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BEFORE THE  
**Federal Communications Commission**  
WASHINGTON, DC 20554

In the Matter of )  
 )  
AirTouch Communications, Inc. )  
 )  
Petition for Waiver of Section 20.18(e) of the )  
Commission's Rules )  
 )

) CC Docket No. 94-102  
) DA 98-2631

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FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF THE SECRETARY

To: Chief, Wireless Telecommunications Bureau

**COMMENTS AND PETITION FOR WAIVER OF  
SECTION 20.18(e) OF THE COMMISSION'S RULES**

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February 4, 1999

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## Table of Contents

INTRODUCTION AND SUMMARY .....	2
I. INFORMATION REQUESTED BY THE BUREAU REGARDING POTENTIAL HANDSET SOLUTIONS .....	7
A. Preliminary Tests Indicate That Handset-Based Solutions May Provide ALI With Better Accuracy and Reliability Than Required Under The Commission's Rules .....	7
B. Handsets Capable of Providing ALI Should Be Commercially Available In Advance of the October 1, 2001 Deadline .....	10
C. Location Information Will Be Supplied For Emergency Calls From Roamers .....	14
II. THE COMMISSION SHOULD GRANT A WAIVER OF SECTION 20.18(e) .....	15
CONCLUSION .....	16

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To: Chief, Wireless Telecommunications Bureau

**COMMENTS AND PETITION FOR WAIVER OF  
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Pursuant to the Wireless Telecommunications Bureau's ("Bureau") *Public Notice*, dated December 24, 1998, and Sections 1.3 and 22.119 of the Commission's rules, AirTouch Communications, Inc. ("AirTouch"), on behalf of its subsidiaries and affiliates, hereby petitions the Bureau for a waiver of the Enhanced 911 ("E911") Phase II Automatic Location Identification ("ALI") compliance deadline contained in Section 20.18(e) of the Commission's rules.<sup>1</sup> As requested herein, AirTouch seeks a waiver that would deem it in compliance with Phase II requirements if it offers to subscribers

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<sup>1</sup> See 47 C.F.R. §§ 1.3, 22.119; *Wireless Telecommunications Bureau Outlines Guidelines For Wireless E911 Rule Waivers For Handset Based Approaches To Phase II Automatic Location Identification Requirements*, CC Docket No. 94-102, *Public Notice*, DA 98-2631 (December 24, 1998).

handsets capable of providing better location information than required by the FCC, and if such handsets are offered in advance of the current implementation deadline.<sup>2</sup>

Grant of the requested waiver is in the public interest and is essential to permit AirTouch and other wireless carriers sufficient time to evaluate, and if beneficial, implement on a phased-in basis a handset-based approach to the Commission's Phase II ALI requirements. The Bureau has indicated that grant of a waiver will not obligate carriers to utilize a handset-based solution.<sup>3</sup> Instead, a waiver will give carriers the option of choosing either a network or handset solution to the Phase II requirements. AirTouch expressly reserves that right. Lastly, in the alternative, AirTouch requests modification of Section 20.18(e), as specified herein.

#### **INTRODUCTION AND SUMMARY**

Over the last few years, the Commission has sought to improve the quality and reliability of 911 services available to the public. Initially, the Commission acted to ensure the availability of 911 services via wireless phones. In addition, the Commission determined that location information should accompany 911 calls from wireless handsets to permit a public safety answering point ("PSAP") to send assistance to a caller's actual location.

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<sup>2</sup> Specifically, and as discussed herein, AirTouch would be deemed in compliance if it 1) offers ALI-capable handsets for sale in advance of the current Phase II deadline; and 2) if the handsets provide ALI with 90 meter accuracy and 70 percent reliability. *See* n.17.

<sup>3</sup> *Public Notice* at 5.

The Commission's rules require the provision of ALI in two stages.<sup>4</sup> Under Phase I, which became effective April 1, 1998, wireless carriers are required to relay the location of the cell site receiving a 911 call to the designated PSAP.<sup>5</sup> Under Phase II, PSAPs must be given the "location of a 911 call by longitude and latitude within a radius of 125 meters using root mean square ("RMS") techniques."<sup>6</sup> The current Phase II ALI deadline is October 1, 2001.

The Commission recognized, however, that technological developments in this area were unsettled and sought to ensure that the efforts to deploy Phase II ALI were "technologically and competitively neutral."<sup>7</sup> It therefore did not promulgate extensive technical standards, but instead adopted general performance criteria, so as to permit "various technologies to be used in the provision of Phase II ALI."<sup>8</sup> The Commission

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<sup>4</sup> 47 C.F.R. §§ 20.18(d), (e). This information must be provided only if (i) the administrator of the designated PSAP has requested the information, (ii) the PSAP is capable of using the information, and (iii) a mechanism for recovering the costs of implementing an ALI system has been established. 47 C.F.R. § 20.18(f).

<sup>5</sup> 47 C.F.R. § 20.18(d). As of April 1, 1998, only a few PSAPs requested Phase I ALI.

<sup>6</sup> 47 C.F.R. § 20.18(e). The Commission specified that Phase II requires carriers to have the "capability to identify the latitude and longitude of a mobile unit making a 911 call, within a radius of no more than 125 meters in 67 percent of all cases." *Revision of the Commission's Rules to Ensure Compatibility with Enhanced 911 Emergency Calling Systems*, CC Docket No. 94-102, *First Report and Order and Further Notice of Proposed Rulemaking*, 11 F.C.C.R. 18676, 18712 (1996) ("*E911 Report and Order*"); *Memorandum Opinion and Order*, 12 F.C.C.R. 22665, 22726 (1997) ("*E911 MO&O*").

<sup>7</sup> *E911 MO&O*, 12 F.C.C.R. at 22725.

<sup>8</sup> Letter from Daniel B. Phythyon, Chief, Wireless Telecommunications Bureau, FCC, to Pamela J. Riley, Vice President — Federal Regulatory, AirTouch

(continued...)

further specified that the implementation deadline would not be applied in a way that “would hamper the development and deployment” of ALI technologies and systems that provide better accuracy and reliability than required by Section 20.18(e), and that waivers might be appropriate depending upon technological developments with regard to ALI.<sup>9</sup>

At the time the Phase II deadline was adopted, it was widely expected that ALI technology would be based in networks.<sup>10</sup> Since then, however, there have been a number of developments with respect to other solutions, particularly handset-based solutions using Global Positioning Satellite (“GPS”) technology. In this regard, recent tests indicate that it may be possible to locate callers with ALI-enabled handsets with a greater accuracy level than specified in the rule. In addition, there are indications that ALI-enabled handsets may be commercially available well in advance of the current Phase II compliance deadline. AirTouch and others within the wireless community are now in the process of evaluating handset test results and initiating additional tests for the purpose of determining the accuracy, reliability, and cost of such possible solutions. In addition, standards work, potential infrastructure modifications and negotiations with manufacturers regarding deployment schedules and feasibility are ongoing.

