Saddleback Communications
A Division of the Salt River Pima-Maricopa Indian Community

MTI
Mountain Telecommunications, Inc.

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James Burtle
Chief - Experimental Licensing Branch
Federal Communications Commission
445 12th Street SW
Washington, DC 20054

30th September 2000

Dear Mr. Burtle

We are pleased to present the second annual progress review under the 3.4GHz Experimental License **(6120-EX-PL-1998)** granted by the FCC on 22nd September 1998 and modified on 10th April 2000 **(0041-EX-ML-1999)**. Our customers continue to be delighted with the full-quality "wireline equivalent" service that they receive via Fixed Wireless Access (FWA) and ALL are now regular users of the service for full speed fax or modem access. The modified license has enabled us to increase the number of installed customer units and we now have approximately 250 of the permitted 400 in service. The balance is earmarked for a specific residential area which is separate from the main reservation, and for which we do not enjoy Rights of Way for the connecting links when we take over the copper grid from the Incumbent Local Exchange Carrier later this year.

As with last year's report, we have not observed <u>any</u> interference from other spectrum users (e.g. airborne radars) over the past twelve months, and have <u>not</u> been notified of any interference to other spectrum users as a result of our operation under this License. Some of our customers continue to experience drop-side interference from a local AM radio station, which we try to address using screened drop cable and grounding improvements. We have confirmed that this is NOT indicative of any RF interference issue at 3.4GHz.

The FWA solution continues to meet our service, technical and cost / commercial expectations, but we now have to address the following issues :

a) The rest of the World (especially Mexico) is now deploying later versions of our FWA system which also deliver digital packet-based Internet access at speeds greater than 100kb/s. Without visible progress on the relevant spectrum allocation and licensing process in the US, these upgrades will not be available for our customers, who will remain limited to the existing 56kb/s analog modem access.

b) We continually review the US progress on other FWA and spectrum licensing issues, but still cannot identify any other appropriate / available solutions for our needs, including Cellular, WCS, PCS and MMDS and LMDS bands / technologies.

c) Without visible progress on the relevant spectrum allocation and licensing process in the US we will have to carefully limit our further investments in FWA technology, and start planning the deployment of more expensive and less appropriate solutions based on fiber and copper to meet our service and community needs.

We would welcome any attention that the FCC, NTIA and DoD can bring to bear on resolving the US spectrum and licensing issues so that we don't have to resort to traditional (and more expensive) copper solutions. Meanwhile, we will continue with the Experiment as described in the attached report. Please let us know if there is any additional information or clarification that you require.

Yours Sincerely

Jack Pleiter

Jack Pleiter, President
Mountain Telecommunications Inc

Mike Scully

Michael Scully, President
Saddleback Communications

CC :	Ivan Makil	President, Salt River Pima-Maricopa Indian Community
	Jim Irvin	Chairman, Arizona Corporation Commission
	Senator John McCain	Arizona
	William Kennard	Chairman, Federal Communications Commission
	Dale Hatfield	Chief, FCC Office of Engineering & Technology
	Greg Rohde	Asst. Secretary, Communications & Information, NTIA
	Lynne Cutler	Deputy Assistant to the President
	William Hatch	Acting Director, Office of Spectrum Management, NTIA
	Cynthia Raiford	Director, Spectrum Management, DASD C3I, Dept. of Defense
	Ray Strassburger	Director, Govt. Relations, Nortel
	James Casey	Counsel, Greenberg & Traurig LLP

CONCERNING - THE USE OF FIXED WIRELESS ACCESS (FWA)
TO PROVIDE BASIC & ADVANCED TELECOMMUNICATIONS SERVICES
TO RESIDENTIAL AND SMALL BUSINESS USERS
IN UNSERVED, UNDERSERVED AND COMPETITIVE APPLICATIONS

EXPERIMENTAL LICENSE ACTIVITY

TO INVESTIGATE THE FEASIBILITY AND VIABILITY OF USING

FWA "OFF-THE-SHELF" SOLUTIONS AT 3400-3700 MHz

TO MEET SERVICE AND BUSINESS OBJECTIVES

AT SCOTTSDALE, ARIZONA

SEPTEMBER 1999 - SEPTEMBER 2000

REPORT PREPARED BY DAVID TRINKWON, TRANSCOMM INC

1) INTRODUCTION

As reported last year, after analyzing their service and business plan requirements, MTI and Saddleback determined that their needs could NOT be met by existing wireless technologies such as CMRS[1], BETRS[2], MMDS[3] or LMDS[4]. However, they DID find that appropriate solutions existed "off-the-shelf" outside the USA where regulators, spectrum management authorities and service providers were already deploying and planning FWA solutions from a number of competitive vendors. Further research identified that although several vendors, systems and frequency variants were in existence, a number of important steps had been taken (e.g. within CITEL[5], ETSI[6], ITU[7], Europe, Canada, Mexico and Australia) to harmonize these solutions around parts of the 3400-3700 MHz frequency band. An Experimental License was granted on 22nd September 1998 and the FWA system has been operating continuously at Scottsdale ever since.

