HAI has constructed a forward-looking incremental cost model to determine the impact on an MMDS operator's business if the Commission were to reduce the amount of available spectrum in the MMDS/ITFS bands by 90 MHz.[31] This model is based upon real world assumptions regarding, among other things, MMDS/ITFS broadband technologies, competitive pricing and throughput requirements, market characteristics, and expected future developments in the marketplace. It also differentiates between market sizes, dividing the 493 BTA's into five quintiles. The model proceeds to calculate capital investment requirements, operating expenses and revenue projections relating to a typical market in each quintile over a ten-year study period.[32]

In its baseline scenario, HAI assumes the availability of 26 channels for MMDS/ITFS broadband operations. According to HAI, with this amount of spectrum, an MMDS operator deploying an appropriate network architecture will be able to develop and maintain an economically viable business in all market sizes. In smaller markets -- the third through fifth quintiles – this translates into a supercell system to serve the subscriber base.

The impact of reducing available spectrum is striking. The HAI study demonstrates that a reduction by 90 MHz of the spectrum available to an MMDS operator in any

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[31] This model does not take into account the significant acquisition costs associated with purchasing the rights to use the MMDS/ITFS spectrum, nor does it consider the costs spent to date by MMDS operators to develop their businesses. As previously indicated, WorldCom has already invested over $1 billion to acquire and develop MMDS/ITFS spectrum. WorldCom's business model is designed to recoup this investment along with the costs of deploying its MMDS/ITFS networks.

[32] The model, however, does not purport to describe the operations or plans of WorldCom, or any other specific MMDS operator. HAI has constructed a generic business case based on data available from a number of sources.

given market destroys the commercial viability of broadband service using the MMDS/ITFS frequencies. This is primarily due to the fact that a significant loss of spectrum translates into a dramatic reduction in available broadband capacity. The effects of such a reduction in capacity can only be mitigated by constructing additional cells to reuse the remaining spectrum or by serving fewer customers. Either scenario results in significantly reduced profitability due to increased investment and operating costs to serve the same number of subscribers or decreased revenues from serving fewer subscribers.[33] The net impact of such a loss of spectrum is equivalent to "falling off a cliff" as supercell networks in smaller markets are forced to become multi-cell networks or as multi-cell networks in larger markets are forced to dramatically increase the number of cells to serve their subscriber bases. In all of these cases, HAI predicts that the business models for MMDS operators became commercially non-viable, effectively eliminating them as a market competitor.

The necessity for MMDS/ITFS licensees to use all of the available spectrum in the MMDS/ITFS band precludes any of the options proposed by the Commission for segmenting the MMDS/ITFS frequency band. As demonstrated in the HAI study, the loss of access to 90 MHz of the available spectrum in the existing MMDS/ITFS bands would have a dramatic negative impact on the commercial feasibility of fixed wireless broadband deployment in the United States.

As the Commission already noted in its *Interim Report*, an MMDS operator cannot simply add more cell sites to compensate for lost spectrum in most smaller markets:

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[33] HAI estimates that the loss of 90 MHz would increase MMDS industry capital requirements to serve half of the markets in the U.S. from $2.7 billion to almost $9 billion.

> As cell size is reduced, the licensee must then make a business decision to continue operating the site with reduced coverage thereby reaching fewer customers or to add new sites to maintain the same coverage as it had prior to the reduction in available spectrum. The consequences of either of these options are clear. Either the licensee ceases to provide service to its customers in the outlying areas of its coverage area (most likely rural and underserved areas) or it must build and maintain additional transmit sites to cover these areas. . . . Namely, the MDS operator either incurs a significant economic cost to build additional sites to continue serving its current customer base or the customers in outlying areas will cease to be able to receive service.[34]

Most markets simply cannot support the considerable additional capital and operating expense of deploying more cell sites. As spectrum is reduced, the number of cells needed to achieve the same capacity is increased substantially. Without access to all of the available MMDS/ITFS spectrum, deployment in most of the markets in the United States becomes economically nonviable.

E. Co-Frequency/Co-Channel Sharing Between MMDS/ITFS and 3G Systems is Not Technically Feasible

Co-frequency/co-channel sharing between MMDS/ITFS and 3G systems is not technically feasible because very large separation distances would be required to avoid mutual interference.[35] The Commission has recognized as much:

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[34] *See FCC Interim Report* at 61.