On December 24, 1998, the Bureau acknowledged the potential need for waivers in order to facilitate the development and deployment of potential handset-based solu-

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<sup>8</sup> (...continued)  
Communications at 1 (October 23, 1998) (citing *E911 Report and Order*, 11 F.C.C.R. at 18714).

<sup>9</sup> *E911 MO&O*, 12 F.C.C.R. at 22725.

<sup>10</sup> *Id.*

tions to the Phase II ALI requirements.<sup>11</sup> In particular, the Bureau cited recent developments and noted that it “may not be possible or economically feasible for carriers to provide ALI for the embedded base of handsets . . . on the date set by the current Commission rules.”<sup>12</sup> The Bureau further expressed a willingness to consider proposals to phase in implementation or to apply the Phase II requirements only to new phones.<sup>13</sup>

In its *Public Notice*, the Bureau asked waiver applicants to supply information regarding:

- The accuracy and reliability of handset-based solutions, including field test information involving different geographical environments;
- Timetables and financial data concerning the deployment of ALI-enabled handsets, including information regarding expected implementation rates, as well as efforts to minimize problems associated with non-ALI capable handsets; and
- Steps the applicant plans to take to address roamer situations, including information concerning roamer use of 911 services in the carrier’s service area.<sup>14</sup>

In this filing, AirTouch supplies the information it has gathered, to date, regarding a possible handset-based solution<sup>15</sup> and satisfies the Commission’s criteria for waiver grant. For the reasons discussed herein, AirTouch respectfully requests a waiver of

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<sup>11</sup> See *Public Notice*.

<sup>12</sup> *Id.*

<sup>13</sup> *Id.*

<sup>14</sup> *Public Notice* at 4.

<sup>15</sup> Given the current status regarding potential handset solutions, AirTouch emphasizes that the information supplied is necessarily somewhat preliminary in nature, and will be updated as further developments occur.

current Phase II requirements to permit it the option to phase in deployment of ALI-capable handsets, should they prove reliable and cost-efficient for the provision of Phase II ALI.<sup>16</sup> More specifically, by grant of this request, AirTouch would be deemed in compliance with Phase II requirements if:

- It offers ALI-capable handsets for sale to customers prior to October 1, 2001; and
- The ALI-capable handsets provide the ALI with 90 meter accuracy and 70 percent reliability (determined by circular error probability (“CEP”)).<sup>17</sup>

Alternatively, AirTouch requests modification of Section 20.18(e) to specify that carriers are in compliance with the rule if they meet the conditions specified above.<sup>18</sup>

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<sup>16</sup> *E911 MO&O*, 12 F.C.C.R. at 22725. The Commission has indicated that, if a carrier demonstrates that a waiver of Section 20.18(e) is warranted, it may be appropriate to grant a waiver of general applicability to all carriers subject to Section 20.18(e). AirTouch supports the grant of an industry-wide waiver because it will encourage further development activities and will expedite Phase II compliance if handset solutions are deemed feasible.

<sup>17</sup> This reliability percentage is intended to specify an aggregate reliability rate for all subscribers initiating E-911 calls and, of necessity, does not specify the reliability obtained for any single user. AirTouch believes that the reliability percentage of handset solutions may in fact be much higher, certainly in outdoor settings, including automobiles. Additional in-building tests are needed, however, to determine reliability and accuracy in indoor environments, particularly multi-story buildings. (In such setting, AirTouch notes that landline phones are generally readily available.) Additional testing information will be provided to the Commission as it becomes available.

<sup>18</sup> Again, as noted above, by this filing AirTouch reserves its right to pursue network-based ALI solutions if they prove appropriate.

**I. INFORMATION REQUESTED BY THE BUREAU REGARDING POTENTIAL HANDSET SOLUTIONS**

**A. Preliminary Tests Indicate That Handset-Based Solutions May Provide ALI With Better Accuracy and Reliability Than Required Under The Commission's Rules**

According to the Bureau, "one of the most critical factors in providing help to 911 callers in emergency situations is the accuracy of the location information."<sup>19</sup> To assist PSAPs in locating emergency callers, the Commission adopted rules which require licensees to implement technology capable of locating a 911 call by longitude and latitude within a radius of 125 meters for 67 percent of all such calls.<sup>20</sup>

There have been numerous field tests to date which indicate that handset-based solutions may be capable of providing ALI with better accuracy and reliability than required by the Commission.<sup>21</sup> For example, SnapTrack, Inc. conducted tests in San Francisco, California in the Fall of 1997, Tokyo and Kyoto, Japan in late 1997, Denver, Colorado in early 1998, and Washington, D.C. in late 1998. These tests were conducted using specially designed handsets in urban, suburban, rural, and mountainous areas and included a variety of building structures — wood, brick, two-story residences, and tall

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<sup>19</sup> *Public Notice* at 3.

<sup>20</sup> 47 C.F.R. § 20.18(e).

<sup>21</sup> *See* Cambridge Positioning Systems Ltd Ex Parte, ITS World (attachment) (April 14, 1997); Tendler Cellular, Inc. Ex Parte Presentation at 3 (Oct. 15, 1997); Tendler Cellular, Inc. Reply Comments, CC Docket No. 94-102, at 2 (Aug. 19, 1996). Indeed, it is *theoretically possible* for handsets utilizing GPS technology to locate a 911 caller within 10 meters. *See* Tendler Cellular, Inc. Ex Parte Presentation at 3 (Oct. 15, 1997).

office buildings. The tests conducted in Denver during the week of February 23, 1998 are representative of the tests conducted and yielded the following results:

- 911 callers in windowed offices within a 50 story office building were located within 84 meters 68.3 percent of the time;
- 911 callers in urban canyons were located within 45 meters 68.3 percent of the time;
- 911 callers in moving automobiles were located within 17 meters 68.3 percent of the time; and
- 911 callers in open areas were located within 4 meters 68.3 percent of the time.<sup>22</sup>

