

07-136

ULS Application

0003079616 - Jamestown Manufacturing Corporation

File Number	0003079616	Radio Service	CP - Part 22 VHF/UHF Paging (excluding 931MHz)
Call Sign	WPVG310	Application Status	2 - Pending

General Information

Application Purpose	EX - Request for Extension of Time	Emergency STA	
Existing Radio Service			
Authorization Type		Action Date	06/27/2007
Receipt Date	06/20/2007	Requested Expiration Date	
Entered Date	06/20/2007	Number of Rules	
Waiver		Grandfathered Privileges	
Attachments	Yes	Regulatory Fee Exempt	
Application Fee Exempt	No	Major Request	

Market Data

Market	BEA044 - Knoxville, TN	Channel Block	CF
Submarket Designator	0	Associated Frequencies (MHz)	000035.33000000- 000035.35000000

Applicant Information

FRN	0004374054	Type	Corporation
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Real Party in Interest		FRN of Real Party in Interest	

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4/27/07

Jamestown Manufacturing Corporation
FCC Form 601, Schedule L
Exhibit 1
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Waiver Request for Extension of Time

Jamestown Manufacturing Corporation (“Jamestown”),¹ licensee of the 698 35-36 MHz (“35 MHz”) paging authorizations identified in this application, hereby respectfully requests a waiver of Section 22.503(k) of the Commission’s rules, 47 C.F.R. § 22.503(k), to extend its “substantial service” requirement by three years from June 21, 2007 to June 21, 2010.² Ample good cause exists to grant the requested waiver. As set forth below, Jamestown has diligently pursued the provision of service to its geographic areas over the past five years only to have delivery of that service repeatedly postponed through a series of unforeseeable and unavoidable equipment delays. With its equipment problems now resolved, Jamestown has already commenced service to one geographic area, and stands ready to roll out service to its other geographic areas – including service to sparsely populated rural areas – according to the schedule contained in Section II.C of this Exhibit

1. Jamestown respectfully submits that it would be contrary to the public interest to terminate its authorizations at the very moment the company is poised to deploy its innovative paging service.

¹ Jamestown is the wholly owned subsidiary of Trimble Navigation Limited (“Trimble”), one of the world’s leading providers of advanced positioning equipment, including Global Positioning System (“GPS”), laser, optical and inertial technologies.

² To the extent necessary, Jamestown also requests a waiver of Section 1.946(c) of the Commission’s rules, 47 C.F.R. § 1.946(c), and an extension of time in which to satisfy its substantial service requirement, pursuant to Section 1.946(e) of the Commission’s rules, 47 C.F.R. § 1.946(e).

I. Introduction and Background

Jamestown's inability to satisfy its substantial service requirement within five years is a direct consequence of two overriding circumstances beyond its control. First, Jamestown entered the paging industry at a time when only a limited number of manufacturers existed with the capability of producing equipment for use in the lower band paging frequencies.³ The dearth of equipment manufacturers severely restricted the manufacturing options available to Jamestown, whose paging network involves innovative communications services for which no "off the shelf" equipment exists. Second, once Jamestown selected the amplifier manufacturer that it believed could best serve its needs, that manufacturer suffered a series of technical and corporate setbacks that unavoidably delayed delivery of market-ready paging equipment. None of these setbacks was within the control of Jamestown.

Against this unfavorable backdrop, Jamestown has sought to develop its pioneering "RTK paging" service. In 2001, Jamestown participated in the FCC's Lower and Upper Band Auction (Auction 40), emerging as the high bidder for 698 lower band paging authorizations in the 35 MHz band. Jamestown specifically selected these authorizations with the intent to establish a new paging network offering subscribers a

³ Over the past several years, the development of marketplace alternatives to paging has left that service widely underutilized and with considerable segments of spectrum allocated to it (including at 35 MHz) lying fallow. With the decrease in consumer demand for paging, service providers, and the manufacturers that produce their equipment, have largely abandoned paging in favor of more attractive alternative technologies. Indeed, two leading providers of paging equipment, Glenayre Technologies Inc. and Motorola Inc., each announced plans to discontinue its paging-related operations in 2001, the same year that Jamestown won its paging authorizations at auction. See *Glenayre to Cut 55% of Workforce and Shut Unit*, N.Y. Times (May 24, 2001) available at <http://query.nytimes.com/gst/fullpage.html?res=9E04E5DD113DF937A15756C0A9679C8B63>; *Motorola to turn off pager manufacturing*, RCR Wireless News (December 10, 2001) at 1.

precision GPS service, called RTK GPS.⁴ RTK GPS provides an extremely high level of precision positioning accurate to within centimeters. Its commercial applications include precision agriculture, mining, construction, surveying and mapping, and its public safety applications include natural disaster damage assessment and recovery, flood control design and maintenance, hazardous waste site mapping, highway construction and snowplow routing. The Commission granted Jamestown's 35 MHz paging application on June 21, 2002, thereby establishing a substantial service demonstration deadline of June 21, 2007.⁵

