Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
ITS 5.9 GHz Band	)	DA 01-686
Licensing and Service Isssues	)	PN released 3-22-01
	)	

To: Chief, Wireless Telecommunications Bureau

Comments
of Warren C. Havens and Telesaurus Holdings GB, LLC

I, Warren C. Havens, hereby submit comments in response to the Public Notice dated 3-22-01 in this matter: Intelligent Transportation System ("ITS") services in the 5.850- f.925 MHz Band ("5.9 GHz"), in particular, with respect to the "Status Report" on this matter submitted on October 6, 2000 by ITS America by John J. Collins and Robert B. Kelly (the "ITS Report").

I currently hold licenses in the A-block of the Location and Monitoring Service ("LMS") (the A-block is 6 MHz within the 902-928 MHz range) covering approximately 60% of the nation's population (including most all major markets). I also hold licenses in the VHF Public Coast Service ("VPC") covering most of the Rocky Mountain parts of the nation, in the 220-222 MHz Service ("220 MHz") in which, with Net Radio Communications LLC (in which I have a majority interest on a fully diluted basis, I hold a plurality of spectrum in the Western 60% of the nation, and in the Automated Marine Telecommunication System Service ("AMTS") in the 217-220 MHz band, in which I hold

licenses for 1 MHz in large parts of Arizona, Nevada, and Utah, and have approximately one hundred additional station applications for other parts of the nation.

I will be transferring all or most of the above named licenses and applications, subject to FCC approval, to Telesaurus Holdings GB, LLC, ("Telesaurus") in which I will retain controlling interest. Telesaurus is backed by additional parties with regard to financing and is in the processing of selecting appropriate companies for technology and systems equipment, and systems deployment, operations, and marketing. In addition, Telesaurus is a participant in FCC Auction 39 (the second auction of licenses in the VPC and LMS bands: licenses not sold in the first auctions several years ago).

In addition, I have substantially discussed the views expressed herein with the two other parties holding geographic licenses in the LMS service: Progeny LMS LLC and FCR, Inc. While I do not speak for them, they have expressed to me their general interest in the views I express herein, based on such ideas promoting a more viable design and potential for of wireless communication systems for ITS functions.

In this regard, the FCC has designated this 5.9 GHz, along with LMS, as the two current Transportation Infrastructure Radio Services. The apparent logic behind this joint designation--both services were allocated for ITS wireless: the former for DSRC; the latter for wide-area location and related voice and data services--is the basis of the views expressed herein. The ITS master plan also calls for both DRSC and wide-area communication systems. The need for both is obvious and need not be discussed here. I will note that the existing wide-area services (via the various CMRS networks), are not designed for the needs of ITS, will not easily be adaptable for integration with advanced

DSRC, and are very expensive due to the cost of the spectrum involved and of the current 2G systems and the upcoming 2.5G and 3G technology upgrades and swapouts. For longer-range needs, ITS in the nation needs both 5.9 GHz and LMS to be planned and deployed in integrated fashion. This will provide a strong foundation of success of ITS in the United States, and this success is a high priority for public safety, pollution control, worker productivity, and a host of commercial services. ITS America has and has had a substantial participation from vendors, operator, and others involved in DSRC in the "Non-multilateration" sub bands within the 902-928 MHz band. It has not had much participation by LMS licensees since these licenses were issued on a geographic basis only recently, [1]and licensees have been, since licensing, working on fundamental issues (appropriate technology and deployment plans and partners, etc.).

I and Telesaurus have participated in ITS America and its 5.9 GHz stakeholder workshop held December 1999 (the "Workshop") (see Appendix A to the Report). In this regard, I included Ralph Haller, former Chief of the FCC Private Radio Bureau, and now head of Fox Ridge Communications, Inc.

The Report does not reflect the major comments I and Mr. Haller made at the Workshop or a follow-up white paper I submitted to ITS America. At the Workshop and in the white paper, Mr. Haller and I proposed that this ITS 5.9 GHz should be used nationwide 1) for the Dedicated Short Range Communications ("DSRC") services which the Workshop focused on, but also 2) for other ITS functions that would involve

[1] Some licenses issued in mid 1999, and others in mid 2000. Others (covering a substantial portion of the nation and substantial percentage of the population) will be licensed pursuant to FCC Auction 39 scheduled to commence June 6 of this year. After this auction, LMS will be fully licensed accross the nation. This shouldl lead to accelleration of deployment of these licenses.

coordinated or integrated networks of wide-area LMS systems overlaying localized 5.9 GHz stations or systems , and 3) high-speed wireless Internet services in the vast majority of the land mass of the nation away from highways and roads on which DSRC could be deployed. Herein, I summarize this proposal.