The tests also demonstrated that handset solutions may provide better reliability than network solutions in rural areas because a handset solution is not as dependent upon cell site deployment. In fact, the tests conducted in Kyoto and Tokyo, Japan proved so successful that NTT DoCoMo, Japan's largest wireless communications provider, opted to purchase a handset-based location determination system.<sup>23</sup>

Additional tests conducted by Integrated Data Communications ("IDC"), in cooperation with a local exchange carrier, three wireless carriers, and the King County E-911 Program Office, also yielded promising results. There, the ALI-capable handsets

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<sup>22</sup> SnapTrack, Inc. Ex Parte, Summary Results: Denver Testing (October 30, 1998). There has been some dispute regarding the desirability of using RMS as a measure of reliability. *See* Ericsson Inc. Ex Parte at 4-10 (March 20, 1998). The accuracy of the Denver, Colorado tests was determined using CEP. *See* SnapTrack, Inc. Ex Parte, Summary Results: Denver Testing (October 30, 1998). AirTouch believes that CEP is a better accuracy measure than RMS and that the Commission should permit its use for determining compliance with Section 20.18(e). For a detailed discussion of the merits of CEP versus RMS, *see* Ericsson Inc. Ex Parte at 4-10 (March 20, 1998).

<sup>23</sup> *See* SnapTrack Press Release (August 17, 1998) (Attachment 3).

located callers within 125 meters “100% of the time, using the FCC’s RMS measure.”<sup>24</sup> Several test calls were placed from moving vehicles and the ALI-capable handsets permitted the PSAPs to track the moving location of the vehicles and to distinguish between calls made from freeways and parallel secondary roads.<sup>25</sup> The success of these tests prompted the King County E-911 Program Office to urge the FCC “to ensure that all Phase II location technologies, including handset solutions which use GPS technology, be given an equal opportunity to be evaluated as viable solutions for providing Phase II location technology to 911 centers.”<sup>26</sup>

Overall, the test results to date indicate that handset solutions may provide ALI with significant accuracy and reliability. However, further testing and development is needed to determine actual performance and feasibility. To this end, AirTouch is part of a test group that will be testing “alpha” prototypes of ALI-capable handsets during the early part of this year. Should these tests further substantiate the test results to date, AirTouch is considering conducting its own tests of beta version ALI-capable handsets, perhaps in late 1999 or early 2000. AirTouch is currently in discussions with various equipment vendors on these issues. The Company understands that other carriers are involved with similar efforts to evaluate handset solutions. Upon completion, these tests

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<sup>24</sup> Integrated Data Communications, Ex Parte at 3-4 (December 30, 1998) (“IDC Ex Parte”). The tests were conducted between June 1 and October 1, 1998. *See* Letter from Marlys R. Davis, E-911 Program Manager for King County, Washington, to Nancy Boocker, FCC Wireless Bureau, at 1-2 (December 30, 1998) (“Davis Letter”).

<sup>25</sup> Davis Letter at 2.

<sup>26</sup> Davis Letter at 3. *Accord* Massachusetts State Police Ex Parte (November 3, 1997).

should allow AirTouch and other carriers to better determine whether handset-based solutions are in fact a viable option for the provision of Phase II ALI. Based on existing timelines, and planned testing activities, AirTouch is hopeful that it will be able to reach a decision regarding the feasibility of a handset solution by the first quarter of 2000.

**B. Handsets Capable of Providing ALI Should Be Commercially Available In Advance of the October 1, 2001 Deadline**

Standards groups are working to finalize standards to ensure that handset solutions can be deployed prior to the Phase II implementation deadline. Standards are necessary with respect to handsets as well as network infrastructure modifications needed to deploy a handset solution. Infrastructure standards work is ongoing with projections that the necessary equipment should be available toward the end of the first quarter of 2000, or the beginning of second quarter 2000.

With regard to the handsets themselves, the Telecommunications Industry Association ("TIA") anticipates that the baseline text for the necessary standards will be completed by the end of the month.<sup>27</sup> Balloting of this standard is scheduled for March 1999. Thus, it is expected that this standards work should be finalized more than two years prior to the current Phase II implementation deadline.

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<sup>27</sup> Letter from Phil Brown, Chair, Working Group I, TR-45.5 Subcommittee, to Kim Chang, Vice Chair Working Group II, TR-45.5 Subcommittee at 1 (November 18, 1998) (Attachment 2).

In turn, TIA predicts that this should provide sufficient time to complete product development and make handsets commercially available approximately one year prior to the Phase II implementation deadline.<sup>28</sup>

Manufacturers are also expecting handset availability in advance of the current Phase II deadline. In this regard, AirTouch has been informed by one handset manufacturer that it expects to have ALI-capable handsets commercially available in 2000. An ALI vendor has indicated that more than sixteen manufacturers are also currently proceeding with prototypes that integrate GPS into handsets for the provision of ALI information.<sup>29</sup> Trials of alpha prototypes are scheduled for testing during the early part of this year, with beta tests to follow in late 1999 or early 2000. Again, indications are that ALI-enabled handsets may be commercially available well in advance of the current Phase II deadline.

With respect to how a phased-in implementation of the Phase II requirement would work, based on internal AirTouch forecasts, it appears that consumers replace handsets approximately every three years. Thus, a phone purchased today is likely to be replaced by 2002. Other sources have estimated that between 15 and 22 percent of existing handsets will be replaced this year,<sup>30</sup> with this rate growing to more than 27

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<sup>28</sup> *Id.*

<sup>29</sup> SnapTrack Press Release at 1 (September 23, 1998) (Attachment 3).

<sup>30</sup> See BT Alex. Brown, *Handsets! Rapid Growth, Explosive Innovation, Intense Competition* (June 29, 1998) (Attachment 4); *Mobile Family Segment To Churn \$4 Billion, Study Says*, Newsbytes (August 21, 1998) (citing 22 percent replacement rate); *Briefs*, Mobile Phone News (August 18, 1997) (citing 17 percent replacement rate).

percent in the year 2001.<sup>31</sup> Replacement rate projections at this level have led to predictions that over 95 percent of wireless subscribers could own ALI-enabled phones by the end of 2004.<sup>32</sup>

Studies have shown that consumers desire both emergency and non-emergency location information.<sup>33</sup> For example, consumers are starting to purchase equipment for automobiles that provides access to advanced navigation or roadside assistance services.<sup>34</sup> Similarly, consumers desiring Phase II ALI will be likely to purchase the phones necessary to supply such information. Many consumers already are trading in older analog phones for digital phones capable of providing new features, with demand for such phones exceeding all predictions. This process should continue for consumers desiring ALI-capable handsets. Demand for these handsets, in turn, would give manufacturers the incentive to incorporate ALI technology into most, if not all, future handsets — again if the feasibility of this solution is confirmed in upcoming months.