Jamestown has diligently pursued construction of the proposed RTK paging system since acquiring its authorizations. These efforts, however, have been significantly and repeatedly hampered by circumstances beyond Jamestown's control – most prominently, the inability of its paging amplifier manufacturer to produce a reliable product on time. After first investigating the vendor options available to them, Jamestown entered into negotiations for the design and manufacture of a lower band paging amplifier with Vytek Products, Inc. (“Vytek”) in October 2002. Four months later, in February 2003, Jamestown agreed to pay a substantial sum to Vytek for the amplifier design and a per-unit additional charge for each amplifier produced. Vytek delivered a prototype amplifier in September 2003.

⁴ Jamestown sought to acquire 35 MHz authorizations because Trimble's existing positioning system, using UHF data radios authorized under Part 90 of the Commission's rules, requires licenses that, in many markets, are difficult to obtain and which require operations on a secondary basis to voice users. Use of the paging frequencies at 35 MHz avoids both problems because the band is underutilized and permits Jamestown's proposed operations on a primary basis. Trimble holds a U.S. patent for its lower band paging positioning system (U.S. Patent 6,879,283).

⁵ On July 6, 2005, Jamestown notified the Commission that it had elected to demonstrate “substantial service” in its paging geographic areas by June 21, 2007, pursuant to Section 22.503(k) of the Commission's rules.

With the prototype in hand, Jamestown commenced over-the-air testing of the unit in Colorado under FCC experimental authorization obtained by Jamestown in December 2003. Testing, however, immediately revealed the prototype to be damaged and inoperable. Jamestown returned the prototype to Vytex for repairs via UPS, which further damaged the unit during the delivery process. Jamestown did not receive the repaired unit until May 2004 after months of substantial electrical and mechanical work by Vytex.

As the prototype was being repaired, CalAmp Corp. ("CalAmp") acquired Vytex in April 2004. This business development had an immediate, and significantly adverse, impact on Jamestown's plans, because CalAmp's business strategy did not include the manufacture of lower band paging amplifiers. Threatened with the possibility of losing the sole source of its amplifier, Jamestown considered working with another paging equipment manufacturer. However, the combination of the dwindling number of paging manufacturers and the fact that it had, at considerable expense, already funded product development of the Vytex amplifier convinced Jamestown that its only practical course was maintenance of its existing vendor relationship with Vytex's successor, CalAmp. After lengthy negotiations with Jamestown, CalAmp agreed to supply ten production amplifier units for another substantial upfront payment, which reflected an 80 percent increase in Vytex's original production price. CalAmp delivered the production units in April 2005.

As Jamestown worked to acquire its paging amplifier from an outside source, it simultaneously pursued internal technical research and production of other required

system components. Jamestown's parent company, Trimble, designed and built the paging receiver that would be used for the proposed RTK paging service. Trimble completed an FCC Declaration of Conformity for the receiver in August 2004. Trimble also developed a lower band paging exciter to operate with the lower band paging amplifier. The exciter and paging amplifier, which together comprise the paging transmitter, obtained type certification from the Commission in July 2005. *See* FCC ID JUP-ELIZABETH35.

Over-the-air testing of the paging transmitter began in Colorado in September 2005. Unfortunately, testing revealed a critical design flaw in the CalAmp amplifier. While the amplifier worked most of the time, the device shut down approximately ten times per month for no apparent reason. Jamestown determined that this failure rate was unacceptably high if its precision paging service were to be feasible, particularly where the many public safety RTK paging applications were concerned.

With no other viable manufacturing options available to it, Jamestown immediately sought to work with CalAmp to correct the amplifier design flaw, but its efforts were delayed because of another corporate change beyond its control. After CalAmp produced and delivered the defective amplifiers, Sonik Messaging Systems ("Sonik") acquired the paging products division of CalAmp. As part of its acquisition, Sonik obtained the design rights of the paging amplifier originally designed for Jamestown by Vytek, and which formed the technical foundation of CalAmp's defective amplifiers delivered to Jamestown. Sonik, however, felt it had no contractual responsibility to fix the amplifier's inherent design flaw. In November 2006, after

extended negotiations, Jamestown agreed to pay Sonik another large sum to investigate and correct the problem. This investigation was unavoidably postponed one month later following a fire at the Sonik facility that destroyed one of the company's key data servers.

Finally, in April 2007, more than four years after Jamestown first contracted with Vytek for the lower band power amplifier, Trimble and Sonik developed a "work-around" solution to the amplifier defect that permits the reliable operation of the paging transmitter. Roll out of Jamestown's RTK paging service commenced shortly thereafter, beginning in June 2007 with service to EA141 covering parts of Colorado, Nebraska and Kansas. Build out is underway in other markets as well, most prominently in Florida, where Jamestown has entered into written agreements for RTK paging infrastructure sites serving the Tampa and St. Petersburg area. Jamestown is confident that it can provide the required substantial service to these and each of the remaining geographic areas covered by its paging authorizations over the next three years.