[35] *See* Harter Study at A-75 of *FCC Interim Report* ("The studies presented in this paper have shown that it is impossible for 3G services to coexist in the same frequency band with MMDS/ITFS fixed services. The level of co-channel interference from 3G hubs alone is sufficient to devastate the commercial operation of a MMDS/ITFS system. If the potential for interference from 3G hubs to MMDS/ITFS hubs and from 3G mobile units to MMDS/ITFS hubs and CPE's is added into the equation, the MMDS/ITFS system will be completely unusable."). A supplemental analysis confirming this showing has been prepared by Mr. Harter, and is being filed in this proceeding as an attachment to the WCA Comments.

> The initial technical analysis shows that if currently contemplated 3G systems were to share the same spectrum or channels in any given geographic area large co-channel separation distances would be needed between 3G systems and incumbent ITFS and MDS systems. Without adequate separation distances, 3G systems would cause extensive interference to incumbent ITFS and MDS systems.[36]

WorldCom understands that the results of this analysis were recently confirmed by the work of the Industry Association Group.

Interference from 3G services into MMDS/ITFS will be severe because of: (1) the sensitivity of the MMDS/ITFS receivers (both hub and CPE) based on the need to utilize higher order modulation techniques; (2) the commercial necessity of utilizing economical receive antennas and the inability to discriminate the mobile 3G services for interference isolation; (3) the already compromised interference environment created by existing levels of co-channel interference between neighboring markets; and (4) the need for high degrees of frequency reuse within urban markets to meet the expected capacity demands.[37] Likewise, interference from MMDS/ITFS services into 3G system would be severe because of: (1) the use of omnidirectional mobile receive antennas with no ability to discriminate; (2) the high power levels at the MMDS/ITFS hubs broadcast over a wide or omnidirectional area; (3) the power levels of the CPE return path transmissions; and (4) the high probability that 3G receivers will be in close proximity to either MMDS/ITFS hubs or CPE sites.[38]

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[36] *FCC Interim Report* at iii.

[37] *See FCC Interim Report at* A-66.

[38] *Id.*

F. WorldCom is Adamantly Opposed to Any Reallocation of the 2150 – 2160/2162 MHz Band

The Commission asks "what effect reallocation or relocation of the 2150-2162 MHz band would have on (MMDS/ITFS licensees) current and planned use of the spectrum."[39] For a number of technical and economic reasons, this spectrum is critical to the success of MMDS/ITFS two-way advanced services and any decision to reallocate or move these channels in order to accommodate 3G services would cripple the industry.

First, and most importantly, WorldCom has uniform access to these channels in virtually all of its markets (WorldCom owns these channels in 28 of the 30 markets where it plans to deploy service this year), and these channels can be used immediately for upstream two-way transmissions. In fact, WorldCom plans to use these two channels for upstream transmissions in the initial launch of service in virtually every market. Consequently, customer premises equipment incorporating these two channels has already been designed and manufactured, and is currently being deployed by WorldCom.

Second, these two channels are particularly useful for lower power upstream transmissions because of the superior propagation characteristics of the 2150-2160/2162 MHz frequency band. These channels have less signal losses than those in the 2.5 GHz band. In addition, these channels can more readily support second generation technologies that mitigate line-of-sight restrictions within fixed wireless systems.

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[39] *See NPRM* at 24.

Third, the frequency separation between the 2.1 GHz band and the 2.5 GHz band allows for two-way transmissions without using expensive filtering in the CPE, thereby creating significant cost savings for operators and consumers.

Removal or reallocation of the 2150-2160/62 MHz band would significantly affect WorldCom's current rollout plans. If these channels were reallocated, the negative cost and schedule changes to CPE development and deployment would be immediate and severe. All CPE transmitter designs were based on an industry standard that includes the use of the 2150-2160/2162 frequency bands. Changes to this standard would require redesign of customer premises equipment, transmitter and receiver front ends, thereby delaying WorldCom's launch in most markets by about one year and doubling WorldCom's non-recurring engineering costs. WorldCom would also need to redesign hub receivers, and reorder hub transmitter frequency elements. Moreover, the intangible loss of goodwill from delays and customer dissatisfaction would devastate WorldCom's MMDS business case.