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<sup>31</sup> See BT Alex. Brown, *Handsets! Rapid Growth, Explosive Innovation, Intense Competition* (June 29, 1998).

<sup>32</sup> To facilitate review of timelines and deployment projections, AirTouch has prepared a timeline (Attachment 1) concerning ALI requirements and possible handset solution efforts. This timeline indicates that, if a handset solution proves feasible, it will be implemented into the marketplace in a rapid, orderly, and appropriate manner. See also SnapTrack Ex Parte (October 30, 1998).

<sup>33</sup> Tendler Cellular, Inc. Ex Parte at 3-4 (October 14, 1997); Cambridge Positioning Systems Ex Parte at 3; TruePosition Ex Parte, Wireless E911 Survey, at 3 (September 16, 1997).

<sup>34</sup> KSI, Inc. Ex Parte (July 13, 1995).

Consistent with the implementation of safety features in other industries — such as the implementation of air bags in the automotive industry<sup>35</sup> — the Commission should deem a carrier Phase II compliant if it offers ALI-enabled handsets to its subscribers prior to the current implementation deadline.<sup>36</sup> In view of the projected rapid turnover of handsets, the Commission should not require commercial mobile radio service (“CMRS”) licensees to replace the embedded base of handsets with ALI enabled handsets. Such a requirement would be cost prohibitive and would prevent the development of handset-based solutions.

AirTouch estimates that the provision of replacement phones to only 20 percent of the wireless population would cost in excess of \$3 billion. Clearly, such a radical and expensive replacement effort would scuttle any prospect of a handset ALI solution. Instead, the Commission should permit ALI-capable handsets to be introduced into the market and phased-in over time, as handsets are replaced. This approach will serve the public interest and will provide prompt ALI Phase II capability, in the event that a handset solution proves feasible.

Further, as technological advances occur, it may be possible to locate 911 callers more precisely than today. A handset-based approach may provide an inexpensive way to make these advances available to the public. Technological advances can be incorporated into new phones and consumers will have the option of upgrading their phones. If

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<sup>35</sup> See Zoltar Ex Parte Reply to Comments at 4 (October 28, 1997).

<sup>36</sup> See *E911 MO&O*, 12 F.C.C.R. at 22725 (referencing Zoltar’s Further Reply Comments at 3-4).

this improved E911 location capability is accompanied by other improvements and enhancements — as is likely — consumers will have incentives to upgrade. Again, market forces should be permitted to facilitate the introduction and deployment of such improvements.

**C. Location Information Will Be Supplied For Emergency Calls From Roamers**

The Commission expresses concern that a handset-based solution to the Phase II ALI requirements will preclude PSAPs from obtaining location information for some roamers making 911 calls. AirTouch submits that the roamer issue is not a reason for precluding handset-based solutions.

Most 911 calls will be accompanied by Phase II location information, provided either by a network-based solution or an ALI-capable handset. Roamers can be placed into two categories: those with ALI-enabled handsets and those without such handsets. All 911 calls placed by roamers within a network using a network-based solution will be accompanied by Phase II ALI. For 911 calls placed by roamers within a network using a handset solution, Phase II ALI will accompany the call if the roamer has an ALI capable phone. If the roamer does not have this type of phone, Phase I ALI will still accompany the call.

It has been predicted that 95 percent of subscribers should have ALI-capable phones by 2004, at which time the roamer problem becomes extremely small.<sup>37</sup> Again, a

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<sup>37</sup> See discussion *supra* at 11-12.

phased-in approach to implementation using ALI-enabled handsets would not undermine compliance efforts or the public interest.

## **II. THE COMMISSION SHOULD GRANT A WAIVER OF SECTION 20.18(e)**

The Commission's waiver standards are set forth generally in Sections 1.3 and 22.119.<sup>38</sup> Pursuant to these sections, a waiver of the Commission's rules is warranted under the following circumstances:

- (1) The underlying purpose of the rule(s) would not be served by strict application and a waiver would serve the public interest;
- (2) Application of the rule(s) would be inequitable, unduly burdensome, or contrary to the public interest;<sup>39</sup> or
- (3) If good cause for waiving the rule can be demonstrated.<sup>40</sup>

As demonstrated herein, AirTouch believes that strict adherence to the Phase II implementation deadline is inconsistent with the underlying purpose of the rule and would undermine the public interest. Accordingly, AirTouch respectfully requests a waiver of Section 20.18(e) to permit a handset-based Phase II ALI solution to be phased-in over time. Grant of this waiver will encourage further analysis and efforts to evaluate the feasibility of handset-based Phase II ALI solutions. Grant would also support the Commission's stated objective to ensure that Phase II ALI solutions are "technologically and competitively neutral."<sup>41</sup>

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<sup>38</sup> 47 C.F.R. §§ 1.3, 22.119.

<sup>39</sup> 47 C.F.R. § 22.119(a).

<sup>40</sup> 47 C.F.R. §§ 1.3.

<sup>41</sup> *E911 MO&O*, 12 F.C.C.R. at 22725.

Preliminary tests indicate that handsets armed with GPS technology can locate a 911 caller with an accuracy level which exceeds current requirements. Implementation of this technology is dependent upon additional testing, standards work and commercial development of handsets. If current projected deadlines are met — and if deployment of a handset solution is determined to be appropriate — significant numbers of subscribers will have ALI-enabled handsets prior to the October 1, 2001 deadline. Absent a waiver, however, it is clear carriers may be foreclosed from developing and implementing handset-based solutions altogether, because of concerns that a handset solution cannot be phased-in over time. Accordingly, good cause exists for waiving the Phase II implementation deadline to permit the development and possible deployment of potentially beneficial handset solutions.

