SPRINT CORPORATION
CINGULAR WIRELESS LLC

July 31, 2002

Mr. Donald Abelson, Chief
International Bureau
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Mr. Thomas J. Sugrue, Chief
Wireless Telecommunications Bureau
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Mr. Edmond J. Thomas, Chief
Office of Engineering and Technology
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Re: ***Written Ex Parte Communication***
Mobile Satellite Systems – Terrestrial Services
Response to ICO's Critique of the Telcordia Analysis
IB Docket No. 01-185; ET Docket No. 95-18

Dear Messrs. Abelson, Sugrue and Thomas:

Cingular and Sprint below respond to the criticisms that ICO Global Communications ("ICO") and its consultant, Radio Dynamics Corporation ("Radio Dynamics"), made on June 13, 2002 concerning the Telcordia Analysis submitted by Cingular and Sprint on May 13, 2002.[1] In their June 13, 2002 written ex parte response,[2] ICO and Radio Dynamics assert that the Telcordia Analysis "manipulates their technical reports,"[3] contains "erroneous assumptions and conclusions"[4] and "irrelevant and inaccurate data,"[5] is "fundamentally flawed,"[6] and "grossly distorts"

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[1] *See* Cingular/Sprint Ex Parte (May 13, 2002), Attachment A, Dr. Jay Padgett, Senior Research Scientist, Telcordia Technologies, "Analysis of Spectrum Sharing Between MSS and Terrestrial Wireless Services" (May 10, 2002) ("Telcordia Analysis"). All FCC filings cited in this document were submitted in Docket Nos. 01-185 and 95-18.

[2] ICO's June 13, 2002 ex parte consists of three separate documents: (1) a three-page letter ("ICO Letter"); (2) an 11-page further comments ("ICO Further Comments"); and (3) an eight-page consultant report: Radio Dynamics Corporation, "Technical Review of MSS Spectrum Sharing Commentary" ("Radio Dynamics Commentary").

[3] ICO Letter at 1.

[4] ICO Further Comments at 1. *See also* Radio Dynamics Commentary at 2, 4 and 8.

[5] ICO Further Comments at 10.

[6] *Id.* at 3. *See also* Radio Dynamics Commentary at 4 (Telcordia Analysis is "seriously flawed"); *id.* at 1 (Analysis is "flawed).

the facts.[7] Indeed, ICO (but not its consultant) goes so far as to accuse Telcordia of using "bad science to support untenable conclusions that have no basis in scientific fact."[8]

These ICO/Radio Dynamics claims are baseless, as demonstrated in Attachment A. Attachment A also documents that many of the ICO/Radio Dynamics criticisms are based on mischaracterizations of the Telcordia Analysis and that their assertions, in large measure, are not supported by any facts.[9]

As importantly, neither ICO's Further Comments nor Radio Dynamics' Commentary addresses the major issues in this proceeding, including:

- *Spectrum Efficiency*. The Telcordia Analysis documented that "spectrum sharing between MSS and ATC systems is not spectrum-efficient, compared to [band] segmentation":

  > The fundamental reason is that with sharing the allowable MSS and ATC terminal densities are both controlled by the very large area of the MSS beam footprint, whereas with segmentation, only the MSS terminal density depends on the beam footprint.[10]

  Neither ICO nor Radio Dynamics challenges this demonstration.

- *Dynamic Frequency Assignment – Benefits*. The Telcordia Analysis pointed out that according to ICO's own claims, ICO's dynamic frequency assignment ("DFA") proposal would enable a terrestrial operator to serve only 50% more handsets compared to a co-channel operation (*i.e.,* 27 vs. 18 active outdoor handsets transmitting at full power per CDMA carrier/satellite beam). Neither ICO nor Radio Dynamics challenges the point that the benefits of DFA are limited and that DFA is far less spectrally efficient than band segmentation.

- *Dynamic Frequency Assignment – Implementation*. ICO has not, to date, submitted in the record any details regarding how it would implement DFA; its presentations have been limited to a "chalkboard-level" discussion of the concept. Neither ICO in its Further Comments nor Radio Dynamics in its Commentary corrects this omission.

In addition, although ICO and Radio Dynamics claim that "an independent, severed terrestrial system cannot co-exist with MSS,"[11] neither presents any facts in support of its asser-

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[7] ICO Further Comments at 3.

[8] *Id.* at 10.

[9] Radio Dynamics calls its paper a "Commentary," which is appropriate because it provides isolated criticisms of the Telcordia Analysis. This "Commentary" does <u>*not*</u> do what ICO claims it does – "assess the feasibility of the type of integrated, ancillary terrestrial components ("ATCs") that ICO and other mobile-satellite service ("MSS") licensees have proposed." ICO Letter at 1.

[10] Telcordia Analysis at 76.

[11] ICO Letter at 2. *See also id.* at 3.

tions. It is also noteworthy that only three weeks earlier, ICO took just the opposition position, conceding that a separate ATC operator in the MSS band would be technically feasible:

> ATC proponents deny that two independent operators can do this, *not because it is technically impossible* . . . .[12]

In light of the foregoing, ICO's assertion that "the problem" with the Telcordia Analysis is that "critical analyses were never performed"[13] is not believable.

Also baseless is ICO's charge that Cingular and Sprint have engaged in an "egregious manipulation of the Commission's processes" because, ICO says, the Telcordia Analysis submitted on May 13, 2002 constitutes an "extremely late pleading . . . intended more for delay than for illumination."[14] It is important to return to the facts:

- ICO did not submit its ATC proposal until March 2001, over six months *after* the Commission released its *2 GHz Service Rules Order*.[15] ICO has never explained why it waited so long to make its ATC proposal;
- In March 2002, the Commission specifically requested a "detailed, technical discussion" regarding the technical feasibility of MSS band sharing.[16] This Public Notice would have been unnecessary had ICO and other MSS parties provided before that date facts in support of the ATC proposal;
- The Telcordia Analysis would have likely been unnecessary had ICO and other MSS providers filed detailed technical data in response to the Commission's March 2002 Public Notice. MSS parties instead chose to respond to the Public Notice by continuing to advance unexplained assertions; and
- The submission on May 13, 2002 of an exhaustive (90-page, single-spaced) technical analysis identifying in detail deficiencies of the MSS March 22, 2002 filings can hardly be characterized as "extreme tardiness."[17]

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[12] *See* ICO Ex Parte, Summary of Key Technical Issues at 2 (May 17, 2002)(emphasis added). *See also* Radio Dynamics Commentary at 1 (Separate operators using dynamic frequency assignment "*may* be impossible.")(emphasis added).

[13] ICO Letter at 3. Equally baseless its ICO's assertion that the Telcordia Analysis does "not say what . . . Cingular/Sprint claim [it does]." *Id.* at 2.

[14] ICO Letter at 2. *See also id.* at 1 (Telcordia Analysis is an "eleventh-hour stud[y]"); *id.* at 2 n. 3 ("There is no excuse for the terrestrial incumbents' delays in submitting this information."); ICO Further Comments at 1 ("late-filed comments and technical submissions"); *id.* at 2 ("extreme tardiness of the Cingular/Sprint" filings); *id.* at 10 ("eleventh-hour filings by Cingular [and] Sprint").