This further annual progress report summarises the activity, results and conclusions reached at the end of the second year, as required under the terms of the Experimental License. It also identifies the ongoing tasks to be carried out in the third year.

In parallel with this Pilot project, MTI and Saddleback have filed a petition for Rulemaking[8] which would lead to mutually agreeable sharing arrangements for (parts of) the 3400-3700 MHz frequency band, and a process for obtaining permanent licenses for FWA applications in rural and

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[1] CMRS - Commercial Mobile Radio Service, include both Narrowband Cellular and Broadband Personal Communications Services (PCS) under FCC Part 22 and 24 Rules, respectively

[2] BETRS - Basic Exchange Telephone Radio Systems under FCC Part 22 Sub-part F Rules

[3] MMDS (including MDS) - Multichannel Multipoint Distribution Service and Multipoint Distribution Service under FCC Parts 74 and 21 Rules respectively.

[4] LMDS - Local Multipoint Distribution Service under FCC Part 101 Rules

[5] CITEL - A Telecommunications Consultative Committee of the Organization of American States (OAS). See particularly the Reports and Recommendations of sub-committee PCC.III (Radio Communications)

[6] ETSI - European Telecommunications Standards Institute. See particularly the Reports and Recommendations of Work Group TM4.

[7] ITU - International Telecommunications Union. See particularly the Reports and Recommendations of Joint Rapporteurs Group JRG 8A/9B

[8] *See Fixed Wireless Access*, Petition for Rulemaking of Mountain Telecommunications, Inc. and Saddleback Communications Company (filed Sept. 30, 1998).

Indian communities. This Petition also includes a more detailed explanation of the background behind the MTI and Saddleback initiatives. Nortel Networks[9,10,11,12,13,14,15] and TransComm[16] have also filed many comments on other FCC proceedings related to spectrum policy, universal service and the proposed transfer of the 3650-3700 MHz frequency band from Government to commercial use.

2) OBJECTIVES

In its Experimental License Application, MTI specifically referenced the following types of operations (per section 5.202 of FCC rules governing the Experimental Radio Service) as being applicable:

(i) *Development of radio technique, equipment, operational data or engineering data related to an existing or proposed radio service.*

(ii) *Limited market studies*

(iii) *Other types of experiments that are not specifically covered under paragraphs (a) through (j) of this section*

MTI stated its intention to operate the system under conditions approximating those that would exist in full-scale commercial deployments of the system, in order to evaluate its technical and operational viability and its ability to satisfy the telecommunications service requirements of SRP-MIC members. Specific objectives were also stated in the MTI Application. These are summarised below, together with a statement of status / progress against each objective.

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[9] Comments of Northern Telecom in WT Docket No. 96-6 (March 1, 1996)

[10] Remarks of David Twyver (Northern Telecom) at the FCC *En Banc* Hearing on Spectrum Policy, March 5, 1996.

[11] Comments of Northern Telecom RM 8837, (Aug. 12, 1996)

[12] Comments and Reply Comments of Northern Telecom, CC Docket No. 96-45 (May7, Dec 19th 1997 respectively)

[13] Comments of Northern Telecom CC Dockets 96-45 and 97-160 (FNPRM) (Sept.24, 1997)

[14] Comments of Northern Telecom CC Docket No. 98-146, (Sept. 14, 1998)

[15] Comments of Northern Telecom ET Docket No. 98-237, (Feb. 16, 1999)

[16] Comments of TransComm ET Docket No. 98-237, (Feb. 16, 1999)

Mountain Telecommunications Inc. and Saddleback Communications Objectives

1. **Demonstrate economic and social benefits of Fixed Wireless Access technology**

   Almost 100 community members have now been provided with full quality "wireline" voice, fax and modem data service for the first time, at normal wireline tariffs and without payment of special construction charges. Prior to FWA these customers either had no telecommunications service at their home or place of business, or used cellular telephones, which were found to be expensive, unreliable or otherwise unsatisfactory. In addition, 150 other customers have been able to choose Saddleback's service in preference to the incumbent LEC service provided over traditional copper, and in advance of Saddleback's proposed acquisition of the ILEC's plant.

