and Procedures for One-Way Paging Stations in the Domestic Public Land Mobile Radio Service, 91 FCC 2d 1214 (1982) ("Paging Operations") (establishing nationwide frequencies for private carrier paging).

<sup>23/</sup> See Amendment of Part 90 of the Commission's Rules to Provide for the Use of the 220-222 MHz Band by the Private Land Mobile Radio Services, 6 FCC Rcd 2356 (1991) ("220 MHz Order").

regional, and national basis. Therefore, an even greater number of users will benefit.

Similarly, the economic efficiencies the Commission has recognized in allocating nationwide channels for other services hold true for VoiceNow services, perhaps to an even greater degree. The ability of carriers to meet the demand for local, regional, and national service in the most cost effective manner is dependent on a common infrastructure for which nationwide licensing would allow. Paging is most efficiently provided through the networking of various wide area systems. The Commission has acknowledged that to operate most efficiently, a multi-area paging network requires the use of a common radio channel in all geographic areas served so that paging receivers will be simple, lightweight, inexpensive and will not require adjustment or modification when used in different geographical areas. Paging Operations, 91 F.C.C. 2d at 1225. More important, the provision of service to the widest possible variety of users will spread costs over a greater number of pagers and minimize the cost of service to the end-user.

These efficiencies also render VoiceNow an inherently nationwide service. Without a specific nationwide set-aside, establishment of nationwide VoiceNow services in this band would be impractical or impossible. An applicant would have to obtain numerous individual authorizations, and possibly use different frequencies throughout the nation. Thus, any potential benefit to end-users would be eliminated.

The Commission has also recognized that nationwide assignments are a critical means of achieving greater spectrum efficiency. 220 MHz Order, 6 FCC Rcd at 2361. Large national systems with increased spectral efficiency take time and a significant amount of resources to implement. As demonstrated above, without a specific nationwide set-aside, establishment of a nationwide system would be impractical. Thus, licensees would be hesitant to invest in spectrally efficient technologies. Conversely, a nationwide allocation would stimulate investment, research, and development. Id. Development of VoiceNow technology as applied to nationwide systems will ultimately provide a broader base of radio technology support for the marketplace.

## VII. CONCLUSION

In accord with the Commission's pioneer preference criteria, PageNet has demonstrated that it is entitled to a pioneer's preference for demonstrating the technical feasibility of offering advanced paging services on a highly spectrally efficient, cost effective basis. PageNet's system design will permit increases in capacity of up to 22 times capacity rates of existing analog systems, and rates of approximately to half what comparatively primitive tone and voice paging services are offered at today. For these exemplary pioneering efforts, the Commission should grant PageNet a pioneer's preference as well as allocate the AMS

spectrum in a manner which permits the provision of VoiceNow services expeditiously.

Respectfully submitted,

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Dated: June 29, 1992

EXHIBIT A

Report Addendum of  
Economic and Management Consultants International, Inc.  
(EMCI)

# **The Market for Digital Voice Pagers With Voice Storage Capabilities**

## **Report Addendum: Reply to Comments**

**Prepared for:**

**PageNet**

**by:**

**Economic and Management Consultants International, Inc.**

**June, 1992**

# **The Market for Digital Voice Pagers With Voice Storage Capabilities**

## **Report Addendum: Reply to Comments**

### **1. Introduction**

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In May, 1992, EMCI submitted to PageNet a report titled The Market for Digital Voice Pagers with Voice Storage Capabilities. PageNet subsequently included EMCI's report in its request for a Pioneer's Preference for Pioneering the Ability for Spectrally Efficient, Cost Effective One-Way Voice Communications in the 930-931 MHz Band. This addendum to EMCI's previous report clarifies some issues raised in comments to PageNet's filing.

### **2. EMCI's Focus Group Methodology**

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Focus groups are purposely designed to reflect commonality within the group, and are not used to reflect a random sample of the population. A description of the correct design of focus groups appears in the classic research text Research for Marketing Decisions by Green, Tull, and Albaum (p. 99):

*"A focus group interview is one in which a group of people jointly participate in an interview that does not use a structured question-and-answer methodology. The group, which usually consists of 8 to 12 persons (but may have as few as 5 or as many as 20), is generally selected purposively to include persons who have a common background or similar buying or use experience that relates to the problem to be researched."*

Thus, focus groups are selected based on the commonality of the group, not a random selection of a population. The backgrounds of EMCI's focus groups are appropriate for the target markets for the proposed product and service. For example:

- **Cellular Use.** Twelve percent of the potential user group used cellular telephones. This group was selected on the basis of interest in using a low-cost mobile communications device. It is certainly not surprising that 12 percent of this group would be cellular users. In addition, the focus groups indicated that cellular users were particularly interested in this service, in itself an important finding.
- **Age.** The age of the groups were between the ages of 25 and 40. EMCI required participants to be between the ages of 18 to 50, which is the expected target market for this service.
- **Income.** Twenty-three percent of potential users had annual household incomes of \$75,000 or more. This is not an unusual group given the demographics of the Washington DC market, and the fact that households with interest in mobile communications tend to be in the upper strata of the income distribution.

EMCI used a standard approach to focus group design in which groups were selected based on common demand characteristics. This methodology does not permit statistically valid projections of demand among the general population. It does, however, permit conclusions concerning likely product acceptance among the groups tested - paging users, paging users with voice mail, and non-users interested in mobile communications. The proper interpretation and limitations of EMCI's research are clearly discussed in page 1 of EMCI's original report.

### **3. Dial Page Experience with Voice Pagers**

In footnote 27 on page 14 of Dial Page's comments, Dial Page states that they have experienced declining demand for voice pagers. Dial Page attempts to link experience in their own markets with tone voice pagers with the likely demand for PageNet's proposed voice pager. There are several serious flaws with this comparison.

First, the pricing and service quality of Dial Page's voice service are very different from that proposed by PageNet. EMCI conducted a survey of 18 of Dial Page's systems in June, 1992. Each of these systems offered rental digital display service and rental tone