[15] *See 2 GHz Service Rules Order*, 15 FCC Rcd 16127 (Aug. 25, 2000).

[16] *See Public Notice,* IB Docket No. 01-185, ET Docket No. 95-18, DA 02-554, at 2 (March 6, 2002).

[17] ICO Further Comments at 2.

The ATC rulemaking proceeding (Docket No. 01-185) has been pending for less than one year.[18] If there have been delays in this proceeding, those delays are largely attributable to the fact that ICO and other MSS parties refuse to provide the facts necessary to support their claims – and now, fail to rebut, with substance, the detailed factual showing contained in the Telcordia Analysis.

In summary, ICO's June 13, 2002 filing does not contribute constructively to the record in the proceeding; in fact, its papers attempt to obfuscate the issues. These papers are limited to isolated, largely insignificant criticisms on a few points in the Telcordia Analysis, and these criticisms are often based on erroneous calculations or a careless reading of the Telcordia Analysis. And, as noted above, they completely fail to address the major issues before the Commission.

Pursuant to Section 1.1206(b)(1) of the Commission's rules, one copy of this letter is being filed with the Secretary's office for filing in IB Docket No. 01-185 and ET Docket No. 95-18.

Respectfully submitted,

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Attachment A: Response to the ICO/Radio Dynamics Critique of the Telcordia Analysis

cc: Marlene H. Dortch, Secretary, FCC
Robert M. Pepper, Chief, Office of Plans and Policy, FCC

[18] *See Flexibility for Delivery of Communications by MSS Providers,* IB Docket No. 01-185, ET Docket No. 95-18, FCC 01-225, 16 FCC Rcd 15532 (Aug. 17, 2001).

Cingular/Sprint Ex Parte
Mobile Satellite Systems – Terrestrial Services
IB Docket No. 01-185/ET Docket No. 95-18
July 31, 2002

Attachment A

RESPONSE TO THE ICO/RADIO DYNAMICS CRITIQUE Of THE TELCORDIA ANALYSIS

Cingular and Sprint below respond to the criticisms that ICO Global Communications ("ICO") and its consultant, Radio Dynamics Corporation ("Radio Dynamics"), have made concerning the Telcordia Analysis.[1] This response is divided into four sections: (a) an identification and correction of ICO's and Radio Dynamics' mischaracterizations of the Telcordia Analysis (pp. 1-7); (b) an identification of the assertions that ICO and/or Radio Dynamics do not support (pp. 7-11); (c) a response to the specific points Radio Dynamics makes in its Commentary (pp. 12-21); and (d) a review of ICO's potential customer claims (pp. 21-24).

I. NUMEROUS ICO AND RADIO DYNAMICS CHARACTERIZATIONS OF THE TELCORDIA ANALYSIS ARE NOT ACCURATE

Several of ICO's and Radio Dynamics' characterizations of the Telcordia Analysis are not accurate and, accordingly, are in need of correction. Because ICO repeats many of the mischaracterizations made by its consultant, Cingular and Sprint address Radio Dynamics' mischaracterizations first.

Radio Dynamics Mischaracterization No. 1:

> "[The Cingular/Sprint letter and the Telcordia Analysis] claim that co-channel frequency reuse between the Satellite Component (SC) and ATC deployments is not feasible."[2]

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[1] *See* Cingular/Sprint Ex Parte (May 13, 2002), Attachment A, Dr. Jay Padgett, Senior Research Scientist, Telcordia Technologies, "Analysis of Spectrum Sharing Between MSS and Terrestrial Wireless Services" (May 10, 2002)("Telcordia Analysis"). All FCC filings cited in this attachment were submitted in Docket Nos. 01-185 and 95-18.

[2] Radio Dynamics Commentary at 1.

Response: This statement does not accurately describe what Cingular, Sprint and Telcordia have said. The Telcordia Analysis concluded, after its exhaustive technical examination, that the sharing of the MSS band by two separate operators – whether using the co-channel approach or a dynamic frequency assignment approach ("DFA") – is "quite feasible":

> There does not seem to be any compelling technical argument for either separate operators or an integrated MSS/ATC operator. . . . Functionally, there seems to be no difference.[3]

However, Telcordia documented that either sharing arrangement (whether independent operators are used or not) would not be as spectrally efficient as band segmentation.[4] Cingular and Sprint also questioned whether constructing a terrestrial network using either of the two sharing approaches would be economically feasible for a MSS operator, given the very small number of ATC terminals that can operate in line-of-sight to the MSS spacecraft.[5]

Radio Dynamics Mischaracterization No. 2:

> "[T]he results [of the Telcordia Analysis] do show that co-channel frequency reuse is, indeed, not feasible for a severed system. However, the results are not applicable to an integrated system with both ATC and SC. The main difference is that, in an integrated system, it is possible to jointly optimize the ATC and SC. This is not possible in a severed system."[6]

Response: Both statements are not accurate, as demonstrated immediately above.

Radio Dynamics Mischaracterization No. 3:

> "[N]either [the AT&T Wireless/Comsearch filing nor the Telcordia Analysis] demonstrates that a spectrally efficient co-channel frequency reuse strategy between the SC and ATC deployments is not feasible in the integrated system as proposed by the MSS providers."[7]

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[3] Telcordia Analysis at 2 and 12.

[4] *See id.* at 73-76.

[5] *See* Cingular/Sprint Letter at 15-16 (May 13, 2002). In contrast, existing terrestrial licensees could use their existing infrastructure (*e.g.,* towers, facilities, switches) to supplement capacity indoors and in urban canyons, thereby providing terrestrial services in the MSS band at a lower cost than a MSS licensee, which would be required to build a terrestrial network from scratch.

[6] Radio Dynamics Commentary at 1.

[7] *Id.* at 1.

Response: This assertion is irrelevant, at least as applied to the Telcordia Analysis.[8] Although it mentioned some potential operational challenges,[9] the Telcordia Analysis did *not* question the technical feasibility of implementing joint ATC-MSS operation either with an integrated operator or separate operators. Rather, it demonstrated that operation of ATC and MSS in separate bands is more spectrum-efficient than joint operation in shared spectrum.[10]

Radio Dynamics Mischaracterization No. 4:

> "[N]either [the AT&T Wireless/Comsearch filing nor the Telcordia Analysis] provides any substantial consideration of the gains associated with dynamic frequency allocation strategy proposed by the MSS providers as a means of increasing SC capacity by eliminating harmful ATC interference."[11]

Response: This statement is false. The Telcordia Analysis repeatedly acknowledged ICO's contention, explicitly noting on page two of its Executive Summary that "ICO states that a 50% increase [in the number of terrestrial handsets] is possible" by using dynamic frequency assignment compared to the co-channel sharing approach.[12] What Radio Dynamics does *not* acknowledge is the fact that "even in the best case, with an integrated ATC/MSS network under the control of a single operator and using dynamic frequency coordination, there is still an extremely low threshold on the density of active ATC terminals that can be tolerated within an SC beam footprint":[13]

> ICO estimates that it could serve up to 45 cochannel outdoor customers per CDMA carrier pair within each beam. Service to 46 outdoor handsets would render its beam incapable of supporting MSS services using the 2.5 MHz being used by the ATC network. Thus, use of only 46 outdoor ATC handsets in an area of the size of Alaska would render its satellite incapable of providing MSS services using the MSS channels utilized by the ATC network.[14]

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[8] Cingular and Sprint are not intimately familiar with the AT&T Wireless/Comsearch paper, and they will accordingly not respond to the criticisms ICO and Radio Dynamics make of that paper.