II. Granting Jamestown's Waiver Request Is Fully Warranted.

Jamestown requests a limited waiver of Section 22.503(k) in order to extend the time to provide substantial service to its geographic areas by an additional three years. Section 1.925 of the Commission's rules, 47 C.F.R. § 1.925, provides that the Wireless Telecommunications Bureau ("Bureau") may grant a waiver request if it is shown that:

- (i) The underlying purpose of the rule(s) would not be served or would be frustrated by application to the instant case, and that a grant of the requested waiver would be in the public interest; or

(ii) In view of unique or unusual factual circumstances of the instant case, application of the rule(s) would be inequitable, unduly burdensome or contrary to the public interest, or the applicant has no reasonable alternative.⁶

The Commission's rules also provide guidance on the standards it considers when examining a request for extension of time to provide coverage. In applicable part, Section 1.946(e) provides that an extension request may be granted if "the licensee shows that failure to meet the construction or coverage deadline is due to involuntary loss of site or other causes beyond its control." 47 C.F.R. § 1.946(e).

As discussed below, waiver is fully warranted in this case given the unique confluence of circumstances that have unavoidably delayed delivery of Jamestown's paging service, and because providing Jamestown with limited additional time to provide substantial service will serve the public interest.

A. Circumstances Beyond Jamestown's Control Led To Service Delay.

As an initial matter, grant of Jamestown's waiver request is justified because it would be contrary to the public interest to terminate Jamestown's licenses just as the company is on the brink of providing a valuable new service. Significantly, the delay in service was not of Jamestown's making.⁷ The unique set of circumstances that unavoidably pushed back delivery of the RTK paging operations – including most critically a lack of reliable equipment producers, but also including multiple corporate

⁶ The Commission may also waive its rules for "good cause . . . shown." 47 C.F.R. § 1.3. As demonstrated herein, ample "good cause" exists to support grant of Jamestown's waiver request.

⁷ Jamestown notes that its extension request does not involve any of the disqualifying circumstances that, by rule, prohibit the granting of such a request. More specifically, Jamestown is not seeking an extension due to delays caused by a failure to obtain financing, to obtain an antenna site, or to order equipment in a timely manner. 47 C.F.R. § 1.946(e)(2).

changes, revised business strategies, component design flaws, and even fire – were unquestionably beyond the control of Jamestown. Despite these hurdles, Jamestown persistently, and at considerable expense and effort, pursued construction of its paging system. The Bureau should recognize these diligent efforts and permit Jamestown to follow through on its plans.

In situations comparable to Jamestown's, the Bureau has granted construction waivers where a lack of equipment prevented timely construction. Last December, for example, the Bureau granted a three-year extension of the construction deadline for Wireless Communications Service licenses held by member companies of the WCS Coalition. *Consolidated Request of the WCS Coalition For Limited Waiver of Construction Deadline for 132 WCS Licenses*, 21 FCC Rcd 14134 (WTB 2006). The Bureau relied on the fact that deployment of the proposed service using "available equipment" was "marred by technical problems or proved to be economically infeasible." *Id.* at 14139. Similarly, the Bureau granted a three-year extension in which to construct Phase II 220 MHz service licenses after the two companies that originally manufactured applicable voice equipment ceased doing so. *Request of Warren C. Havens for Waiver or Extension of The Five-Year Construction Requirement For 220 MHz Service Phase II Economic Area and Regional Licensees*, 19 FCC Rcd 12994, 13000 (WTB 2004). In support of its decision, the Bureau concluded that it was not "reasonable to fault licensees who obtained licenses and then faced an unexpected loss of equipment." *Id.* at 13001. The Bureau also granted a 16-month extension of the construction requirement applicable to 900 MHz Specialized Mobile Radio licensees because digital voice equipment

required for advanced digital 900 MHz systems were not commercially available in “sufficient quantities” in time to meet the original five-year construction deadline. *FCI 900, Inc. Expedited Request for 3-Year Extension Of 900 MHz Band Construction Requirements*, 16 FCC Rcd 11072, 11077 (WTB 2001). The Bureau observed that the public interest would be ill served by compelling the licensees to devote scarce resources to the construction of an obsolete system using available analog equipment simply to meet the construction deadline. *Id.* at 11078.

Just as a lack of suitable equipment justified extension deadlines in these cases, the lack of suitable paging equipment available to Jamestown supports grant of its waiver request. The difficulties associated with producing a reliable paging amplifier were not the fault of Jamestown, but rather resulted from the low number of available equipment manufacturers and the numerous technical and corporate disruptions that interrupted the production process. Despite these obstacles, Jamestown diligently took whatever steps it reasonably could to further the production process. Like the licensees in *WCS Coalition*, *Warren C. Havens* and *FCI 900*, Jamestown should not be punished for not satisfying its substantial service requirement in the face of equipment scarcity.