### CONCLUSION

The Commission adopted its Phase II ALI requirements to promote public safety by ensuring the rapid, efficient, and effective deployment of ALI.<sup>42</sup> The deadline was not intended to preclude the development and deployment of the best and most efficient ALI technologies and systems.<sup>43</sup> For the reasons stated herein, the Commission should grant an industry-wide waiver, or rule modification, that would deem carriers in compliance with Phase II ALI requirements if they offer to subscribers 1) ALI-capable handsets

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<sup>42</sup> *Id.*

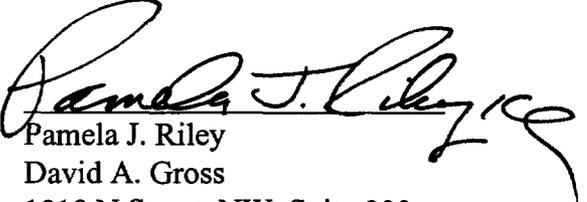
<sup>43</sup> *Id.*

which provide the location of a 911 caller within 90 meters for 70 percent of calls, using CEP; and 2) they offer such handsets prior to October 1, 2001.<sup>44</sup>

Respectfully submitted,

AIRTOUCH COMMUNICATIONS, INC.

By:

  
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February 4, 1999

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<sup>44</sup> Finally, AirTouch notes for the record that, if subsequent developments make these conditions unrealistic, but handset-solutions continue to hold promise, AirTouch will seek further guidance from the Commission regarding the use of handset-based solutions to satisfy Phase II requirements.

## **TIMELINE AND PROJECTED IMPLEMENTATION DATES**

JULY 1996	FCC adopts Phase II ALI requirements.
SEPTEMBER 1996	Petitions for reconsideration of FCC decision filed.
OCTOBER/ NOVEMBER 1997	Field tests of specially designed handsets capable of supplying Phase II ALI conducted in San Francisco.
NOVEMBER/ DECEMBER 1997	Field tests of specially designed handsets capable of supplying Phase II ALI conducted in Japan.
DECEMBER 1997	Commission reaffirms its Phase II ALI requirements.
FEBRUARY 1998	Field tests of specially designed handsets capable of supplying Phase II ALI conducted in Denver.
JUNE/ OCTOBER 1998	Five month test of specially designed handsets capable of supplying Phase II ALI conducted in King County, Washington.
NOVEMBER 1998	Tests of specially designed handsets capable of supplying Phase II ALI conducted in Washington, DC.
EARLY 1999	ALI-capable alpha prototype handsets scheduled for testing.
FEBRUARY 1999	Estimated date for completion of the baseline test for TIA standards (handset).
MARCH 1999	Scheduled balloting for the TIA standard.
LATE 1999/ EARLY 2000	Beta prototypes scheduled for testing, with handsets expected to be made commercially available thereafter.
OCTOBER 2001	Phase II implementation deadline. Estimated that more than one third of existing handsets should be ALI-capable (if feasibility determined and product made available).
OCTOBER 2004	Estimated that more than 90 percent of handsets should be ALI-capable (if feasibility determined and product made available).

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### TIMELINE AND PROJECTED IMPLEMENTATION DATES

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OCTOBER 2004	Estimated that more than 90 percent of handsets should be ALI-capable (if feasibility determined and product made available).



COMMITTEE CORRESPONDENCE

Please reply to:

Phil Brown  
Chair, Working Group I  
TR-45.5 Subcommittee

November 18, 1998

Kim Chang  
Vice-Chair, Working Group II  
TR-45.5 Subcommittee

Dear Kim,

WG-I has reviewed your correspondence to us dated October 23, 1998 regarding Position Location Signaling. Answers to the two questions posed by WG-II are contained below.

1. *Should the location measurement data transmitted between the Position Determination Entity (PDE) and the mobile station be vendor-specific, or should it be explicitly defined in the standard?*

It should be explicitly defined in the standard. The service provider membership of WG-I is unanimous in its desire to have a standardized interoperable approach, in order to avoid a scenario in which multiple PDE implementations are required in the network. Specifically, there is a need to ensure availability of a minimum core set of position measurement data that will meet FCC E-911 Phase II requirements.

2. *...considering the lack of resources and the time it would take to harmonize multiple proposals received by the group (WG-II), it is likely that the work will not be completed by December, 1998.*

The important milestone date for the (U.S.) service providers is October, 2000, which is one year prior to the effective date for the FCC's E-911 Phase II requirements. By this time it is felt that the process of seeding the population of CDMA mobile stations with location-enabled units must be underway. Working backward from that date suggests that a standard must be published at least one year prior to allow for

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product development, and that baseline text should be agreed upon several months prior to that to allow for V&V and the ballot process. Thus, the membership of WG-I feels baseline text for the standardized interoperable approach must be complete by the end of the February, 1999 meeting.

Please contact me if you have any questions or comments.

Sincerely,



Phil Brown  
Chair, TIA TR-45.5.1

cc: Prakash Panjwani – Chair, WG-II TG-3



## IMMEDIATE RELEASE

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### **SNAPTRACK TEST GROUP MOVES ADVANCED WIRELESS LOCATION SYSTEM TO NEXT STAGE OF COMMERCIAL DEVELOPMENT**

#### *Wireless-aided GPS System Closer to Market Availability*

**SAN JOSE, Calif., Sept. 23, 1998** – SnapTrack, inventors of the world's first wireless-aided GPS technology for handset-based location, today announced at PCS '98 that 16 wireless firms are proceeding with prototype integrated handset development for the commercial market. Trials for SnapTrack-enabled phones are scheduled to begin in the first quarter of 1999, with widespread availability planned by the end of that year.

Carrier members of the SnapTrack CDMA Test Group (STCTG) include AirTouch Communications, Ameritech Cellular, Bell Mobility, GTE Wireless, PrimeCo Personal Communications, Sprint PCS, and U S WEST Wireless. Participating manufacturers include Denso, Fujitsu, Hyundai, LGIC, Motorola, Nokia, and Samsung on the handset side, and Texas Instruments (TI) and VLSI on the chipset side.

Established in April, the STCTG focuses on integrating Code Division Multiple Access (CDMA) transmission technology with the SnapTrack system. From a wireless network, independent of air-interface, the SnapTrack system captures information such as approximate handset location, timing, and frequency to use for precise location determination.

(more)

“This forum has devoted a great deal of energy to evaluating the implementation and connectivity issues surrounding wireless location determination. By moving forward with prototype development, we believe we can demonstrate rapid implementation of wireless location technology,” said Steve Poizner, SnapTrack president. “With accuracy and sensitivity unmatched by any other solution, SnapTrack is changing the way people think about wireless location.”

This announcement comes on the heels of last month’s multimillion-dollar licensing agreement with NTT DoCoMo, Japan’s largest wireless carrier. DoCoMo plans to deploy location-based services using SnapTrack technology on its PDC network in the second quarter of 1999. The deal brings together NTT’s world-class expertise in developing cutting-edge wireless services and SnapTrack’s innovative location technology to offer Japanese consumers the most advanced personal navigation system in the world via a variety of wireless devices. Last month, SnapTrack also announced a strategic investment by the venture capital fund established by TI, the world’s leading provider of digital signal processors (DSPs).