[9] *See* Telcordia Analysis at 12.

[10] *See id.* at 73-76.

[11] Radio Dynamics Commentary at 1.

[12] Telcordia Analysis at 2. *See also id.* at 11 and 72.

[13] *Id.* at 11.

[14] Cingular/Sprint Letter at 13-14 (May 13, 2002).

Neither ICO nor Radio Dynamics challenges these facts (which is not surprising given that they are based on ICO's own analysis).

Radio Dynamics' statement that ATC networks would "increase SC capacity" is also inaccurate.[15] There is no circumstance where ATC networks would increase satellite capacity; their only potential is to *decrease (if not exhaust)* satellite capacity. As demonstrated above, ICO does not dispute it would take only a small number of ATC handsets that are in line-of-sight to the satellite before satellite capacity would be lost.

Radio Dynamics Mischaracterization No. 5:

> "The Comsearch and Telcordia technical appendices do not support the claim that a combined MSS and ATC system would require band splitting or would be as spectrally inefficient as severing."[16]

Response: In fact, Telcordia never claimed that "a combined MSS and ATC system would require band splitting." Telcordia also never claimed that "a combined MSS and ATC system . . . would be as spectrally inefficient as severing." To the contrary, Telcordia accepted ICO's claim that use of DFA would be 50 percent more efficient than co-channel sharing:

> Results provided by Globalstar and ICO suggest the degree to which dynamic coordination will allow the ATC uplink EIRP limit to be increased. ICO states that a 50% increase is possible, based on its simulations.[17]

The Telcordia Analysis rather stated that "either cochannel sharing or dynamic frequency assignment could be implemented with either integrated or separate operators."[18]

Radio Dynamics does, however, ignore completely the more significant point made by the Telcordia Analysis– namely that overall spectrum efficiency would be greatly increased by operating MSS and ATC systems in separate frequency bands.[19]

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[15] ICO similarly would have the Commission mistakenly believe that ATC networks "would result in a substantial increase in SC capacity." ICO Further Comments at 6.

[16] Radio Dynamics Commentary at 8.

[17] Telcordia Analysis at 2.

[18] *Id.* at 12.

[19] *See id.* at 73-76.

Radio Dynamics Mischaracterization No. 6:

> "The Telcordia paper uses assumptions that make sense only if the ATC system is severed from the MSS deployment. The assumptions are flawed for a combined MSS-ATC system as proposed by the MSS providers. In the case of ATC-mode handset interference into a satellite receiver, no allowance is made for power control or other parameters that can be optimized in a combined system. In both cases of interference between the ATC base stations and SC-mode handsets discussed in Sections 2) and 3) above, Telcordia did not use the parameters submitted by MSS providers."[20]

Response: In fact, the Telcordia Analysis did allow for the effect of power control on the ATC handset transmit power.[21] As for the use of "parameters submitted by the MSS providers," the Telcordia Analysis did in fact use those parameters in its analysis.[22] Thus, Radio Dynamics' assertions are not consistent with the facts.

Radio Dynamics Mischaracterization No. 7:

> "[N]either [the AT&T Wireless/Comsearch filing nor the Telcordia Analysis] considers the benefits of the joint optimization of the MSS and ATC system as proposed by the MSS operators."[23]

Response: This assertion is not accurate as applied to the Telcordia Analysis. As discussed above, Telcordia did include and discuss the increase in ATC network capacity for integrated MSS/ATC systems based on the results submitted by ICO.

ICO Mischaracterizations No. 1:

> "[T]he Telcordia analysis prepared for Cingular and Sprint clearly provide what ICO has been saying all along: that an independent, severed terrestrial system can not co-exist with MSS in the 2 GHz MSS frequencies. . . . Since all parties agree that independent terrestrial and satellite networks cannot share the same spectrum * * * Everyone agrees that independent operators technically cannot provide terrestrial service in the MSS spectrum on an independent basis. * * * The Telcordia

[20] Radio Dynamics Commentary at 8.

[21] *See* Telcordia Analysis at 18-22.

[22] *See id*.

[23] Radio Dynamics Commentary at 8.

> and Comsearch Analyses merely bolster the undisputed fact that MSS and severed terrestrial systems cannot practically share the same frequencies."[24]

Response: It is not apparent how ICO could make such assertions given that Telcordia stated at page 2 of its Executive Summary that "severing operations is quite feasible, even with dynamic frequency coordination."[25] Telcordia defined "severed" as being "managed by different operators."[26]

ICO Mischaracterization No. 2:

> "The Telcordia and Comsearch Analyses . . . fail to refute the feasibility or public interest benefits of an integrated ATC and SC system. The Commission therefore cannot accord either the Comsearch Analysis or the Telcordia Analysis serious consideration."[27]

Response: The Telcordia Analysis "failed to refute the feasibility" of an integrated ATC/MSS system because it assumed the accuracy of ICO's assertion (still unproven) that such a system would be technically feasible. The Telcordia Analysis instead demonstrated, among other things, that (a) with ATC/MSS spectrum sharing, the size of any terrestrial network, regardless of the identity of the ATC network operator, would be severely limited, (b) if it was technically feasible for an MSS licensee to use DFA, it would be technically feasible for an independent operator to use the same spectrum sharing technique; and (c) from the perspective of spectrum efficiency (*i.e.,* number of customers served per megahertz per geographic area), it would make more sense to adopt band segmentation rather than to permit spectrum sharing – *regardless* of the sharing approach used and *regardless* of the identity of the terrestrial operator.

Telcordia admittedly did not address the "public interest" issues associated with integrated or non-integrated operations. This is because its competence is in technical areas and because the Commission specifically requested supplemental comments "limited" to "technical

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[24] ICO Letter at 2 and 3 and ICO Further Comments at 2.

[25] Telcordia Analysis at 2.

[26] *Id.*

[27] ICO Further Comments at 3.

comment."[28] It is not apparent why the Commission "cannot" give "serious consideration" to the Telcordia Analysis when it addressed in great detail the very issues on which the Commission specifically sought comment.

ICO Mischaracterization No. 3:

> "The Telcordia Analysis ignores or selectively discounts a number of other critical factors, which if properly taken into account, would yield a conservative estimate of 1.6 million ATC subscribers in the United States that can be supported by an integrated MSS system."[29]

Response: Telcordia summarized the calculations that ICO used in arriving at its projected customer number of 1.6 million.[30] These assumptions are not realistic (*e.g.,* use of 30 MHz of MSS spectrum vs. the 7 MHz assigned to ICO; no more than one in 40 customers will ever use the ATC network at one time; at any one time, no more then 10 percent of all active ATC handsets will be in line-of-sight to ICO satellites). Rather than attempt to defend these questionable assumptions in its June 13 response, ICO instead asserts that Telcordia "ignore[d] or selectively discount[ed] a number of other critical factors" – without identifying those "other factors."