B. Granting the Waiver Request Will Serve The Public Interest In Numerous Ways.

Granting the instant waiver request will enable Jamestown to deploy its innovative paging service to each of its geographic areas, thereby advancing the public interest in a number of important ways. The public interest benefits derived from Jamestown’s paging service include the following:

1. Improved Delivery Of Public Safety Services

The enhanced capabilities of Jamestown's RTK paging service offer public safety entities distinct operational advantages over existing GPS positioning technology. For example, disaster recovery efforts employing current GPS systems to position emergency response personnel and excavation equipment require that a control point first be found and a reference station set up and calibrated before rescue operations can begin.

Jamestown's RTK paging service eliminates these time-consuming steps because its system has control points and reference stations pre-determined. The result is a far more rapid – and thus potentially life-saving – disaster recovery operation.

Jamestown's paging systems will also permit enhanced monitoring of geographic fault lines for seismic activity. Current monitoring requires "after-the-fact" processing of data collected by less efficient GPS systems. With Jamestown's RTK paging system, real time monitoring of seismic activity is feasible, thereby making possible the collection of data of significant value to the nascent field of earthquake prediction.

Jamestown's paging system will also improve the monitoring of buildings and dams for structural defects and other public safety concerns. The RTK paging system makes these efforts more economical by eliminating the need for the monitoring agency to purchase, protect and maintain individual base stations and to acquire individual licenses.

Public safety entities rely on precision positioning technology for the construction and maintenance of roads. This reliance is often restricted, however, by the ability of State Departments of Transportation and local County road crews to secure individual Part 90 licenses, which are difficult to obtain from the often-oversubscribed public safety

pool of licenses. Jamestown bypasses this problem through its use of the undersubscribed lower band paging frequencies. Jamestown's approach will not only make it significantly easier for state and local governments to build and maintain their roads, it will also reduce competition among agencies for individual Part 90 public safety radio licenses, which ultimately aids all public safety activities.

2. Deployment of Service to Rural Areas

One of the key commercial applications of RTK positioning technology is precision agriculture, which permits highly efficient use of arable farm land. To meet this need, Jamestown acquired paging licenses that encompass the nation's principal agricultural regions, including hundreds of counties defined as "rural areas" by the Commission. *See Facilitating the Provision of Spectrum-Based Services to Rural Areas and Promoting Opportunities for Rural Telephone Companies To Provide Spectrum-Based Services*, 19 FCC Rcd 19078, 19087 (2004) (establishing a baseline definition of "rural area" as those counties (or equivalent) with a population density of 100 persons per square mile or less based upon the most recent Census data) ("*Rural R&O*"). For example, the coverage area of Jamestown's RTK paging licenses (as illustrated in Attachment 1 hereto) includes nearly complete coverage of North Dakota, South Dakota, Kansas and Iowa. According to the 2000 U.S. Census:

- All 53 of the counties in North Dakota are "rural areas;"
- 65 out of 66 counties (98.5%) in South Dakota are "rural areas;"
- 98 out of 105 counties (93.3%) in Kansas are "rural areas;" and
- 90 out of 99 counties (90.9%) in Iowa are "rural areas."

See Attachment 2 hereto. Jamestown's licenses cover other major agricultural areas marked by low population densities, including the Texas panhandle, Nebraska and eastern Montana. By giving Jamestown an additional three years to implement service to these and other comparable areas, the Commission will promote its statutory obligation and public interest policy objective to facilitate the widespread deployment of communications services to rural and other under populated areas.⁸ See 47 U.S.C. § 309(j)(3)(A) (in awarding licenses through competitive bidding, the Commission shall promote "the development and rapid deployment of new technologies, products, and services for the benefit of the public, including those residing in rural areas"); *Rural R&O* at 19081. See also *Monet Mobile Networks, Inc.; Request for Waiver and Extension of the Broadband PCS Construction Requirements*, 17 FCC Rcd 6452, 6454 (WTB 2002) (granting extension request to meet construction requirements for PCS licenses located in Basic Trading Areas throughout North Dakota, South Dakota, Kansas and Minnesota in part because deployment would bring service to rural and sparsely populated areas).