Prototype development of handsets integrated with SnapTrack’s DSP-based software follows a successful battery of field trials conducted in Denver earlier this year. The findings, released in August, show SnapTrack’s technology yields a consistently high level of accuracy in locating callers and allowing the information to be routed to a third party. Sensitivity and accuracy testing resulted in measurements ranging from four meters inside a car on rural roads, to less than 85 meters inside a 50-story high rise on the 21<sup>st</sup> floor. Reliable location fixes were generated 89 percent of the time in the high rise, 94% of the time within the interior of a masonry office building, and 100% of the time in the other environments tested.

(more)

The FCC mandate requiring delivery of location information with wireless 9-1-1 calls has catalyzed the development of this innovative technology, which also enables carriers to generate revenue from value-added location services, including roadside assistance, traffic information, mobile yellow pages, efficient dispatch, asset tracking, and location-sensitive billing. The Denver field trials proved SnapTrack's wireless location system exceeds the FCC accuracy requirements for wireless E9-1-1, providing the high precision required to support location-based services. SnapTrack can pinpoint callers within feet of their actual location, even in buildings and cars, where conventional GPS does not operate effectively, if at all. SnapTrack technology allows callers to be found automatically in an emergency, while the *Location on Demand* privacy feature permits location calculation only after user authorization.

#### **ABOUT SNAPTRACK**

San Jose, Calif.-based SnapTrack™, Inc., was founded in 1995 to enhance economically the safety and productivity of people and assets when they are mobile. The company's goal is to leverage existing assets to develop high-performance wireless location determination technology. SnapTrack's patented cellular-aided GPS technology offers accurate, high-speed location of a wireless caller anytime, anywhere. SnapTrack's Web site is located at [www.snaptrack.com](http://www.snaptrack.com).

###

# Handsets!

Rapid Growth, Explosive Innovation, Intense Competition

June 29, 1998

## INDUSTRY OVERVIEW

- We expect global cellular/PCS handset unit sales to grow from 102 million in 1997 to 371 million in 2002, for a 5-year compound annual growth rate (CAGR) of 29.4%. We expect handset sales to grow from \$39.6 billion in 1997 to over \$76.7 billion by 2002 for a CAGR of 14% (18% for digital handsets).
- Mobile handsets, once regarded as simple devices to convert radio frequency signals into voice and vice versa, have evolved to a mass consumer electronics market characterized by rapid growth, innovation and intensifying competition.
- Competition is heating up as new spectrum is freed up and new operators enter markets. Pricing pressure is driven by carriers, which often subsidize handsets and want to cut subscriber acquisition costs, and by the arrival on the scene of dozens of new handset manufacturers that are determined to stake a claim in the market.
- Cellular/PCS networks are transitioning from analog technology to an array of digital standards such as GSM, TDMA, CDMA, and PDC.
- We have four leading handset providers under coverage: Ericsson, Inc., Motorola, Inc., Nokia Corporation and Qualcomm, Inc. Our investment rating on the shares of Ericsson and Motorola is "market perform." We rate Nokia and Qualcomm shares "buy."

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Company Name	Ticker	Analyst Stock Rating	Price	FY EPS		CY P/E	
				1998E	1999E	1998	1999
Ericsson, Inc.	ERICY	3	29	\$0.77	\$0.89	37.7x	32.6x
Motorola, Inc.	MOT	3	53 7/8	\$0.72	\$2.10	74.8x	25.7x
Nokia Corporation	NOK.A	2	74 9/16	\$2.23	\$2.32	33.4x	32.1x
Qualcomm, Inc.	QCOM	2	55 15/16	\$1.56	\$2.80	33.7x	NM

## Net Worldwide Handset Unit Sales: By Technology

	1995	1996	1997	1998	1999	2000	2001	2002
<b>New subscribers</b>								
Analog	20,913,390	14,833,662	7,020,288	1,268,904	(4,465,102)	(11,202,151)	(16,164,614)	(19,533,000)
GSM	7,291,152	19,472,000	37,186,042	43,302,194	52,153,808	56,411,116	57,136,447	60,664,083
CDMA	1,500	1,062,566	5,300,661	10,923,264	17,445,959	24,276,398	29,450,085	35,385,515
TDMA	1,172,701	1,861,191	3,829,182	8,337,544	12,481,231	18,043,064	23,325,534	26,229,873
PDC	2,739,300	10,611,800	13,558,000	12,199,968	8,751,163	4,042,852	915,209	(3,015,286)
<b>Net new handset unit sales</b>	<b>32,118,043</b>	<b>47,841,219</b>	<b>66,894,173</b>	<b>76,031,874</b>	<b>86,367,059</b>	<b>91,571,278</b>	<b>94,662,662</b>	<b>99,731,185</b>
<b>Replacement rate</b>								
Analog	6.40%	8.91%	13.51%	12.50%	9.98%	7.19%	4.86%	3.09%
GSM	6.96%	11.15%	15.17%	21.66%	26.60%	31.38%	36.02%	40.60%
CDMA	2.50%	5.00%	9.79%	14.98%	20.62%	26.87%	33.12%	37.77%
TDMA	4.99%	8.75%	15.79%	21.37%	25.85%	30.39%	34.95%	39.62%
PDC	10.00%	15.00%	22.50%	35.00%	40.00%	45.00%	50.00%	50.00%
<b>Net handset replacement rate</b>	<b>6.59%</b>	<b>10.04%</b>	<b>15.27%</b>	<b>20.09%</b>	<b>23.74%</b>	<b>28.19%</b>	<b>33.35%</b>	<b>38.28%</b>
<b>Replacement sales</b>								
Analog	4,428,268	7,489,601	12,296,854	11,540,491	8,767,629	5,509,179	2,937,857	1,263,211
GSM	859,829	3,547,412	10,465,001	24,331,194	43,740,474	69,299,826	100,127,314	137,495,781
CDMA	38	53,203	623,143	2,589,385	7,162,981	15,857,686	29,294,034	46,781,808
TDMA	86,812	314,982	1,173,449	3,369,743	7,302,363	14,068,406	24,333,706	37,974,410
PDC	330,430	2,087,415	6,181,673	13,885,924	19,370,092	23,610,637	28,691,645	25,184,003
<b>Net replacement handset unit sales</b>	<b>5,705,376</b>	<b>13,492,614</b>	<b>30,740,121</b>	<b>55,716,737</b>	<b>86,343,540</b>	<b>128,345,734</b>	<b>183,384,555</b>	<b>248,699,211</b>
<b>Net handset sales</b>								
Analog	25,341,658	22,617,705	23,829,459	18,380,344	10,085,253	6,525,348	1,724,036	1,263,211
GSM	8,150,981	23,019,412	47,651,043	67,633,389	95,894,283	125,710,942	157,263,761	198,159,864
CDMA	1,538	1,115,769	5,923,804	13,512,649	24,608,940	40,134,084	58,744,119	82,167,322
TDMA	1,259,513	2,176,173	5,002,631	11,707,287	19,783,594	32,111,470	47,659,240	64,204,283
PDC	3,069,730	12,699,215	19,739,673	26,085,892	28,121,255	27,653,489	27,606,854	25,184,003
<b>Net handset unit sales by technology</b>	<b>37,823,419</b>	<b>61,628,275</b>	<b>102,146,611</b>	<b>137,319,561</b>	<b>178,493,325</b>	<b>232,135,333</b>	<b>292,998,010</b>	<b>370,978,682</b>