II. SEVERAL ICO AND RADIO DYNAMICS STATEMENTS ARE NOT EXPLAINED OR SUPPORTED AND ACCORDINGLY CANNOT BE ANALYZED

ICO and Radio Dynamics make several sweeping statements in their papers that they do not explain or support in any way. Thus, in the absence of substantive foundations, Cingular, Sprint and Telcordia are precluded from analyzing the validity of the assertions.

Radio Dynamics Unsupported Assertion No. 1:

> "In fact, while frequency reuse may be impossible in severed systems, it can be utilized in the proposed integrated system with both an ATC and SC."[31]

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[28] *See Public Notice,* Commission Staff Invites Technical Comment on Certain Proposals to Permit Flexibility in the Delivery of Communications by Mobile Satellite Service Providers in the 2 GHz Band, the L-Band, and the 1.6/2.3 GHz Band, IB Docket No. 01-185, DA 02-554, at 2 (March 15, 2002).

[29] ICO Further Comments at 5.

[30] *See* Telcordia Analysis at 72.

[31] Radio Dynamics Commentary at 4.

Response: Radio Dynamics presents no facts for its assertion that frequency reuse "may be impossible" for an independent operator, while possible for a MSS licensee. In fact, Telcordia has demonstrated that having separate operators would be "quite feasible":

> However, either cochannel sharing or dynamic frequency assignment could be implemented with either integrated or separate operators. The basic limitations on sharing would be the same, and the questions about the physical-layer impact of abruptly changing the operating frequency of an entire CDMA ATC network remain the same, although the signaling and information exchange necessary to do so are the same for separate operators as for an integrated operators. Functionally, there seems to be no difference.[32]

The Telcordia Analysis included an extended discussion of how an independent operator of a terrestrial network using the MSS band could implement DFA.[33] Notably, neither ICO nor Radio Dynamics challenges any of the facts that Telcordia presented.

Radio Dynamics Unsupported Assertion No. 2:

> "[T]he Telcordia analysis erroneously suggests that a severed terrestrial operator is equally capable of managing three of the four interference scenarios (i.e., SC-mode handset to ATC base, ATC base to SC-mode handset, and ATC-mode handset to satellite) as an ATC-integrated MSS operator. As shown below, a severed terrestrial operator in fact is incapable of managing interference in those areas."[34]

Response: Radio Dynamics does not offer a single fact in support of its statement that an independent terrestrial operator would be "incapable" of managing three of the four interference scenarios. It is also noteworthy that Globalstar does not share Radio Dynamics' views, as Globalstar does not challenge the Telcordia conclusion that a severed terrestrial operator is equally capable of managing three of the four interference scenarios.[35]

Radio Dynamics Unsupported Assertion No. 3:

> "According to Figure 11 [of the Telcordia Analysis] and the preceding equations when the above-mentioned allowances are made, the numbers of handsets can be

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[32] Telcordia Analysis at 2 and 12.

[33] *See* Telcordia Analysis at 77-79.

[34] Radio Dynamics Commentary at 4.

[35] Globalstar's June 27, 2000 Technical Statement as applied to the Telcordia Analysis discusses only the fourth interference scenario: ATC handset interference to the MSS satellite.

> increased by several orders of magnitude. An additional order of magnitude is gained when the proper ATC system design for an integrated MSS system is used as discussed in the preceding section. The result is a quite feasible MSS-ATC co-channel deployment."[36]

Response: The assertions Radio Dynamics makes in the second sentence – an undefined "additional order of magnitude [would be] gained" as a result of an undefined "proper ATC system design" – are offered without explanation, analysis, or proof of any sort and, in fact, are inconsistent with ICO's previous results which show that an integrated ATC/MSS system using DFA would allow 50% more ATC handsets than an integrated system not using DFA.

Radio Dynamics Unsupported Assertion No. 4:

> "An MSS operator operating the ATC can easily accommodate these planning requirements into its system. An independent operator who wishes to do this [dynamic resource management] will encounter significant signaling overload (as opposed to "fairly small blocks of data" as predicted by Telcordia) and must use additional system hardware. This would not be financially or spectrally efficient."[37]

Response: Radio Dynamics does not offer a single fact or calculation to support its assertion that an independent ATC operator would encounter "significant signaling overload."

Radio Dynamics Unsupported Assertion No. 5:

> "[N]either [the AT&T Wireless/Comsearch filing nor the Telcordia Analysis] provides adequate analysis of the dynamic frequency allocation strategy."[38]

Response: This assertion is perplexing, in light of the fact that none of the MSS proponents have provided such an analysis. The information that MSS operators have provided to date concerning integrated MSS/ATC operations has been limited to very high-level discussions, with results stated without any details about methodology or analysis. Nevertheless, Telcordia accepted these results at face value and used them in its analysis.

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[36] Radio Dynamics Commentary at 6.

[37] *Id.* at 7.

[38] *Id.* at 8.

ICO Unsupported Assertion No. 1:

> "[T]he Telcordia Analysis reaches a number of patently erroneous conclusions, the most egregious of which are (1) separate MSS and terrestrial operators are equally capable of managing interference issues as a single integrated MSS operator managing both ATC and SC. . . .[?]"[39]

Response: ICO never explains or supports this assertion – namely, that an integrated operator can do something that an independent terrestrial operator cannot do. Nor is any such explanation or support contained in the Radio Dynamics Commentary.

Later in its Comments, ICO asserts that "an integrated MSS operator can operate under more aggressive assumptions" and can "react or respond in real time to variations in the aggregate level of interference to the satellite."[40] Although ICO further claims that separate operators would be required to operate under "much more conservative parameters because little or no real-time coordination and exchange information between both systems is practical,"[41] ICO never explains its assertions. The Telcordia Analysis identified several different ways that separate ATC and MSS operators could share needed information in "real time."[42] Neither ICO nor its consultant has challenged this demonstration.

ICO Unsupported Assertion No. 2:

> "As the Radio Dynamics Review confirms, however, interference between satellite and terrestrial operations can be mitigated effectively only by a single, integrated operator."[43]

Response: While its Commentary does make this assertion,[44] Radio Dynamics never explains or supports this claim in any way.

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[39] ICO Further Comments at 3.

[40] *Id.* at 5.

[41] *Id.* at 5.

[42] *See* Telcordia Analysis at 78.

[43] ICO Further Comments at 4.

[44] *See* Radio Dynamics Commentary at 4 ("[A] severed terrestrial operator in fact is incapable of managing interference in those cases.").

ICO Unsupported Assertion No. 3:

> "Although this frequency coordination and harmonization is readily achievable by an integrated MSS operator, it becomes an operational nightmare when two separate operators are involved."[45]

Response: ICO does not support its assertion that use of an independent ATC network operator would pose "an operational nightmare." In fact, ICO's assertion is counterintuitive. ICO identifies the information needed to implement dynamic frequency assignment in an ATC/MSS system.[46] This information must be shared between the equipment controlling the satellites and the terrestrial base stations. The legal ownership of the satellite controller equipment and the terrestrial base stations does not affect the proper functioning of this information sharing. Indeed, Telcordia identified several different ways in which separate terrestrial and MSS operators could share this information.[47]

ICO Unsupported Assertions No. 4:

> "Denying 2 GHz MSS operators the flexibility to provide ATC to urban and indoor areas would jeopardize the viability of 2 GHz MSS and render it unavailable even to rural customers. 2 GHz MSS operators would . . . remain unable to achieve scale economies necessary to sustain commercial viability. As a result, the limited MSS offerings would deter capital investment and reduce demand for MSS even in rural areas."[48]

Response: ICO does not provide any factual support these sweeping assertions. Although in earlier filings it has pointed to an increase in total revenues if it were to provide terrestrial services, ICO has *never* submitted projected costs for an ATC network (*e.g.,* base stations, switches, facilities), *much less* demonstrated that the ATC revenues would exceed ATC costs (and even assuming they would, that ICO would use ATC profits to subsidize MSS service in rural areas).