3. Underutilized Paging Spectrum Put To Use

Granting Jamestown's waiver request will also serve the public interest by putting to use in a highly efficient manner spectrum that would otherwise almost

⁸ Because Jamestown's paging licenses also cover many Native American reservations, including ten reservations located in South Dakota alone, granting the instant waiver request will also advance the Commission's goal of promoting the deployment of wireless telecommunications services to tribal lands. See *Extending Wireless Telecommunications Services To Tribal Lands*, 15 FCC Rcd 11794 (2000).

certainly lie fallow.⁹ The 35 MHz band spectrum that Jamestown acquired at auction is, as noted above, not in high demand. Terminating Jamestown's authorizations and requiring that the spectrum covered by those licenses be returned would not benefit consumers in any tangible way, as it is unlikely another entity exists that would be interested in acquiring the rights to that spectrum. Moreover, no one – not even Jamestown – could apply for the freed up spectrum in the foreseeable future even if they wanted to, because the FCC has no paging auction on its schedule. The Commission has long made it clear that putting fallow spectrum to use is in the public interest. *See, e.g., Promoting Efficient Use of Spectrum Through Elimination of Barriers to the Development of Secondary Markets*, 18 FCC Rcd 20604 (2003). Consistent with that objective, the Bureau should grant the instant waiver request so that the subject 35 MHz spectrum is utilized more quickly than would be possible under any other licensing scenario.

4. Delivery Of A New Communications Service

Finally, granting the Jamestown waiver request will promote the policy of the United States, as codified in the Communications Act of 1934, as amended, “to encourage the provision of new technologies and services to the public.” 47 U.S.C. § 157(a); *see also* 47 U.S.C. § 309(j)(3)(A) (Commission has statutory obligation, in the auction context, to promote “the development and rapid deployment of new technologies,

⁹ Jamestown's RTK paging system promotes efficient spectrum use in two key ways. First, the lower band paging transmitter developed by Trimble provides more than ten times the spectral efficiency of earlier comparable lower band paging equipment. Second, existing precision GPS operations are highly inefficient because individual licenses in the UHF business band are required to transmit data from individual operator base stations. The Jamestown paging system will eliminate that inefficiency by replacing the current individual channels and base stations with a comparatively few number of lower band paging channels that transmit shared data.

products, and services for the benefit of the public, including those residing in rural areas”). Jamestown’s innovated RTK paging system qualifies as a new technology, as it will provide consumers with an improved means of obtaining highly precise positioning data more quickly, efficiently and accurately than before.

For all these of reasons, Bureau should conclude that the public interest would best be served by the grant of Jamestown’s waiver request.

C. Jamestown Will Provide Substantial Service In Three Years’ Time.

As detailed above, Jamestown has been diligent over the past five years in seeking to bring its RTK paging service to market. It plans to be equally diligent when deploying its service over the next three years. The following schedule sets out the number of licenses (and their approximate cumulative coverage area in square miles) that Jamestown plans to build out over each of the next three years:

Year	# of Licenses Built	Coverage Area (in square miles)
2007-08	120	~250,000
2008-09	240	~500,000
2009-10	338	~750,000
Total:	698	~1.5 million

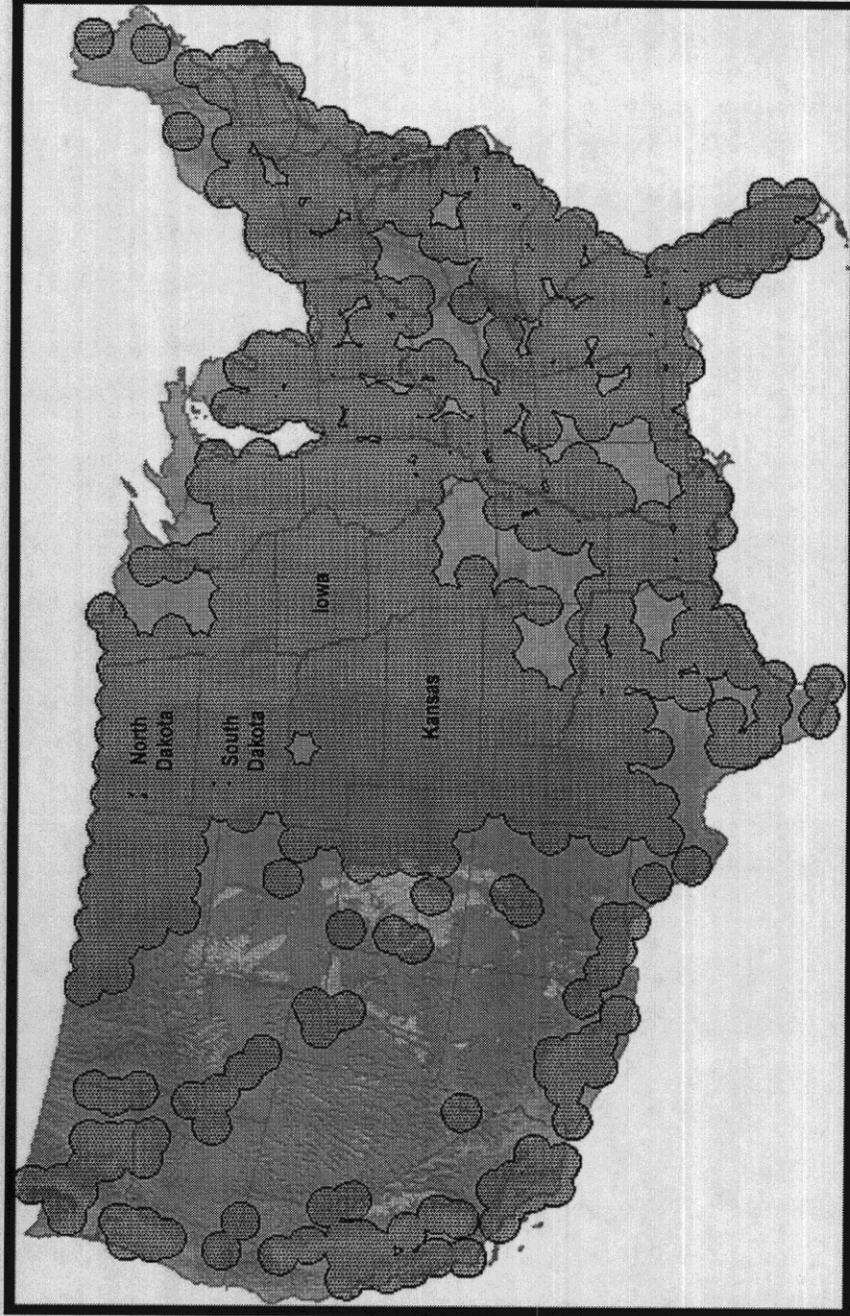
As the schedule shows, Jamestown will aggressively deploy its services immediately upon grant of the instant waiver request, and continue to pursue construction until it achieves the required substantial service for each of the geographic areas covered by its licenses by June 2010.