The essential rationale for our proposal was that any new spectrum allocation should be put to the highest and best use to justify the allocation and for it to be a success in the marketplace, and this involves expanding the use of the 5.9 GHz beyond DRSC on busy transportation routes to the uses noted above, and such expanded use will result in probably some orders of magnitude increase in volume of system and end-user-device components specific to 5.9 GHz which will be needed for its commercial success.

Indeed, one of the major reasons given by vendors and others at the Workshop for potential failure or slow pace of adoption of DRSC in 5.9 GHz was the high cost of components verses costs of current 900 MHz DRCS (in the 902-928 MHz range). The proposal outlined herein could solve that problem: by making the best and highest use of 5.9 GHz, advanced DSRC use of 5.9 GHz will be enhanced.

Multi-band nationwide ITS-focused networks: 5.9 GHz, LMS 902-928 MHz, and 217-225 MHz. These three bands may be used for regional and ultimately nationwide ITS-focused networks, serving both public safety entities and applications, as well as commercial operators and applications related to transportation uses (mostly highway, but

others also). Herein (and for other purposes),[2] we use the term "National Infrastructure Radio Service." The following is from the Comments I filed in PR Docket No. 92-257 on or about 2-6-01 (with regard to proposed new rules for AMTS):

> NIRS, 4 bands: AMTS . . . [would be, as proposed] designated as a National Infrastructure Radio Service ("NIRS") along with 220 MHz, LMS Multilateration[3] and LMS Non-Multilateration (together herein, "LMS"), and the recently allocated 5.9 GHz (a Transportation Infrastructure Radio Service) (herein, "5.9 GHz"), and all such NIRS be subject to certain rules to foster joint development for the purposes of NIRS. (See below, IVDS and 222-225 should also be integrated into NIRS.)
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> These components listed above are discussed below after discussion of the overall concept. This concept is that AMTS and 220 MHz are still largely undeveloped,[4] as are LMS and 5.9 GHz, and together, these provide a needed combination of frequencies for the combination of macrocell, minicell, and picocell topologies needed for a nationwide service for major US infrastructure entities.[5] Such entities need a new integrated nationwide high-capacity[6] service to use as their primary radio service, or to use as a

[2] See, e.g., Comments of Warren Havens in PR Docket No. 92-257 filed on or about 2-6-01 (with regard to proposed new rules for AMTS).

[3] LMS Multilateration licensed systems must provide wide-area location services and may provide associated voice and data, including (as I plan for my LMS licensed systems) voice and data largely over the Internet and Intranets (as opposed to the Public Switched Network) (but with PSN voice and data for emergency situations).

[4] These services, while in large part licensed, involve licenses that are very lightly loaded, and from evidence I have gained, pre-auction licenses reported as constructed are in many cases not actually in operation.

[5] Use of appropriate mobile satellite system for most remote areas may also be a valuable component of NIRS, such as the recently "rescured" Iridium system now targeted in large part to servce important needs in remote areas not covered or not covered well by terrestrial wireless networks.

[6] Without a very large market created by such nationwide high capacity service, there is not sufficient volume to warrant the cost of development of advanced digital 3G or 4G technology (e.g., involving expensive ASICS and other components) and the manufacturing volumes needed to obtain sufficiently low cost and advanced features to be successful. The best evidence is GSM: a large market was created by the EC member nations requiring GSM and allocating the radio spectrum for GSM. It thus took off and has now dominated worldwide wireless. An example at the other end of the scale is 220 MHz in the US: it "flopped" as noted in the text and footnotes above, as has AMTS to date.

critical virtual-PMR adjunct (for redundancy, extra capacity, interoperability, and more advanced services) to their primary radio services, as further discussed below. I believe that what I am proposing here will be supported by the majority of existing licensees and "stakeholders" in the noted proposed component bands. [7] [8]

The proposed NIRS end-user "infrastructure" entities include two main classes ('a' and 'b' below), and two other user classes ('c' and 'd' below) that may choose to participate.

a. Private-sector utility and transport entities: utilities (electric, gas, water), pipelines, transportation entities (rail, trucking, local transit, marine, highway departments, airport ground services, some Telematics service providers such as AAA).

b. Public-Sector land and real property agencies:[9] i.e., under the US Department of Interior[10] and Department of Agriculture[11] and the analogous State entities, and other such entities, private and public, involved in developing, providing, or managing basic infrastructure-based services and or public lands.[12]

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[7] I can discuss the basis of this with the FCC if the FCC decides to consider an alternative licensing scheme as I propose herein. Essentially, I believe (and have had substantial communications to support my belief) that such licensees will expect the best financial return by participation in NIRS as the higest and best use of their spectrum.