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[45] ICO Further Comments at 4.

[46] *See id.* at 7 ("(1) the locations of the terrestrial base stations and SC-mode handsets; (2) the emission characteristics of the SC-mode handsets; and (3) the receive characteristics of the terrestrial base stations.").

[47] *See* Telcordia Analysis at 77-79.

[48] ICO Further Comments at 10.

III. RESPONSE TO THE SPECIFIC POINTS IN THE RADIO DYNAMICS COMMENTARY

Radio Dynamics divides its critique of the Telcordia Analysis into three sections, corresponding to three different interference scenarios. Cingular and Sprint follow the same organization to facilitate the Commission's review of the issues.

A. Interference from Terrestrial Handsets to ICO Satellites

Radio Dynamics acknowledges that the Telcordia Analysis makes "the important point that all ATC-mode handsets within the satellite spot beam will contribute to the interference level and that, therefore, an aggregate power level must be computed."[49] Importantly, limits on the total emission levels of ATC handsets must be established whether the terrestrial network is operated by a MSS licensee or a different firm; without such limits, available satellite capacity will be degraded, if not lost altogether. As Globalstar has acknowledged:

> As the Telcordia Analysis points out, at any given time, there will be a maximum allowable number of ATC users because of the potential for interference into MSS. The maximum number would have to be enforced *regardless of which entity was operating the terrestrial service*.[50]

Radio Dynamics asserts the Telcordia Analysis of ATC handset interference to satellites is flawed in two respects: (1) the power levels that Telcordia used in its analysis allegedly are too high; and (2) Telcordia supposedly used improper parameters in conducting its analysis. Neither criticism has merit, as demonstrated below.

1. Terrestrial Handset Power Levels

The principal point that Radio Dynamics attempts to make in section 1.1 of its Commentary is that the Telcordia Analysis supposedly used terrestrial handset transmit levels that are too high.[51] The Telcordia Analysis assumed that the maximum transmit level of a terrestrial (ATC-

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[49] Radio Dynamics Commentary at 5.

[50] Globalstar Ex Parte Letter at 7 (June 27, 2002)(emphasis added).

[51] *See* Radio Dynamics Commentary at 5.

mode) handset would be 100 milliwatts.[52] This is the same level that ICO used in its own calculations.[53] There is, therefore, no factual basis to this Radio Dynamics criticism.

Radio Dynamics asserts that the Telcordia Analysis "assum[ed] that the ATC system has been designed for optimal stand-alone performance."[54] The Telcordia Analysis made no such assumption, and it is thus not surprising that Radio Dynamics does not recite in support of its claim a page reference to the Telcordia Analysis. Consistent with ICO's own analysis, Telcordia assumed that the terrestrial network would use the CDMA air interface with a maximum handset transmit power of 100 milliwatts.[55] Equations (24) through (36) in the Telcordia Analysis, and the supporting text and graphs, provide a detailed analysis of the effect of terrestrial handset uplink interference to the spacecraft, including as parameters the maximum handset transmit power, the excess loss (to the satellite), the effect of speech activity, the effect of handset transmit power control, and the capacity of terrestrial cells and sectors.[56]

Radio Dynamics next asserts that the Telcordia Analysis "assumes that all base stations will allow ATC mode handsets out to the boundaries of available coverage" and that this assumption is "unrealistic for two reasons":

> First, the primary purpose of integrating ATC is to provide coverage in areas inaccessible to satellite coverage. A large number of these cells will be microcells and picocells, some located indoors or in urban canyons, where, because of power control, it is unlikely that substantial amounts of ATC mode handset radiation will reach the satellite. Secondly, as is known from standard terrestrial deployments, it is always necessary to use a larger number of power limited cells to cover urban markets to allow for greater capacity.[57]

Radio Dynamics appears to have fundamentally misunderstood the Telcordia Analysis. In the Analysis, the total uplink interference from the terrestrial network to the satellite depends on the maximum terrestrial handset transmit power and the other parameters included in equation

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[52] *See* Telcordia Analysis at 1.

[53] *See* ICO Ex Parte (March 8, 2001), Appendix B at § 4, p. 11, Table 4.

[54] Radio Dynamics Commentary at 5. ICO repeats this erroneous assertion. *See* ICO Letter at 2 (June 13, 2002).

[55] *See* Telcordia Analysis at 1.

[56] *See id.* at 21-27.

[57] Radio Dynamic Commentary at 5. ICO repeats this point. *See* ICO Further Comments at 6.

24.[58] No statement of assumption was made in that analysis about the coverage radius of the terrestrial system, nor is such an assumption necessary for the analysis.

Clearly, the signal path from some terrestrial handsets to the satellite may be blocked or attenuated because they may be located indoors and in urban canyons. However, one of the main results of the Telcordia Analysis (which is consistent with ICO's own analysis) is that even if many terrestrial handsets are blocked from the satellite, it would take a relatively small number handsets that are not blocked to significantly degrade the satellite uplink capacity or shut it down entirely (*e.g.,* 46 active ATC handsets[59] in line-of-sight to an ICO satellite in an area the size of Alaska would render the ICO satellite incapable of providing MSS services using the MSS channels utilized by the ATC network). Accordingly, unless the FCC imposes some type of restriction limiting terrestrial handsets to indoor operation, it is unreasonable to assume that few terrestrial handsets will be visible to the satellite.

Overall, Radio Dynamics suggests that small-cell, low-power terrestrial deployments should be assumed when calculating interference to the MSS uplink. While such assumptions would indeed reduce the calculated impact of the terrestrial handset interference (as is obvious from the equations in the Telcordia Analysis), those assumptions would be inconsistent with ICO's own assumptions. Further, to make such assumptions valid, there would need to be regulatory limits enforcing a maximum terrestrial handset transmit power corresponding to the level used in the analysis (*e.g.,* 10 milliwatts for a 10 dB reduction). Notably, neither ICO nor any of the other MSS proponents has proposed the adoption of limits on the total emissions of terrestrial handsets.[60]

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[58] *See* Telcordia Analysis at 21.

[59] This includes ICO's 2-dB allowances for the effects of speech activity and power control. *See* ICO Comments (March 22, 2002) at A-4.

[60] ICO and other MSS proponents would no doubt respond by stating that such limits would be unnecessary if the MSS licensee also operates the terrestrial network. However, without such limits, MSS licensees could begin sacrificing (and they would have the strong financial incentive to sacrifice) MSS capacity so they can serve additional terrestrial handsets. As a practical matter, spectrum "borrowed" from MSS to support additional terrestrial capacity would never be returned for MSS use. Allowing MSS licensees to provide terrestrial service without any limits on total handset emissions would, for all practical purposes, result in a *de facto* reallocation of the MSS band from satellite to terrestrial use.