CONCLUSION

Over the past five years, Jamestown has diligently pursued construction of its RTK paging service using spectrum that would otherwise lie fallow. Despite its best efforts, circumstances beyond its control have unavoidably delayed Jamestown from timely satisfying its substantial service requirement. With the roll out of service currently underway, now is not the time to terminate Jamestown's licenses and thwart the delivery of an important new service. For the reasons discussed herein, Jamestown respectfully requests that the Commission extend its substantial service demonstration deadline by three years until June 21, 2010 to allow it to complete its planned construction.

ATTACHMENT 1

**Jamestown Manufacturing Corporation
RTK Paging
Coverage Map**



● = Coverage area of license

ATTACHMENT 2

IOWA
Population Density By County

Geographic area	Population	Population Density per Square Mile of Land Area
Iowa	2,926,324	52.4
Adair County	8,243	14.5
Adams County	4,482	10.6
Allamakee County	14,675	22.9
Appanoose County	13,721	27.6
Audubon County	6,830	15.4
Benton County	25,308	35.3
Black Hawk County	128,012	225.7
Boone County	26,224	45.9
Bremer County	23,325	53.3
Buchanan County	21,093	36.9
Buena Vista County	20,411	35.5
Butler County	15,305	26.4
Calhoun County	11,115	19.5
Carroll County	21,421	37.6
Cass County	14,684	26
Cedar County	18,187	31.4
Cerro Gordo County	46,447	81.7
Cherokee County	13,035	22.6
Chickasaw County	13,095	25.9
Clarke County	9,133	21.2
Clay County	17,372	30.5
Clayton County	18,678	24
Clinton County	50,149	72.2
Crawford County	16,942	23.7
Dallas County	40,750	69.5
Davis County	8,541	17
Decatur County	8,689	16.3
Delaware County	18,404	31.8
Des Moines County	42,351	101.8
Dickinson County	16,424	43.1
Dubuque County	89,143	146.6
Emmet County	11,027	27.9
Fayette County	22,008	30.1
Floyd County	16,900	33.8
Franklin County	10,704	18.4
Fremont County	8,010	15.7
Greene County	10,366	18.2
Grundy County	12,369	24.6
Guthrie County	11,353	19.2
Hamilton County	16,438	28.5
Hancock County	12,100	21.2
Hardin County	18,812	33
Harrison County	15,666	22.5
Henry County	20,336	46.8
Howard County	9,932	21
Humboldt County	10,381	23.9
Ida County	7,837	18.2
Iowa County	15,671	26.7
Jackson County	20,296	31.9
Jasper County	37,213	51
Jefferson County	16,181	37.2
Johnson County	111,006	180.7
Jones County	20,221	35.1
Keokuk County	11,400	19.7
Kossuth County	17,163	17.6
Lee County	38,052	73.5
Linn County	191,701	267.2
Louisa County	12,183	30.3