G. Redesignation of MMDS/ITFS Spectrum for "Flexible Use" Will Create Severe Marketplace Uncertainty And Retard The Development of Advanced Fixed Wireless Service

The Commission has asked for comments as to whether the 2.5 GHz band should be allocated for mobile and fixed services on a co-primary basis – *i.e.*, flexible use.[40] WorldCom has serious concerns with such a proposal. WorldCom is in the MMDS business to provide two-way *fixed* broadband services, and it already has devoted, and continues to devote, substantial resources to deploy these services. While on its face a flexible allocation would appear to allow

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[40] *See NPRM* at ¶ 63.

spectrum to be used for its highest and best use, in reality, it will only create uncertainty in the marketplace and delay the provision of advanced broadband wireless services. Currently, manufacturers and vendors are devoting substantial resources to develop lower cost next generation equipment for the broadband fixed wireless services that WorldCom, and other MMDS licensees, are deploying. A flexible allocation for the MMDS/ITFS spectrum will result in the diversion of resources away from the development and deployment of these much-needed fixed wireless broadband services.

A flexible allocation approach, moreover, would significantly complicate frequency coordination in the MMDS/ITFS frequency bands. As it stands now, coordination among two-way licensees and incumbent MMDS/ITFS providers is a daunting and complicated task. Adding a mobile allocation to the band would only further complicate matters by creating new and more difficult interference scenarios.

H. Relocation Is Not a Viable Option For MMDS/ITFS Licensees

The Commission has asked for comment on several matters relating to relocation of incumbent users in order to accommodate 3G services. Relocation is not a viable option for incumbent MMDS/ITFS users. As a threshold matter, no suitable spectrum has been identified for relocating MMDS/ITFS providers. Frequencies above 3 GHz have unfavorable propagation characteristics and other significant constraints.[41] In addition, any alternative spectrum that is not contiguous with, or close to the existing MMDS/ITFS bands, raises a host of technological and pricing issues for manufacturers and operators. Further, any relocation would place the delivery of MMDS/ITFS broadband services in limbo: deployment in the current MMDS/ITFS

[41] *See* HAI Study at Section IV (attached to WCA Comments).

band would stop, and deployment in any new frequency bands would not be possible until those bands were cleared – which could take years to accomplish.

Moreover, cost-effective two-way broadband equipment is just becoming available in the MMDS/ITFS bands, whereas no such equipment for as yet unidentified relocation spectrum can be expected for years to come. The Commission must also recognize that equipment manufacturers can be expected to discontinue or scale back research and development on MMDS equipment if MMDS/ITFS is going to be moved to another band. All of these consequences of relocation would substantially delay the delivery of two-way fixed broadband wireless services to the public and could irrevocably harm the business case for deployment of such services.

The forced relocation of an emerging mass-market service, like MMDS/ITFS, would also be unprecedented. Indeed, prior relocations that the Commission has ordered involved internal microwave links, or similar facilities, that were used as part of an overall communications network.[42] It would be difficult, if not impossible, to compensate providers and users completely for the relocation of a mass-market service like MMDS/ITFS. Any relocation of this magnitude would create significant customer relationship issues, lost opportunity costs for providers, and lost economic benefits to consumers -- including the first broadband "pipe" to

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[42] *See, e.g., Redevelopment of Spectrum to Encourage Innovation in the Use of New Telecommunications Technologies*, 8 FCC Rcd. 6589 (1993) (relocation of point-to-point microwave licensees); *Amendment to the Commission's Rules Regarding a Plan for Sharing the Costs of Microwave Relocation*, 11 FCC Rcd. 8825 (1996) (relocation of point-to-point microwave services); *Amendment of Section 2.106 of the Commission's Rules to Allocate Spectrum at 2 GHz for Use by the Mobile-Satellite Service*, 15 FCC Rcd. 12315 (2000) (relocation of the broadcast auxiliary service); *Amendment of Part 90 of the Commission's Rules to Facilitate Future Development of SMR Systems in the 800 MHz Frequency Band*, 12 FCC Rcd. 19079 (1997) (relocation of incumbent SMR licensees).

many consumers, the first broadband competitor to DSL or cable modem service for other consumers, and increased investment and employment in the telecommunications sector. It is simply not possible to compensate MMDS/ITFS providers or the public for these lost opportunity costs, economic benefits, and goodwill.