Source: BT Alex. Brown Incorporated

## Net Worldwide Handset Unit Sales:

### By Region

	1995	1996	1997	1998	1999	2000	2001	2002
<b>New subscribers</b>								
North America	10,078,881	11,464,155	11,004,027	12,234,321	12,872,196	13,122,564	11,825,513	10,485,698
Europe	8,273,196	13,418,468	21,640,229	25,998,595	31,650,491	32,120,515	28,397,626	26,700,436
Asia Pacific	11,278,358	19,189,201	26,266,755	27,111,040	29,170,542	32,342,812	36,608,345	40,203,807
Latin America	1,623,529	2,366,445	6,084,540	8,207,895	9,778,366	10,254,376	12,138,204	12,719,685
Africa/Middle East	864,079	1,402,950	1,898,622	2,480,024	2,895,464	3,731,012	5,692,973	9,621,560
<b>Net new handset unit sales</b>	<b>32,118,043</b>	<b>47,841,219</b>	<b>66,894,173</b>	<b>76,031,874</b>	<b>86,367,059</b>	<b>91,571,278</b>	<b>94,662,662</b>	<b>99,731,185</b>
<b>Replacement rate</b>								
North America	5.00%	8.06%	15.20%	14.64%	15.05%	20.20%	27.73%	36.46%
Europe	8.95%	12.48%	17.03%	23.87%	29.01%	34.20%	39.34%	44.46%
Asia Pacific	7.61%	11.14%	15.75%	23.36%	27.02%	30.75%	34.63%	37.47%
Latin America	2.66%	5.22%	7.74%	11.78%	17.19%	18.62%	23.91%	30.04%
Africa/Middle East	3.98%	6.69%	7.50%	10.53%	14.85%	19.23%	23.33%	27.75%
<b>Net handset replacement rate</b>	<b>6.59%</b>	<b>10.04%</b>	<b>15.27%</b>	<b>20.09%</b>	<b>23.74%</b>	<b>28.19%</b>	<b>33.35%</b>	<b>38.28%</b>
<b>Replacement sales</b>								
North America	1,802,847	3,830,701	8,895,960	10,359,336	12,586,047	19,543,336	30,107,194	43,406,907
Europe	2,067,023	4,555,768	9,905,095	20,086,303	33,597,446	50,587,311	69,362,927	90,255,724
Asia Pacific	1,669,593	4,579,791	10,615,681	22,071,974	33,418,419	47,966,490	66,711,080	87,239,158
Latin America	106,207	332,260	963,423	2,432,389	5,230,868	7,574,989	12,631,229	19,687,465
Africa/Middle East	59,706	194,094	359,963	766,734	1,510,759	2,673,608	4,572,125	8,109,956
<b>Net replacement handset unit sales</b>	<b>5,705,376</b>	<b>13,492,614</b>	<b>30,740,121</b>	<b>55,716,737</b>	<b>86,343,540</b>	<b>128,345,734</b>	<b>183,384,555</b>	<b>248,699,211</b>
<b>Net handset sales</b>								
North America	11,881,728	15,294,856	19,899,987	22,593,657	25,458,243	39,883,311	52,575,670	66,475,443
Europe	10,340,219	18,268,678	34,746,675	48,944,743	67,384,345	84,474,454	99,180,435	118,157,679
Asia Pacific	12,947,951	23,768,992	38,193,402	51,894,119	66,235,279	83,543,583	106,065,050	132,468,441
Latin America	1,729,736	2,698,705	7,047,963	10,640,284	15,009,234	17,829,365	24,769,433	35,905,063
Africa/Middle East	923,785	1,597,044	2,258,585	3,246,757	4,406,223	6,404,620	10,407,422	17,972,055
<b>Net handset unit sales by region</b>	<b>37,823,419</b>	<b>61,628,275</b>	<b>102,146,611</b>	<b>137,319,561</b>	<b>178,493,325</b>	<b>232,135,333</b>	<b>292,998,010</b>	<b>370,978,682</b>