[8] I am involved in all these bands, including as a potential "stakeholder" in 5.9 GHz, designated by the FCC, along with LMS, as a Transportation Infrastructure Radio Service.

[9] Such public entities involve vast infrastructure to manage such lands and property, and thus have analgous wireless needs as the noted private sector infrastructure entities: both classes have vast physical improvements (roads, plant, buildings) and mobile workforce needing integrated mobile and fixed wireless over wide areas.

[10] National Park Service, BLM, etc.

[11] US Forest Service, Fish and Game, etc.

[12] There is a significant degree of correlation and interoperation between such private infrastructure entities and such public land and property entities, e.g., on rights of way, service to the public in emgergencies, wide-area radio coverage needs; and both classes need similar advanced radio services with features far advanced from those offered by current two-way radio systems and current and planned CMRS. Both classes also need interoperation between other such "infrastructure" entities.

c. ITS core-function entities and functions: A concept being discussed by stakeholders in US "Intelligent Transportation Systems" (such as among members of the ITS America) involves mandatory or wide-spread use in highway-capable vehicles of basic ITS functions such as location-based services for crash and emergency notification and information, providing to highway departments real-time data on highway traffic flows; providing to law enforcement entities information regarding defined major motor vehicle violations.[13] NIRS could provide such basic Telematics functions by design more effectively and at less cost than CMRS. NIRS could also serve to integrate these wide-area mobile radio ITS functions with the DSRC functions of LMS non-multilateration and 5.9 GHz.[14]

d. Public Safety entities may also choose to be an end user of NIRS for such noted adjunct purposes, described further below.

The above-noted private-sector NIRS entities need NIRS for primary wireless services since they do not at this time hold or have set aside by the FCC sufficient allocation of radio spectrum set aside for their needs.[15] The above-noted public-sector NIRS entities need NIRS for critical adjunct wireless services since NIRS will provide an otherwise non-obtainable nationwide radio service with mission-critical features at a low cost (partly in trade for infrastructure-use rights), such adjunct services providing (in addition to such entities primary radio services on its dedicated spectrum) (i) redundancy and additional capacity for peak periods, emergencies, and failures of such primary service, (ii) interoperability among various such public-sector NIRS entities, with such private-sector NIRS entities, and with

[13] E.g., speeding and certain unsafe driving, unsafe condition of the vehicle, lack of valid vehicle registration, etc.

[14] DSRC stands for Dedicated Short Range Communications. DSCR is used in non-multilateration LMS such as for "smart tag" readers (e.g., as used as the toll booths along the Dulles Airport access toll road in northern Virginia), and several dozen more advanced formes of DSRC (each involving a very short range fixed transmitter along a roadway or facility used by vehicles to transmit one- or two-way data to the vehicle or users in the vehicle). Such pico cells, normally isolated (in current practice and as planned by those planning DSRC for the new 5.9 GHz TIRS radio service), can be beneficially integrated with NIRS, such as by NIRS: linking the DSRC sites via its wide-area backhaul network, exchanging traffic flow data; clearing some vehicles for toll payment prior to reaching toll booths; etc.

[15] I have met with leaders of many of these entities in the last eighteen months (since obtaining the radio licenses listed in Exhibit 1 below) and base this needs assesment on the views expressed to me by such leaders and their internal needs assesments. I have also found first-tier wireless equipment vendors who have independently come to the same assessment. Expert consultants in wireless have also confirmed such assessment.

Public Safety entities who may also choose to use NIRS for such adjunct service. The use for ITS core functions is noted above and would be of substantial benefit to Highway Departments, Transit entities, Public Safety, and ultimately to US commerce and population in general as it would increase the safety and efficiency of roadway traffic.

Today, Information Technology is leading the world economy and wireless is a leading component in IT, often projected to soon have more traffic than wired networks. [16] Change is occurring rapidly and in wireless, and a new technology good enough for any nationwide deployment involves billions of dollars in development and construction and years of work. For this, there must first exist the underlying spectrum available of sufficient quantity and nature. For the proposed NIRS in the US, the proposed four frequency bands are ideal and (as noted above) they are currently still largely "available." They are ideal as follows described below, and partially depicted in Exhibit 2 below.