   Preliminary analysis of the 1999/2000 system event logs shows that ALL 252 customer units currently in service have used their lines to support full speed fax and/or modem (internet) access more than 30,000 times during the past year, as tabulated below :

No of Customers	No of Fax/ Modem Sessions
2	Approx 6000 each
5	Approx 1000 - 1500 each
15	Approx 250 - 1000 each
10	Approx 100 - 250 each
10	Approx 50 - 100 each
110	Approx 10 - 50 each
100	Approx 1 - 10 each
252	**30,000**

   Once Saddleback completes the purchase of the ILEC plant, it will be able to economically re-deploy some of the FWA units to serve a part of the community which is across the Salt River from the main reservation, and for which there is no existing way to connect the customers to Saddleback's central office, since all the wireline plant is routed back to the ILEC's wire centers on the South side of the River.

2. **Evaluate customer acceptance of services provided**

   All customers continue to express complete satisfaction with the quality, reliability and feature transparency of the services provided via FWA. There are still a few instances of interference from a local AM radio station which has caused complaints. It is usually possible to resolve

these situations to the satisfaction of the customers. These problems also occur on wireline connections in the same areas.

3. **Demonstrate progress towards becoming facilities-based CLEC**

   At present all wireline customers in the community are served by the traditional incumbent LEC (Qwest). Saddleback Communications has been designated by the Community to be the (new) incumbent Local Exchange Carrier (LEC) and is in the process of negotiating the transfer of the wireline facilities and existing customers from Qwest. Meanwhile Saddleback offers the FWA (Experimental) service to Qwest customers in the Community, in the manner of a Competitive LEC (CLEC). As mentioned above, approximately 150 customers are currently served in this way. MTI itself provides CLEC service throughout Arizona, using a combination of its own facilities and leased fiber or copper through agreements with Qwest and other facilities providers. MTI would like to competitively serve customers off the reservation using FWA, but this is not permitted by the Experimental License, even though the FWA transmissions presently cover large areas of urban Tempe and Scottsdale.

4. **Evaluate system performance in a real network environment**

   Proper attention must be paid to (customer) installation procedures to assure "carrier quality" performance and reliability, while avoiding the prohibitive costs associated with "line of sight" radio technologies. Saddleback has trained local native staff to carry out a complete, quality-assured, residential installation within 1 - 1.5 hours, including inside wiring and customer discussion time. Coverage has so far been provided using six pairs of (omni-directional) 307kHz radio frequency carriers, each providing ten 32kb/s traffic time-slots. A preliminary analysis of system event logs for the past year shows a significant number of situations where all available timeslots were in use, and Saddleback will now be considering the addition of further radio frequency carriers to increase capacity, in order to maintain wireline-standard availability. Further analysis will be carried out to determine the appropriate co-relation of the "blocked timeslot" events with associated traffic demand versus propagation or known fault situations.

5. **Investigate service, application and business opportunities**

   In addition to meeting the needs of unserved residential and business customers on the tribal lands, the FWA system has enabled Saddleback to address demands for additional lines not available from the existing US West copper grid. Also to serve customers who prefer

Saddleback, but needed switch features which are not available when Saddleback resells the Qwest service (but are available when Qwest sells the service). With the license modification, Saddleback has been able to successfully serve an additional 100 such customers to date.

6. **Develop staff knowledge on technology and associated functions / processes**
   As reported last year, more than six MTI and Saddleback employees have been trained on the FWA technology, plus associated installation, planning and network management sub-systems. Training has been provided on-site in Scottsdale, AZ and at Nortel's facilities in the United Kingdom.

7. **Develop plans for product standardization, market introduction and deployment**
   These plans are on hold, pending the resolution of the FCC Petition and any resolution of band-sharing issues with DoD and NTIA. Saddleback must now start to develop contingency plans for replacing the FWA in due course with more expensive fiber and copper access solutions.

8. **Address regulatory aspects of wireless technologies**
   MTI and Saddleback continue to press the FCC, DoD and NTIA to resolve the issues that limit their access to appropriate spectrum for the use of these "off-the-shelf" global solutions to some long-standing and difficult telecommunications access problems. Meanwhile, they continue to monitor progress on domestic US spectrum and product availability (eg ISM, PCS, WCS, MMDS, GWCS and 3650-3700MHz bands) to watch for emerging alternative FWA solutions.

3) PROJECT DESCRIPTION

A summary of the MTI / Saddleback project was included in last year's report.