Source: BT Alex. Brown Incorporated

## Technology Adoption Rates All Technologies

	1995	1996	1997	1998	1999	2000	2001	2002
<b>Technology adoption as % of net adds</b>								
Analog	65.11%	31.01%	10.49%	1.67%	-5.17%	-12.23%	-17.08%	-19.59%
GSM	22.70%	40.70%	55.59%	56.95%	60.39%	61.60%	60.36%	60.83%
CDMA	0.00%	2.22%	7.92%	14.37%	20.20%	26.51%	31.11%	35.48%
TDMA	3.65%	3.89%	5.72%	10.97%	14.45%	19.70%	24.84%	28.30%
PDC	8.53%	22.18%	20.27%	16.05%	10.13%	4.41%	0.97%	-3.02%
<b>Technology adoption as % of installed base</b>								
Analog	79.91%	62.50%	45.22%	33.28%	24.15%	16.83%	11.00%	6.30%
GSM	14.26%	23.67%	34.28%	40.49%	45.22%	48.51%	50.55%	52.13%
CDMA	0.00%	0.79%	3.16%	6.23%	9.55%	12.96%	16.09%	19.06%
TDMA	2.01%	2.68%	3.69%	5.69%	7.77%	10.17%	12.66%	14.75%
PDC	3.82%	10.35%	13.65%	14.31%	13.31%	11.52%	9.71%	7.75%
<b>Penetration rates by technology</b>								
Analog	1.30%	1.55%	1.64%	1.63%	1.51%	1.29%	1.00%	0.66%
GSM	0.23%	0.59%	1.24%	1.98%	2.84%	3.73%	4.59%	5.48%
CDMA	0.00%	0.02%	0.11%	0.30%	0.60%	1.00%	1.46%	2.00%
TDMA	0.03%	0.07%	0.13%	0.28%	0.49%	0.78%	1.15%	1.55%
PDC	0.06%	0.26%	0.49%	0.70%	0.84%	0.89%	0.88%	0.81%
<b>Worldwide Penetration Rate</b>	<b>1.63%</b>	<b>2.47%</b>	<b>3.62%</b>	<b>4.89%</b>	<b>6.27%</b>	<b>7.69%</b>	<b>9.09%</b>	<b>10.50%</b>
<b>Net new subscribers by technology</b>								
Analog	20,913,390	14,833,662	7,020,288	1,268,904	(4,465,102)	(11,202,151)	(16,164,614)	(19,533,000)
GSM	7,291,152	19,472,000	37,186,042	43,302,194	52,153,808	56,411,116	57,136,447	60,664,083
CDMA	1,500	1,062,566	5,300,661	10,923,264	17,445,959	24,276,398	29,450,085	35,385,515
TDMA	1,172,701	1,861,191	3,829,182	8,337,544	12,481,231	18,043,064	23,325,534	26,229,873
PDC	2,739,300	10,611,800	13,558,000	12,199,968	8,751,163	4,042,852	915,209	(3,015,286)
<b>Net new subscribers</b>	<b>32,118,043</b>	<b>47,841,219</b>	<b>66,894,173</b>	<b>76,031,874</b>	<b>86,367,059</b>	<b>91,571,278</b>	<b>94,662,662</b>	<b>99,731,185</b>
<b>Worldwide installed base by technology:</b>								
Analog	69,182,275	84,015,937	91,036,225	92,305,129	87,840,027	76,637,876	60,473,262	40,940,262
GSM	12,347,213	31,819,213	69,005,255	112,307,449	164,461,257	220,872,373	278,008,821	338,672,903
CDMA	1,500	1,064,066	6,364,727	17,287,991	34,733,951	59,010,349	88,460,434	123,845,949
TDMA	1,739,037	3,600,228	7,429,410	15,766,954	28,248,185	46,291,248	69,616,782	95,846,655
PDC	3,304,300	13,916,100	27,474,100	39,674,068	48,425,231	52,468,082	53,383,291	50,368,005
<b>Worldwide installed base:</b>	<b>86,574,325</b>	<b>134,415,544</b>	<b>201,309,717</b>	<b>277,341,591</b>	<b>363,708,650</b>	<b>455,279,929</b>	<b>549,942,590</b>	<b>649,673,776</b>

Source: BT Alex. Brown Incorporated

## Worldwide Subscriber Estimates All Technologies

	1995	1996	1997	1998	1999	2000	2001	2002
Net new subscribers - total:								
North America	10,078,881	11,464,155	11,004,027	12,234,321	12,872,196	13,122,564	11,825,513	10,485,698
Europe	8,273,196	13,418,468	21,640,229	25,998,595	31,650,491	32,120,515	28,397,626	26,700,436
Asia Pacific	11,278,358	19,189,201	26,266,755	27,111,040	29,170,542	32,342,812	36,608,345	40,203,807
Latin America	1,623,529	2,366,445	6,084,540	8,207,895	9,778,366	10,254,376	12,138,204	12,719,685
Africa/Middle East	864,079	1,402,950	1,898,622	2,480,024	2,895,464	3,731,012	5,692,973	9,621,560
Net new subscribers	32,118,043	47,841,219	66,894,173	76,031,874	86,367,059	91,571,278	94,662,662	99,731,185
Worldwide installed base:								
North America	36,056,937	47,521,092	58,525,119	70,759,440	83,631,636	96,754,200	108,579,714	119,065,412
Europe	23,097,710	36,516,178	58,156,407	84,155,002	115,805,493	147,926,007	176,323,634	203,024,070
Asia Pacific	21,926,155	41,115,356	67,382,111	94,493,151	123,663,693	156,006,505	192,614,850	232,818,657
Latin America	3,995,095	6,361,540	12,446,080	20,653,975	30,432,341	40,686,716	52,824,920	65,544,604
Africa/Middle East	1,498,428	2,901,378	4,800,000	7,280,024	10,175,488	13,906,500	19,599,473	29,221,033
Worldwide subscriber installed base:	86,574,325	134,415,544	201,309,717	277,341,591	363,708,650	455,279,929	549,942,590	649,673,776

### % Year to Year Change

	1995	1996	1997	1998	1999	2000	2001	2002
Net new subscribers - total:								
North America	16.26%	13.74%	-4.01%	11.18%	5.21%	1.95%	-9.88%	-11.33%
Europe	42.59%	62.19%	61.27%	20.14%	21.74%	1.49%	-11.59%	-5.98%
Asia Pacific	150.27%	70.14%	36.88%	3.21%	7.60%	10.87%	13.19%	9.82%
Latin America	36.80%	45.76%	157.12%	34.90%	19.13%	4.87%	18.37%	4.79%
Africa/Middle East	132.50%	62.36%	35.33%	30.62%	16.75%	28.86%	52.59%	69.01%
Net new subscribers:	56.40%	48.95%	39.83%	13.66%	13.59%	6.03%	3.38%	5.35%
Worldwide installed base:								
North America	38.80%	31.79%	23.16%	20.90%	18.19%	15.69%	12.22%	9.66%
Europe	55.81%	58.09%	59.26%	44.70%	37.61%	27.74%	19.20%	15.14%
Asia Pacific	105.92%	87.52%	63.89%	40.23%	30.87%	26.15%	23.47%	20.87%
Latin America	68.46%	59.23%	95.65%	65.95%	47.34%	33.70%	29.83%	24.08%
Africa/Middle East	136.22%	93.63%	65.44%	51.67%	39.77%	36.67%	40.94%	49.09%
Worldwide subscriber installed base:	58.98%	55.26%	49.77%	37.77%	31.14%	25.18%	20.79%	18.13%

Source: BT Alex. Brown Incorporated

**CERTIFICATE OF SERVICE**

I, Shelia L. Smith, hereby certify that on this 4th day of February 1999, copies of the foregoing were served on the following by hand:

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