217-222 MHz (of AMTS and the 220 MHz services, including also 217-218 "IVDS"),[17] extended to 225 MHz by reallocating the 222-225 Amateur band to NIRS,[18] and possibly also including most or all of 216-217

[16] Even is close to correct, there will be a need for many times the spectrum that exists in total that is usable for wide-area systems (several GHz down to 100 Mhz or thereabouts). The need for more spectrum for more and more advanced wireless is a major concern these days from commercial wireless operators and vendors, the FCC, Congress, the Executive Branch, and the Military (which wants to keep what it has in the face of demands to release spectrum to the burgeoning commercial wireless industry). NIRS as proposed herein should be seriously considered at this time for the critical US needs I have described while there exists the opportunity to develop NIRS around these four frequency bands. If not pursued at this time, LMS multilateration licensees will move on to other things-- we LMS licensees will have no other choice.

[17] IVDS, 220 MHz, and incumbent AMTS licensees could elect to become part of TIRS and adopt TIRS technology, and those that do not do so by the end of a certain reasonable period (such as the end of the first five after the end of the initial auction proposed herein of AMTS and 222-225 MHz) would be required to conform to TIRS technology and services.

[18] This band is not heavily used by Amateurs, e.g., as indicated by a review of catalogs of Amateur radio equipment. It is in the public interest to reallocate this to such NIRS purposes which are more critical to the US private and public sectors than the services contemplated by the FCC in the 3rd FNPRM for AMTS. I would propose that this reallocation licensing be done via auction at the same time as the AMTS auction and via the same NIRS-related Guard Band Manager sheme, but with the whole 222-222 MHz for the above described "NIRS Set-Aside" (proposed above for 1 of the 2 MHz in AMTS). In addition, by allocating 216-225 MHz or thereabouts as proposed, this frequency band component of NIRS could achieve a approximately a 4 MHz separation in Tx and Rx frequencies, if used in pairs for frequency division duplex

MHz[19]: Thus, 4 MHz total if only AMTS and 220 MHz, and 7-9 MHz total with such extension(s). This frequency range is ideal for a base macro-cell layer to cover the majority of the land mass of the US, including smaller cities towns, rural plants and facilities, rough terrain, highways and railroads linking major markets, and modest-speed data links to vehicles with high-power mobile radios and high-gain antenna. These may also be used for certain remote fixed services and point-to-point links.

902-928 MHz LMS: used for an overlaying mini-cell layer largely in the larger markets, busiest highway corridors, and other heavy use locations. These would also be used for a low-tier low-power "cordless phone" mode. (3G and 4G wireless generally contemplates both high-tier high-power mobile mode, and such low-tier mode, the two largely integrated.)

5.9 GHz: 75 MHz recently allocated by the FCC for ITS functions, used as noted above for DSRC. As proposed in this NIRS concept, it would also be used for high-speed backhaul, and where not needed along the highways for DSRC, it would be used for various peripatetic and fixed wireless services.[20]

The FCC should not move ahead at this time and auction AMTS. Due to the weaknesses in AMTS (and the adjacent 220 MHz service) noted above, and the fact that the FCC has already licensed AMTS covering the vast majority of the US population (and allowed "Fill-in" stations that will enable warehousing: see Exhibit 3 below), such an auction in the near future will

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("FDD"). However, we would probably propose use of time division duplex ("TDD") (which achieves full duplex via rapidly alternating Tx and Rx on one frequency, not on separated frequency pairs, and thus is used with unpaired blocks of spectrum) as the primary diplexing technique due to multiple advantages including simpler end-user radios, and more spectrum efficiency especially for the contemplated *variable* asymmetrical up- and down- link IP-centric traffic, and leveraging the precise timing at each base station that NIRS would have for providing GPS-based location technology required for LMS and NIRS (network assisted GPS location techniques for both constant and periodic wireless location applications).

[19] With the techniques available in the contemplated 4G NIRS technology noted herein, I believe the TV channels below 216 MHz could be protected and the current uses also protected. At least, this should be studied. A goal of such 4G, including the DARPA 4G initiative, is to develop technology that, among other things, increases spectrum efficiency via interference excission and sharing of bands by multiple users.

[20] As noted elsewhere herein, the 4G technology contemplated for NIRS will include techniques to enable sharing of a radio band by systems employing air interfaces whether directly overlaid or side-by-side.