IOWA
Population Density By County

Geographic area	Population	Population Density per Square Mile of Land Area
Lucas County	9,422	21.9
Lyon County	11,763	20
Madison County	14,019	25
Mahaska County	22,335	39.1
Marion County	32,052	57.8
Marshall County	39,311	68.7
Mills County	14,547	33.3
Mitchell County	10,874	23.2
Monona County	10,020	14.5
Monroe County	8,016	18.5
Montgomery County	11,771	27.8
Muscatine County	41,722	95.1
O'Brien County	15,102	26.4
Osceola County	7,003	17.6
Page County	16,976	31.7
Palo Alto County	10,147	18
Plymouth County	24,849	28.8
Pocahontas County	8,662	15
Polk County	374,601	657.9
Pottawattamie County	87,704	91.9
Poweshiek County	18,815	32.2
Ringgold County	5,469	10.2
Sac County	11,529	20
Scott County	158,668	346.5
Shelby County	13,173	22.3
Sioux County	31,589	41.1
Story County	79,981	139.6
Tama County	18,103	25.1
Taylor County	6,958	13
Union County	12,309	29
Van Buren County	7,809	16.1
Wapello County	36,051	83.5
Warren County	40,671	71.1
Washington County	20,670	36.3
Wayne County	6,730	12.8
Webster County	40,235	56.3
Winnebago County	11,723	29.3
Winneshiek County	21,310	30.9
Woodbury County	103,877	119
Worth County	7,909	19.8
Wright County	14,334	24.7

Source: *Census 2000 Summary File 1*

Note: Yellow highlight indicates County with population density per square mile of land area of 100 or less.

KANSAS
Population Density by County

Geographic area	Population	Population Density per Square Mile of Land Area
Kansas	2,688,418	32.9
Allen County	14,385	28.6
Anderson County	8,110	13.9
Atchison County	16,774	38.8
Barber County	5,307	4.7
Barton County	28,205	31.5
Bourbon County	15,379	24.1
Brown County	10,724	18.8
Butler County	59,482	41.7
Chase County	3,030	3.9
Chautauqua County	4,359	6.8
Cherokee County	22,605	38.5
Cheyenne County	3,165	3.1
Clark County	2,390	2.5
Clay County	8,822	13.7
Cloud County	10,268	14.3
Coffey County	8,865	14.1
Comanche County	1,967	2.5
Cowley County	36,291	32.2
Crawford County	38,242	64.5
Decatur County	3,472	3.9
Dickinson County	19,344	22.8
Doniphan County	8,249	21
Douglas County	99,962	218.8
Edwards County	3,449	5.5
Elk County	3,261	5
Ellis County	27,507	30.6
Ellsworth County	6,525	9.1
Finney County	40,523	31.1
Ford County	32,458	29.5
Franklin County	24,784	43.2
Geary County	27,947	72.6
Gove County	3,068	2.9
Graham County	2,946	3.3
Grant County	7,909	13.8
Gray County	5,904	6.8
Greeley County	1,534	2
Greenwood County	7,673	6.7
Hamilton County	2,670	2.7
Harper County	6,536	8.2
Harvey County	32,869	60.9
Haskell County	4,307	7.5
Hodgeman County	2,085	2.4
Jackson County	12,657	19.3
Jefferson County	18,426	34.4
Jewell County	3,791	4.2
Johnson County	451,086	946.1
Kearny County	4,531	5.2
Kingman County	8,673	10
Kiowa County	3,278	4.5
Labette County	22,835	35.2
Lane County	2,155	3
Leavenworth County	68,691	148.3
Lincoln County	3,578	5
Linn County	9,570	16
Logan County	3,046	2.8
Lyon County	35,935	42.2
Marion County	13,361	14.2
Marshall County	10,965	12.1

KANSAS
Population Density by County

Geographic area	Population	Population Density per Square Mile of Land Area
McPherson County	29,554	32.8
Meade County	4,631	4.7
Miami County	28,351	49.2
Mitchell County	6,932	9.9
Montgomery County	36,252	56.2
Morris County	6,104	8.8
Morton County	3,496	4.8
Nemaha County	10,717	14.9
Neosho County	16,997	29.7
Ness County	3,454	3.2
Norton County	5,953	6.8
Osage County	16,712	23.8
Osborne County	4,452	5
Ottawa County	6,163	8.5
Pawnee County	7,233	9.6
Phillips County	6,001	6.8
Pottawatomie County	18,209	21.6
Pratt County	9,647	13.1
Rawlins County	2,966	2.8
Reno County	64,790	51.6
Republic County	5,835	8.1
Rice County	10,761	14.8
Riley County	62,843	103.1
Rooks County	5,685	6.4
Rush County	3,551	4.9
Russell County	7,370	8.3
Saline County	53,597	74.5
Scott County	5,120	7.1
Sedgwick County	452,869	453.2
Seward County	22,510	35.2
Shawnee County	169,871	309
Sheridan County	2,813	3.1
Sherman County	6,760	6.4
Smith County	4,536	5.1
Stafford County	4,789	6
Stanton County	2,406	3.5
Stevens County	5,463	7.5
Sumner County	25,946	22
Thomas County	8,180	7.6
Trego County	3,319	3.7
Wabaunsee County	6,885	8.6
Wallace County	1,749	1.9
Washington County	6,483	7.2
Wichita County	2,531	3.5
Wilson County	10,332	18
Woodson County	3,788	7.6
Wyandotte County	157,882	1,042.9

Source: *Census 2000 Summary File 1*

Note: Yellow highlight indicates County with population density per square mile of land area of 100 or less.