2. Handset/Satellite Parameters

Radio Dynamics complains in section 1.2 of its Commentary that the Telcordia Analysis used the wrong parameters in discussing the impact of terrestrial networks on satellite uplink capacity: "a more realistic value of L_{EX} = 10 dB or L_{EX} = 15 dB should [have been] used" in Figure 11.[61] Radio Dynamics then asserts that Telcordia "omitted . . . most allowances for blockage and power reduction."[62]

Cingular and Sprint do not understand this criticism, because the referenced Figure 11 included curves for excess loss (L_{EX}) of 0, 5, 10, and 15 dB – the very levels that Radio Dynamics says that Telcordia should have considered. The Figure is reproduced below for reference.

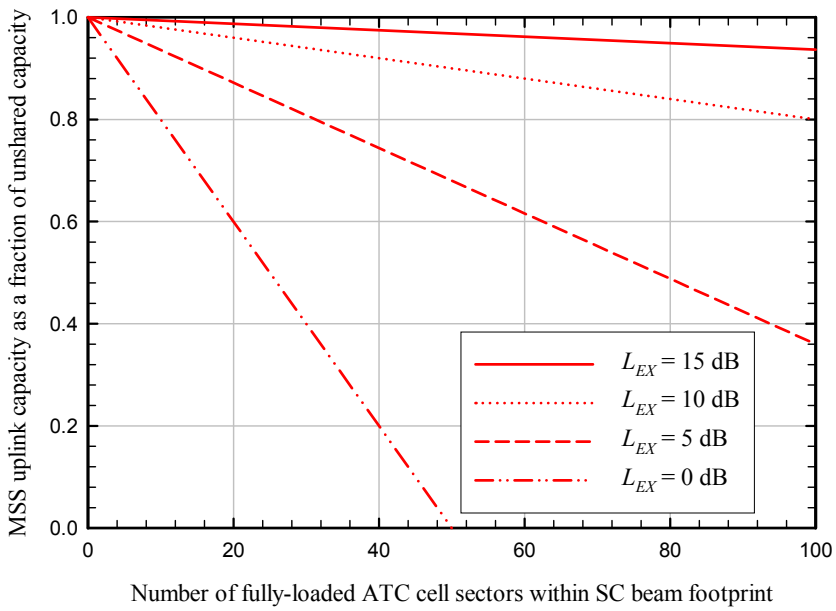

Figure 11 from the Telcordia paper

It is, moreover, unclear what Radio Dynamics means by "power reduction" in this context. As the Telcordia Analysis noted, a 6-dB reduction in average power was used to account for the effect of CDMA uplink power control.[63]

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[61] Radio Dynamics Commentary at 5-6.

[62] *Id.* at 5.

[63] *See* Telcordia Analysis at 18-20 and 26.

Radio Dynamics next asserts that Telcordia omitted "several other mitigating factors such as voice activation allowances, multibeam distribution, etc.," that[?] would further substantially reduce the effective power.[64] In fact, the Telcordia Analysis considered the effect of "voice activation" by including a 3-dB reduction in average power for speech activity detection.[65] It is unclear what Radio Dynamics means by "multibeam distribution" or what additional factors the "etc." might refer to, so Cingular, Sprint and Telcordia cannot respond to this point.

Radio Dynamics concludes its section 1.2 by stating that an "additional order of magnitude is gained when the proper ATC system design for an integrated MSS system is used as discussed in the preceding section. The result is a quite feasible MSS-ATC co-channel deployment."[66] However, these assertions are offered without any explanation, analysis, or proof and, in fact, are inconsistent with ICO's previous results which show that an integrated ATC/MSS system using DFA would allow 50% more ATC handsets than an integrated system not using DFA.

Overall, the statements made in the Radio Dynamics Commentary indicate a careless reading of the Telcordia Analysis and a lack of understanding of the Telcordia model.

B. Interference from MSS Terminals to Terrestrial Base Stations

The Telcordia Analysis also reviewed the issue of interference from MSS terminals to terrestrial base stations, concluding that the interference would be "confined to areas near MSS-ATC coverage boundaries and appear[s] to be manageable using fairly straightforward engineering practices such as power-balancing between MSS and ATC."[67] Radio Dynamics claims in section 2 of its Commentary that this conclusion is flawed for three reasons.

1. <u>The Appropriate MSS Terminal Transit Power</u>. Radio Dynamics first asserts that Telcordia used the wrong transmit power for MSS terminals, which, in turn, skewed the exclusion zones:

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[64] Radio Dynamics Commentary at 6.

[65] *See* Telcordia Analysis at 26.

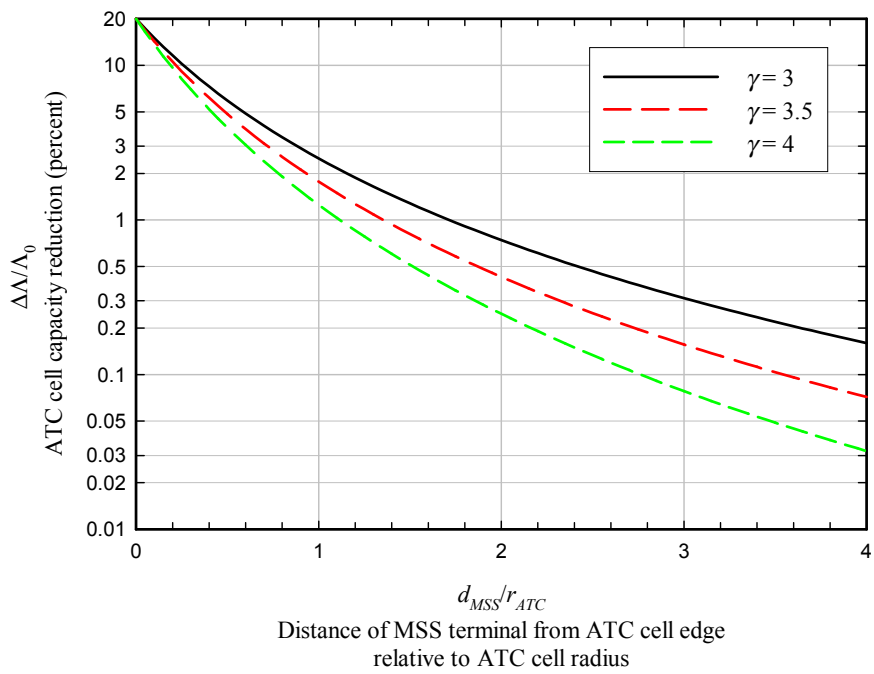
[66] Radio Dynamics Commentary at 6.

[67] Telcordia Analysis at 1 and 27-36.

> Telcordia's analysis assumes a transmit EIRP of 400 mW for the SC mode user terminal. The actual transmit EIRP for an ICO SC-mode handset is on the order of 5 watts (11 dB higher than the Telcordia assumption). As a result, the exclusion distances calculated by Telcordia are not sufficient: much wider exclusion zones are created around severed terrestrial base stations within which SC-mode handsets could not operate without harmful interference to the severed terrestrial base station.[68]

Radio Dynamics has misread the Telcordia Analysis, because the 400 milliwatt EIRP was used in connection with *Globalstar's* proposed system (using CDMA for both MSS and ATC), and *not ICO's* proposed system (CDMA for ATC and FDMA/TDMA for MSS).[69] Telcordia never claimed that a 400-milliwatt EIRP was appropriate for an FDMA/TDMA system such as ICO's.