II. IF THE FCC DETERMINES THAT ADDITIONAL SPECTRUM IS NEEDED FOR 3G SERVICES, THERE ARE OTHER OPTIONS AVAILABLE THAT PROVIDE AMPLE SPECTRUM WITHOUT ENCROACHING ON THE MMDS/ITFS BANDS

It is not necessary to displace MMDS/ITFS licensees in favor of 3G services. Indeed, in the *NPRM*, the Commission identified 200 MHz of spectrum without considering the MMDS/ITFS bands,[43] in addition to the existing cellular and PCS spectrum. To the extent that the mobile industry can demonstrate a need for additional spectrum, these other bands can be allocated for 3G services without disrupting MMDS/ITFS -- an existing advanced broadband wireless service. Indeed, Nortel Networks – a global supplier of wireless networks, including 3G and fixed wireless broadband equipment – recently observed in a letter to the Chief of the Wireless Telecommunications Bureau, the following key points, among others:[44]

- The MMDS/ITFS spectrum is highly valuable for fixed wireless broadband access, especially in second and third tier U.S. markets which remain either unserved or underserved; and

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[43] According to the *NPRM*, the spectrum already available consists of 40 MHz at 2110 – 2150, 30 MHz at 700 MHz, and 45 MHz at 1710-1755 MHz. The NPRM also explores the availability of another 85 MHz at 1755 – 1850 MHz.

[44] *See* Letter from Raymond L. Strassburger to Thomas J. Sugrue re Spectrum for Third Generation Wireless (November 9, 2000).

- Other bands under consideration for 3G (i.e., the 1.7 GHz band) have technical and practical advantages over the 2.5 GHz band.

Furthermore, MMDS/ITFS spectrum should not be targeted for reallocation or relocation in the name of 3G global harmonization. Indeed, the Commission has already acknowledged that global harmonization is unlikely.[45] Countries throughout the world, including countries in Europe,[46] are moving in different directions, and accordingly, as the Commission's *Interim Report* demonstrates, it is extremely doubtful that the 2.5 GHz band will be used worldwide for 3G services in the foreseeable future if at all:

> The 2500 – 2690 MHz band is used principally for electronic newsgathering in Europe, Australia and New Zealand. Many of the other countries, including the United States, Canada, Brazil, Malaysia, China and South Africa, use the 2500 – 2690 MHz band principally for MDS services. Japan and Korea indicated that they intend to rely heavily on this band for Mobile Satellite Service while China and Malaysia indicated an intention to use this band for satellite services.[47]

To the extent that global harmonization is viewed by some as a goal that would help facilitate global roaming, the development of multi-band phones, as the Commission recognizes, should

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[45] *FCC Interim Report* at ii ("There currently is no global consensus as to how the frequency bands identified at WARC-92 and WRC-2000 will be used to implement 3G, or whether common global bands for use by 3G systems are achievable.").

[46] Indeed, it does not appear that European Administrations are likely to consider use of the 2.5 GHz band for 3G services until the 2010-2015 time frame.

[47] *FCC Interim Report* at 14.

serve to achieve this goal: "[n]evertheless, global roaming could be facilitated by the adoption of a limited number of common frequency bands that could be included in multi-band phones."[48]

Designating the MMDS/ITFS bands for 3G services also would not serve to further regional harmonization of spectrum. To the contrary, preserving the MMDS/ITFS allocation in the United States would further regional harmonization since Canada, Mexico, Brazil and other countries in the Americas plan on using the 2.5 GHz band for MMDS.[49] A uniform band plan for the Americas certainly would reduce the potential for interference along common borders and create spectrum efficiencies.

III. CONCLUSION

In reliance on the Commission's actions and statements over the past five years, WorldCom, and other MMDS licensees, have invested billions of dollars in purchasing spectrum rights, developing an advanced wireless platform, and deploying two-way broadband fixed services to consumers and businesses throughout the United States, including many markets unserved or underserved by other broadband technologies. There is an urgent need for these services – something the Commission explicitly acknowledges in its NPRM.

WorldCom is delivering on one of the promises of the Communications Act and on the Commission's stated objectives to provide broadband telecommunications services to

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[48] *See 3G NPRM* at ¶ 24 n.47. *See also* NPRM at ¶ 24 n. 47 ("While global roaming would obviously be facilitated by having a single global band for 3G systems, it is not clear at this time that will occur in the near term.").

[49] *NPRM* at ¶ 24 n. 47 ("Canada, Mexico, and several other countries from the Americas have indicated that they are likely to provide additional 3G spectrum in the 1710 – 1850 MHz band and that, in particular, the 2500 – 2690 MHz band would not be available for 3G systems in their countries.").

unserved and underserved markets, including many rural areas. The Commission should not adopt any regulations or policies in this proceeding that could jeopardize the timely delivery of such services, including reallocating any part of the MMDS/ITFS spectrum for 3G services. Doing so would create more regulatory uncertainty, not less, and result in significant delays in the deployment of needed broadband services.