> yield small sums and not be yield the best use of AMTS. Instead, the FCC should via an appropriate rulemaking explore the NIRS concept for AMTS and the other noted bands . . . .
>
> Summary [from this quoted text]
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> Today, Information Technology is leading the world economy and wireless is a leading component in IT, often projected to soon have more traffic than wired networks. [21] Change is occurring rapidly and in wireless, and a new technology good enough for any nationwide deployment involves billions of dollars in development and construction and years of work.
>
> For this, there must first exist the underlying spectrum available of sufficient quantity and nature, along with suitable regulatory framework. "Advanced Technology 220 MHz" ("AT 220 MHz") as outlined below would contribute to this.
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> Also, public-resource-licensed commercial business (including FCC wireless licensees) should be held to higher "corporate citizen" standards than other private enterprise. In this regard, I propose below a "Nationwide Environmental Wireless Service" as a component of AT 220 MHz.
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> Finally, spectrum reallocation should be combined with FCC (and other Federal) support for US advanced wireless technology, "4G technology." One way to achieve this is noted below: support of the DARPA 4G initiative now underway.

As noted above, we propose that 5.9 GHz be used not only for DSRC but for high-speed backhaul functions of integrated DRCS and LMS wide-area ITS-focused networks (described above in the concept of NIRS), and for mobile and fixed high-speed wireless Internet services which would be operated by such integrated network for both ITS related functions and a broad array of commercial applications. See attached depictions.

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[21] Even is close to correct, there will be a need for many times the spectrum that exists in total that is usable for wide-area systems (several GHz down to 100 Mhz or thereabouts). The need for more spectrum for more and more advanced wireless is a major concern these days from commercial wireless operators and vendors, the FCC, Congress, the Executive Branch, and the Military (which wants to keep what it has in the face of demands to release spectrum to the burgeoning commercial wireless industry).

We will comment further in Reply Comments.

Respectfully submitted,

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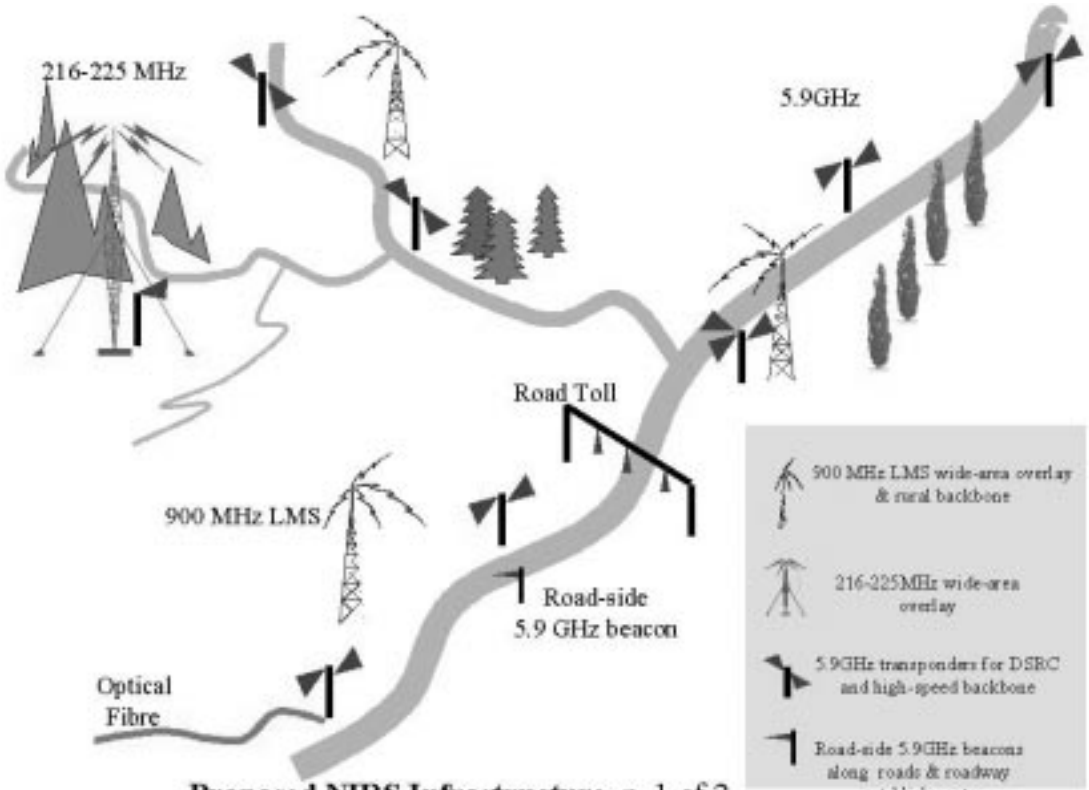

Proposed NIRS Infrastructure, p. 1 of 2

Proposed NIRS Infrastructure, p. 2 of 2

(further depiction of roadway DSRC and other use of 5.9 GHz)