4) INTERFERENCE ANALYSIS - RADIO FREQUENCIES

A specific objective of this Experimental License is to evaluate any interference to the FWA system from other users in the band (or emitting spurious signals into the band from lower frequencies). In particular, airborne high powered military radars such as AWACS. We are also obliged to remedy (or shut down the system) in the event that the FWA system causes interference to a primary user in the band (e.g. military radars). Luke AFB is located 30 miles west of the MTI Base Station (bearing 280°), but we were advised that none of the platforms normally assigned there had any of

the radars being analysed by the DoD-Joint Spectrum Center. However, we could expect AWACS overflights occasionally as planes come over on training flights or with the radars switched on *en route* to their assigned missions. We would NOT be told when the flights would (or had) taken place.

For last year's report, we carried out two specific data collection / analysis periods, using specially generated test calls and procedures to gather the statistics in the system event logs. The conclusion was that during the special monitoring periods only random and infrequent events were observed. No patterns of interference from any external sources were observed and no evidence was found to support the hypothesis that there was a loss of service due to interference. It was not possible to provide detailed correlation between the measurement data and presence of potential interferors without information about specific interferor (e.g. radar) events. For this second year, we did NOT run any specially generated test calls, but HAVE analyzed the normal system event logs to look for any patterns of alarms that might indicate interference.

A) In Call Signal Quality Alarms

An "In Call Signal Quality" alarm can be triggered by one of six possible events: RSSI failure, MAC-CRC failure, FEC failure, Vector Error failure, DLC-CRC failure, or an Errored Slot. Alarms indicate that a certain type of failure occurred during a call. 27,000 such "Warning" alarms were logged during this second year, and further analysis will shortly be carried out to determine and co-relate the specific causes. Since the principle concern here is the potential interference from radars or other sources, we will just summarize three aspects for the present.

Firstly, were the failures linked to specific radio frequency carriers - interference would be expected to affect different (frequency) carriers to different extents. The following table summarizes the results, and shows that there IS a bias towards the lower frequencies, but we would need to investigate the uplink / downlink data in more detail before assigning any significance to this result.

RF Carrier	No of Alarms
0	5168
6	5303
18	4641
24	4284
36	4309
42	3638
Total	**27343**

Secondly, does the alarm data show "bursts" of alarms on specific dates, which might co-relate to radar (eg AWACS) operations (if known). In general there were less than 100 such alarms on any day, but the table below shows the dates on which greater numbers of occurrences were noted.

No of Alarms	Dates
100 - 200	Sep 99 - 9,11,18,19 Oct 99 - 1,4,5,17,19-21,29 Nov 99 - 1,8,11,12,14-16,22 Jan 00 - 2-4,28,29 Feb 00 - 18,21,22,27,28 Mar 00 - 1-3,8,10,11,13-23,31 Apr 00 - 3-7,12,13,17,18,20,25-26,28-30 May 00 - 1,2,7,18,19,24 Jun 00 - 23,28-30 Jul 00 - 24,25,30,31 Aug 00 - 3,6-10,14,28
200 - 300	Sep 99 - 14,15 Mar 00 - 12,16,18 Apr 00 - 21 Jul 00 - 3,21,28 Aug 00 - 11,15,16,30
300 - 400	Apr 00 - 4 May 00 - 16 Aug 00 - 17,29
400 - 500	May 00 - 10 Jun 00 - 22
> 500	Apr 00 - 14
42	
27343	

Thirdly, radar interference would be expected to affect all customers equally, whereas analysis of the alarms shows the following distribution :

No of Alarm Events	No of Customers
3000 - 4000	2
2000 - 3000	1
1000 - 2000	6
500 - 1000	5
100 - 500	17

50 - 100	12
Less than 50	136
27343	**179**

B) In Call Signal Quality Metrics

The "In Call Signal Quality" metrics for FEC (Forward Error Correction) and MAC failures for a single customer unit was recorded and logged on uplink and downlink. These record the number of times each type of failure occurred during a call. 3000 such calls were logged over the past year and an analysis of the metrics will be carried out shortly.

C. Conclusion

Again, no system alarms have been raised over the second one-year period to indicate any bursts of errors that might be attributable to RF interference, and there have been no complaints or comments from the customers that would give rise to any such concerns. The impact (if any) of FWA system interference to external systems (DoD's or others) can not be ascertained, except by the operators of the impacted systems. No such reports have been received.

5) MARKET STUDIES

The costs of the FWA solution remain as predicted, and significantly cheaper than the previously estimated wireline solutions. Resolution of the spectrum sharing proposals for the US market would further increase the manufacturing volumes significantly, yielding additional economies of scale. Subscriber units can be (and have been) re-deployed to meet changing subscriber needs or service priorities, and have also been used to quickly / economically provide full quality service to temporary construction sites or special events.

APPENDIX A

MAPS & CHARTS

Figure 1 : Location of SRP-MIC Community and Base Station