Nevertheless, because MSS handset transmit power is a parameter in equation (39) of the Telcordia Analysis, the results can easily be adjusted to account for any desired MSS handset transmit power. Figure 13 in the Telcordia Analysis, which pertains to this issue, is reproduced below for convenience.



[68] Radio Dynamics Commentary at 6. ICO repeats this same criticism. *See* ICO Further Comments at 4 and 7.

[69] The 400-mW MSS handset transmit power was chosen based on the parameters appropriate to the Globalstar MSS system, as Telcordia clearly stated. *See* Telcordia Analysis at 28.

Figure 13 from the Telcordia paper

The equation used to generate these curves was equation (40).[70] That equation is:

$$\frac{\Delta\Lambda}{\Lambda_0}(d_{MSS}) = 0.2\left(\frac{r_{ATC}}{d_{MSS} + r_{ATC}}\right)^{\gamma}$$

For a 5-watt MSS handset this becomes:

$$\frac{\Delta\Lambda}{\Lambda_0}(d_{MSS}) = 2.5\left(\frac{r_{ATC}}{d_{MSS} + r_{ATC}}\right)^{\gamma}$$

For example, for a path loss exponent (γ) of 3.5, $d_{MSS}/r_{ATC} = 0.5$ gives an ATC uplink capacity reduction of about 5% in Figure 13, with a 400-mW MSS handset transmit EIRP. With a 5-watt MSS handset transmit power, the same reduction would occur for $d_{MSS}/r_{ATC} \cong 2$; i.e., the MSS handset is two ATC cell radii from the edge of the ATC cell.

While a higher MSS handset transmit power obviously requires larger distance to the ATC cell for a given capacity reduction, Radio Dynamics' statement – "much wider exclusion zones are created around severed terrestrial base stations"[71] – is an exaggeration.

2. <u>MSS Terminal Distribution</u>. Radio Dynamics next states that Telcordia erroneously "assum[ed] a uniform planar distribution of MSS handsets":

> This assumption is flawed due to the fact that any real population of MSS handsets is not uniformly distributed. This significantly increases the likelihood of interference from MSS handsets to a severed terrestrial base station, contrary to Telcordia's conclusion. Thus, using proper ICO SC-mode handset parameters, the coverage gaps caused by severed operations will extend to several thousands of square kilometers (effectively limited by the radio horizon) rather than the few tens of square kilometers predicted by Telcordia.[72]

It is not clear whether Radio Dynamics understood the assumption Telcordia utilized regarding the distribution of MSS terminals. With $d_{MSS}/r_{ATC} = 2$ and $r_{ATC} = 5$ km, the 5% "ex-

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[70] *See* Telcordia Analysis at 28.

[71] Radio Dynamics Commentary at 6.

[72] *Id.*

clusion zone" is $\pi\left(15^2 - 5^2\right) = 628$ square kilometers. MSS handsets were assumed randomly distributed over area (as a two-dimensional Poisson point process) – that is, the probability that there are *N* MSS handsets within some area *A* is the same regardless of the location of the area. It was *not* assumed, for example, that MSS terminals were located at fixed points on a uniform grid.

Notwithstanding this detail, the Telcordia Analysis did acknowledge the possibility of a biased location distribution for the MSS terminals, stating: "Only if MSS-linked terminals are systematically clustered near ATC coverage boundaries does MSS-to-ATC uplink interference become a significant issue."[73]

3. Dynamic Resource Management. Radio Dynamics also takes issue with Telcordia's conclusion that interference from MSS terminals to terrestrial base stations can be managed "using fairly straightforward engineering practices":

> With this exclusion zone, interference from SC-mode handsets to the terrestrial base station cannot be managed "using fairly straightforward engineering practices," as Telcordia suggests. On the other hand, an ATC-integrated MSS operator can effectively manage this interference by allocating non-overlapping frequencies for SC-mode handsets operating within the exclusion zone of an ATC base station.[74]

While it is true that eliminating cochannel operation will mitigate the MSS terminal-to-terrestrial base station problem, ICO has already stated that its DFA technique would increase the allowable ATC capacity by only 50% compared to cochannel operation, based on ATC uplink interference to the SC.[75] Thus, whatever benefits DFA may confer on the ATC uplink are largely academic.

In section 1.1 of its Commentary, Radio Dynamics made the obvious observation that lowering the transmit power levels of terrestrial handsets would reduce the impact on the satellite uplink.[76] What Radio Dynamics failed to note, however, is that this "solution" would worsen the

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[73] Telcordia Analysis at 8.

[74] Radio Dynamics Commentary at 6.

[75] *See* ICO March 22 Comments at A-6.

[76] *See* Radio Dynamics Commentary at 5.

MSS terminal-to-ATC uplink interference problem, which is also obvious from the Telcordia Analysis.[77]

C. Interference from Terrestrial Base Station to MSS Terminals

Radio Dynamics asserts in section 3 of its Commentary that Telcordia used the wrong thermal noise floor in analyzing the interference from terrestrial base stations to MSS terminals:

> [The] Telcordia analysis is based on a thermal noise floor of –111 dBm for an SC-mode handset. ICO SC-mode handsets typically have a thermal noise floor of around –130 dBm. This difference is fairly large and thus, once more, the exclusion zones predicted by Telcordia, in the order of a few square kilometers, are no longer applicable.[78]

It is well-known to radio engineers that the thermal noise floor of a receiver is $fkTB$, where f is the receiver noise factor, and the more often-used noise figure is $F = 10\log f$ dB; k is Boltzman's constant (1.38×10^{-23} joules/°K), T is the effective temperature, usually taken as 290°K for handsets at normal temperatures, and B is the channel bandwidth of the receiver in Hz. In dBm, this translates the well-known formula for the noise floor:

$$N = -174 + 10\log B + F \text{ dBm}$$

For terrestrial systems, noise figures are typically in the range of 6 to 8 dB. With more expensive front-end low noise amplifiers, noise figures in the 2 to 3 dB range can be achieved in handsets. The –111 dBm noise floor that Telcordia used and to which Radio Dynamics refers was based on a CDMA handset with a bandwidth of 1.25 MHz and a noise figure of 2 dB.[79]

Radio Dynamics' claim that an ICO MSS terminal has a noise floor of –130 dBm is difficult to understand. In earlier filings, ICO used a 3-dB bandwidth of 25 kHz.[80] Using the above formula, this gives $N = -130 + F$ dBm – that is, the noise floor would be –130 dBm with a 0-dB receiver noise figure, which does not seem plausible. ICO and Radio Dynamics have apparently neglected to account for the receiver noise figure. However, the main point is that the difference

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[77] *See* Telcordia Analysis at 27-28.

[78] Radio Dynamics Commentary at 7. ICO repeats this same criticism. *See* ICO Further Comments at 8.

[79] *See* Telcordia Analysis at 48.

[80] *See* ICO Ex Parte (March 8, 2001), Appendix B, Table 3.

between the noise floor assumed in the Telcordia Analysis and the noise floor of ICO's MSS terminals is simply due to the difference in bandwidths.