The Commission must not now modify its well-reasoned spectrum management policies for the MMDS/ITFS band by displacing or disrupting one advanced wireless service being deployed today – MMDS/ITFS – in favor of another planned wireless service – 3G. WorldCom submits that both 3G services and two-way MMDS/ITFS broadband services can be accommodated by the Commission without disrupting the existing MMDS/ITFS band allocations. The Commission has identified sufficient spectrum outside of the MMDS/ITFS band to meet the asserted needs of 3G proponents. By accommodating 3G services outside of the MMDS/ITFS band, the Commission can preserve its policies promoting the advancement of broadband wireless services to all Americans, while advancing its stated objective in this proceeding to bring new 3G services to the public.

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Dated: February 22, 2001

CERTIFICATE OF SERVICE

I hereby certify that on this 22nd day of February, 2001 a true and correct copy of the foregoing Comments of WorldCom, Inc. was sent by hand to the following:

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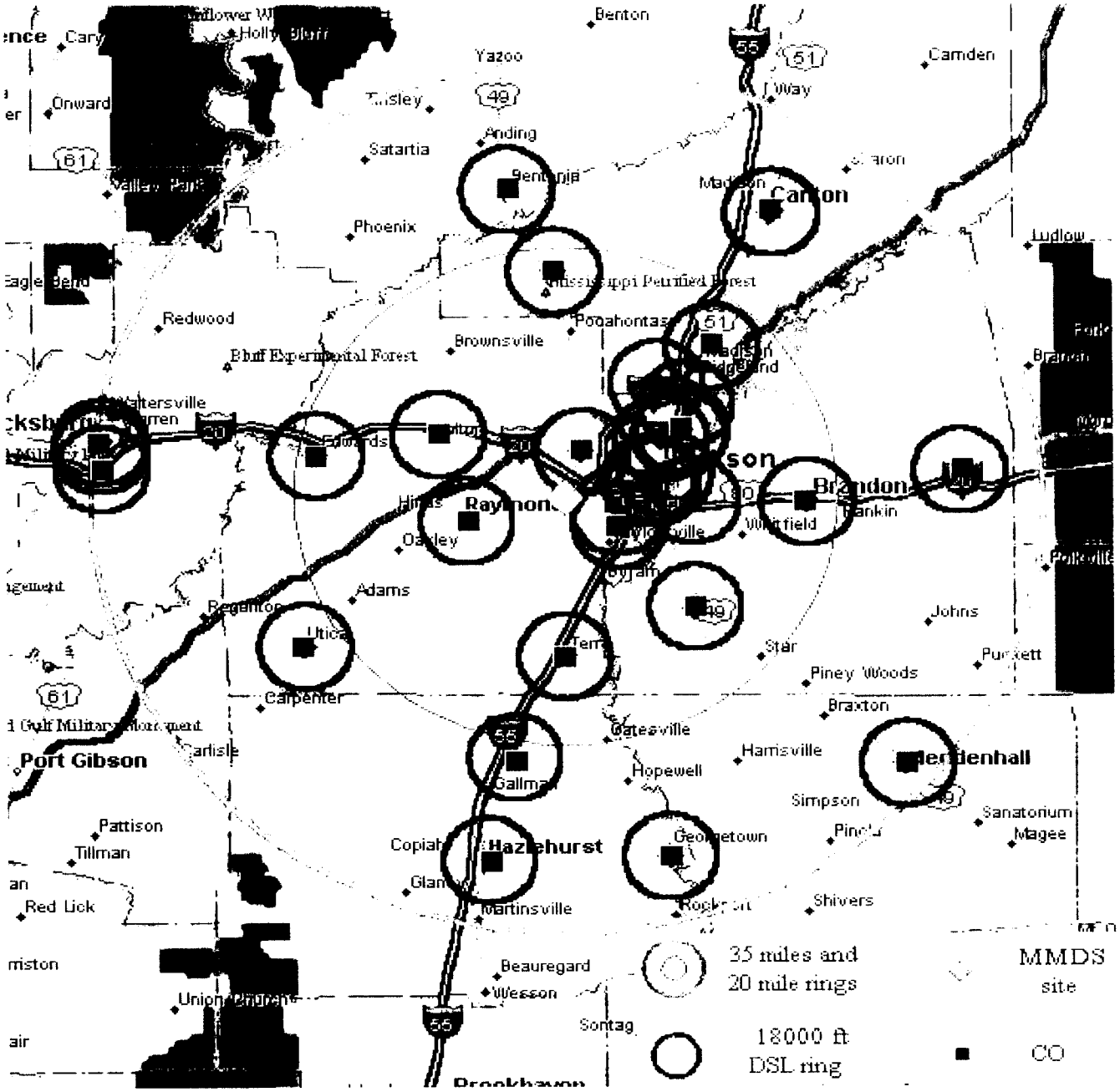
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Whitfield
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Piney Woods
Carpenter
Braxton
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Gatesville
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Hazlehurst
Georgetown
Red Lick
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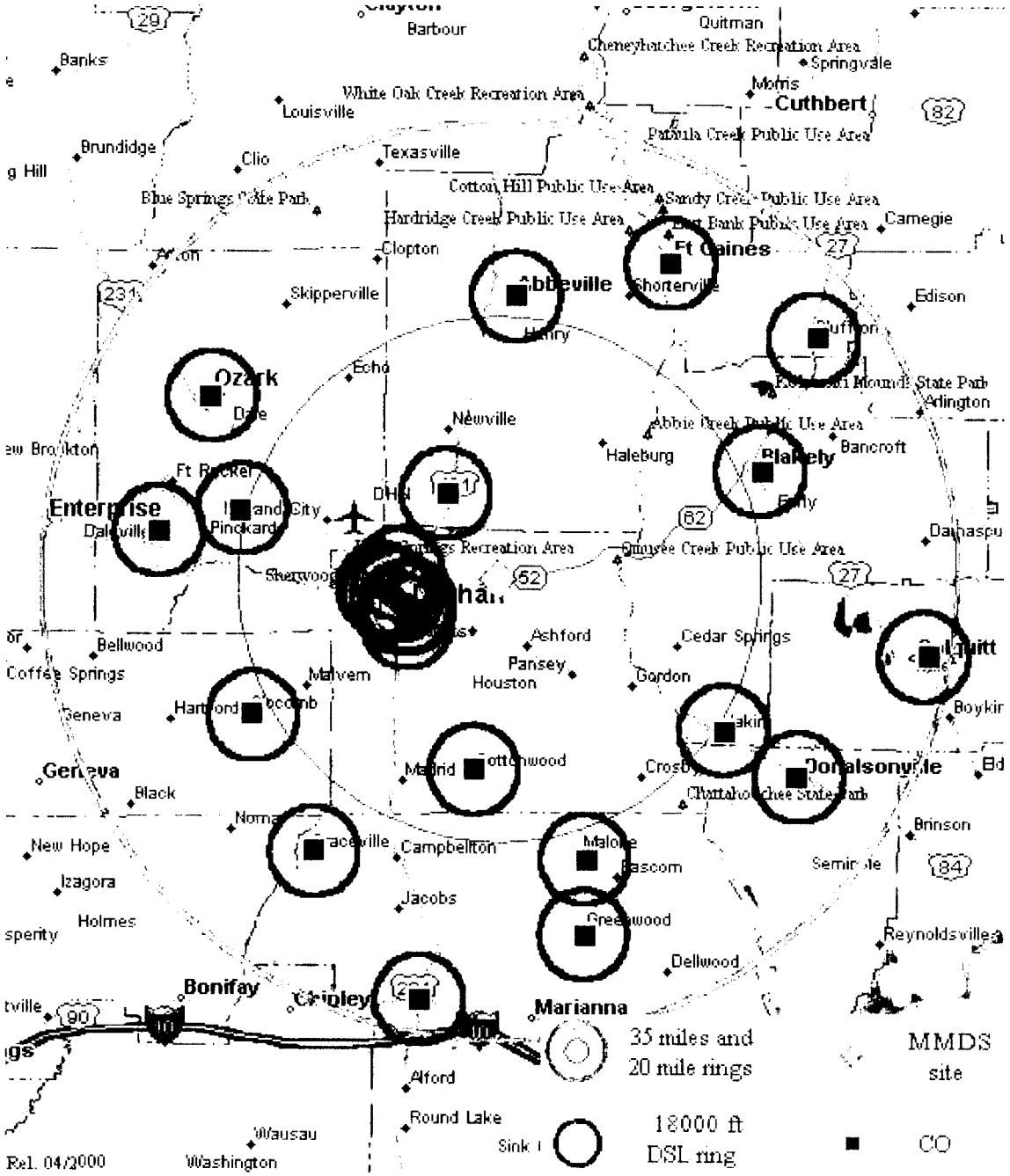
Jackson, MS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White Oak Creek Recreation Area
Morris
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Louisville
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Sandy Creek Public Use Area
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Sherwood
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Cedar Springs
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New Hope
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