NORTH DAKOTA
Population Density by County

Geographic area	Population	Population Density per square mile of land area
North Dakota	642,200	9.3
Adams County	2,593	2.6
Barnes County	11,775	7.9
Benson County	6,964	5
Billings County	888	0.8
Bottineau County	7,149	4.3
Bowman County	3,242	2.8
Burke County	2,242	2
Burleigh County	69,416	42.5
Cass County	123,138	69.8
Cavalier County	4,831	3.2
Dickey County	5,757	5.1
Divide County	2,283	1.8
Dunn County	3,600	1.8
Eddy County	2,757	4.4
Emmons County	4,331	2.9
Foster County	3,759	5.9
Golden Valley County	1,924	1.9
Grand Forks County	66,109	46
Grant County	2,841	1.7
Griggs County	2,754	3.9
Hettinger County	2,715	2.4
Kidder County	2,753	2
LaMoure County	4,701	4.1
Logan County	2,308	2.3
McHenry County	5,987	3.2
McIntosh County	3,390	3.5
McKenzie County	5,737	2.1
McLean County	9,311	4.4
Mercer County	8,644	8.3
Morton County	25,303	13.1
Mountrail County	6,631	3.6
Nelson County	3,715	3.8
Oliver County	2,065	2.9
Pembina County	8,585	7.7
Pierce County	4,675	4.6
Ramsey County	12,066	10.2
Ransom County	5,890	6.8
Renville County	2,610	3
Richland County	17,998	12.5
Rolette County	13,674	15.2
Sargent County	4,366	5.1
Sheridan County	1,710	1.8
Sioux County	4,044	3.7
Slope County	767	0.6
Stark County	22,636	16.9
Steele County	2,258	3.2
Stutsman County	21,908	9.9
Towner County	2,876	2.8
Traill County	8,477	9.8
Walsh County	12,389	9.7
Ward County	58,795	29.2
Wells County	5,102	4
Williams County	19,761	9.5

Source: *Census 2000 Summary File 1*

Note: Yellow highlight indicates County with population density per square mile of land area of 100 or less.

SOUTH DAKOTA
Population Density by County

Geographic area	Population	Population Density per square mile of land area
South Dakota	754,844	9.9
Aurora County	3,058	4.3
Beadle County	17,023	13.5
Bennett County	3,574	3
Bon Homme County	7,260	12.9
Brookings County	28,220	35.5
Brown County	35,460	20.7
Brule County	5,364	6.5
Buffalo County	2,032	4.3
Butte County	9,094	4
Campbell County	1,782	2.4
Charles Mix County	9,350	8.5
Clark County	4,143	4.3
Clay County	13,537	32.9
Codington County	25,897	37.7
Corson County	4,181	1.7
Custer County	7,275	4.7
Davison County	18,741	43
Day County	6,267	6.1
Deuel County	4,498	7.2
Dewey County	5,972	2.6
Douglas County	3,458	8
Edmunds County	4,367	3.8
Fall River County	7,453	4.3
Faulk County	2,640	2.6
Grant County	7,847	11.5
Gregory County	4,792	4.7
Haakon County	2,196	1.2
Hamlin County	5,540	10.9
Hand County	3,741	2.6
Hanson County	3,139	7.2
Harding County	1,353	0.5
Hughes County	16,481	22.2
Hutchinson County	8,075	9.9
Hyde County	1,671	1.9
Jackson County	2,930	1.6
Jerauld County	2,295	4.3
Jones County	1,193	1.2
Kingsbury County	5,815	6.9
Lake County	11,276	20
Lawrence County	21,802	27.3
Lincoln County	24,131	41.7
Lyman County	3,895	2.4
Marshall County	4,576	5.5
McCook County	5,832	10.2
McPherson County	2,904	2.6
Meade County	24,253	7
Mellette County	2,083	1.6
Miner County	2,884	5.1
Minnehaha County	148,281	183.1
Moody County	6,595	12.7
Pennington County	88,565	31.9
Perkins County	3,363	1.2
Potter County	2,693	3.1
Roberts County	10,016	9.1
Sanborn County	2,675	4.7
Shannon County	12,466	6
Spink County	7,454	5

SOUTH DAKOTA
Population Density by County

Geographic area	Population	Population Density per square mile of land area
Stanley County	2,772	1.9
Sully County	1,556	1.5
Todd County	9,050	6.5
Tripp County	6,430	4
Turner County	8,849	14.3
Union County	12,584	27.3
Walworth County	5,974	8.4
Yankton County	21,652	41.5
Ziebach County	2,519	1.3

Source: *Census 2000 Summary File 1*

Note: Yellow highlight indicates County with population density per square mile of land area of 100 or less.