Significantly, this difference in bandwidths (or more precisely, the *ratio* of the bandwidths) has the same effect on the received interference from a CDMA terrestrial base station as it does on the thermal noise floor. That is, if the receiver interference power from the CDMA terrestrial base station, over a 1.25 MHz bandwidth, is I_{ATC} then the interference power seen by the 25-kHz SC-mode handset is $I_{ATC} \cdot (25/1250) = I_{ATC}/50$, or 17 dB lower than the interference seen by the 1.25-MHz CDMA MSS terminal considered in the section of the Telcordia Analysis to which Radio Dynamics refers. Correcting the noise floor in the Radio Dynamics Commentary to allow for a 2-dB receiver noise figure, the noise floor becomes –128 dBm, which is also 17 dB below the assumed noise floor for the CDMA receiver. Thus, the effective noise floor increase in dB from a CDMA terrestrial base station transmitting with a given power level, at a given distance from the MSS terminal, is the same for the 25-kHz ICO terminal as it is for the 1.25-MHz CDMA MSS terminal assumed in the Telcordia Analysis. The effect of the terrestrial interference on the signal-to-interference plus noise ratio ("SINR") therefore is the same in either case. The statements in the Radio Dynamics Commentary are based on two critical oversights, which led to a 19-dB error in its assessment of the Telcordia Analysis.

IV. AN ANALYSIS OF ICO'S POTENTIAL CUSTOMER CLAIMS

ICO repeats in its Further Comments the assertion it made earlier in this proceeding: with ATC authority, it could "conservatively" serve 1.6 million ATC customers in the U.S.[81] It is important that the Commission understand the assumptions ICO has used to reach this estimate. Among other things, ICO assumes:

- It will have access to 30 MHz of MSS spectrum and use ten CDMA carrier pairs (1.25 MHz frequency bands).[82] However, ICO currently holds a MSS license for only 7 MHz of spectrum, which is capable of supporting two CDMA carrier pairs.

[81] *See* ICO Letter at 3 (June 13, 2002) and ICO Further Comments at 5.

[82] *See* ICO Comments at 34 (Oct. 22, 2001); Cingular/Sprint Letter at 14 n.47 (May 13, 2002).

Thus, even assuming the validity of all of its other assumptions, ICO could at most serve 320,000 ATC customers with its current 2 GHz MSS license.

- ICO assumes that no more than 2.5 percent of its customers (one in 40) would ever use its ATC service at any one time.[83] ICO never explains how it arrived at this figure.[84] ICO also never explains what it would do if more than 2.5% of its customers need to use the ATC system at the same time. Two choices would be available to ICO: (1) deny service, or (2) generate additional interference to its satellites, with the result that the satellites would have less (or no) capacity to serve customers in rural areas.
- ICO assumes that no more than 10 percent of all ATC usage would occur outdoors, within sight of the satellite, and that indoor handsets (the other 90 percent) would be completely blocked from the satellite and contribute nothing to the interference.[85] ICO never explains how it arrived at this figure or how it expects to control where its customers make or receive calls. ICO also never explains what it would do if more than 10% of its customers need to use the ATC system outdoors. Two choices would be available to ICO: (1) deny service, or (2) generate additional interference to its satellites, with the result that the satellites would have less (or no) capacity to serve customers in rural areas.

Cingular and Sprint made these very points in their May 13, 2002 *ex parte* letter. That ICO chose not to respond to these points speaks volumes that even ICO does not really believe it can "conservatively" serve 1.6 million ATC customers – *unless* it plans to devote all MSS spectrum to its terrestrial service, rendering its satellites incapable of providing any service to rural areas.

A strategy of allocating MSS spectrum to terrestrial use rather than satellite use certainly would make sense from a financial point of view. According to a new Globalstar claim, using

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[83] *See* ICO Comments (Oct. 22, 2001), Appendix at A-5.

[84] For example, Globalstar has utilized a 3 percent figure. *See* Globalstar Ex Parte (June 27, 2002), Technical Statement at 11.

[85] *See* ICO Comments (Oct. 22, 2001), Appendix at A-3 and A-4.

the MSS band it could serve 490 terrestrial customers for each MSS customer.[86] Indeed, from a purely financial/investor point of view, it would be fiscally irresponsible not to dedicate all available MSS spectrum to terrestrial use. Of course, the Commission's charter for the MSS industry – serve rural areas not covered by terrestrial networks – would be completely undermined by the *de facto* reallocation of the MSS band to terrestrial use. If sharing of spectrum between MSS and terrestrial systems is allowed, the only way such a *de facto* reallocation can be avoided is by the imposition of limits on the total power levels that terrestrial handsets can emit into the sky. The alternative is band segmentation, which would ensure that MSS spectrum is, in fact, dedicated to MSS operations.

It is also useful to compare ICO's ATC customer projections (1.6 million customers with 30 MHz; 320,000 customers with 7 MHz) with the alternative: band segmentation. A terrestrial network with segmented MSS spectrum could serve more than 1.6 million customers using only 2.5 MHz of MSS spectrum (vs. the 30 MHz that ICO states it would need – even assuming the accuracy of all of ICO's assumptions). In addition, MSS licensees acknowledge that their MSS spectrum "currently is drastically underutilized."[87] For example,

- After several years of operations, Globalstar serves only "70,000 subscribers nationwide;"[88] and
- During 2001 and with access to over 25 MHz of MSS spectrum, Globalstar's network averaged only 65,400 minutes of use per day.[89]

These facts alone dictate that the Commission should reallocate some MSS spectrum for terrestrial services.

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[86] *See* Globalstar Ex Parte at 5-6 (June 27, 2002). Although, Globalstar's figure is grossly inflated (as Cingular and Sprint will demonstrate), ICO concedes this basic point when it notes that with MSS spectrum sharing, the terrestrial operator would be able to serve a "significantly smaller" number of customers compared to a terrestrial operator using band segmentation. *See* ICO Letter at 3 (June 13, 2002).

[87] Official Globalstar Creditors Committee Ex Parte at 5 (May 13, 2002). *See also* Globalstar Ex Parte at 7 (April 26, 2002)("Assets are underutilized").

[88] Official Globalstar Creditors Committee Ex Parte at 4 (May 13, 2002).

[89] *See* Globalstar Ex Parte at 2 and 4 (April 26, 2002).

V. CONCLUSION

The foregoing discussion makes apparent that ICO's and Radio Dynamics' criticisms are limited to isolated, less significant points made in the Telcordia Analysis, with ICO and Radio Dynamics ignoring completely the major issues in this proceeding and addressed in the Telcordia Analysis. The few criticisms that ICO and Radio Dynamics do make of a 90-page, single spaced analysis are based on erroneous calculations or a careless reading of the Telcordia Analysis. Many of the assertions that ICO and Radio Dynamics make are unexplained and many of the arguments that ICO and Radio Dynamics purport to rebut involve positions never adopted by either Cingular/Sprint or Telcordia.

One point is uncontroverted: ICO's assertion that Telcordia has used "bad science to support untenable conclusions that have no basis in scientific fact"[90] – is not only unsupported but also contrary to the record evidence.

[90] ICO Further Comments at 10.