

1 William Christopher Carmody
(Admitted *pro hac vice*)
2 Jacob W. Buchdahl
(Admitted *pro hac vice*)
3 SUSMAN GODFREY L.L.P.
4 560 Lexington Avenue, 15th Floor
New York, New York 10022
5 Telephone: (212) 336-8330
Facsimile: (212) 336-8340
6 Email: bcarmody@susmangodfrey.com
7 Email: jbuchdahl@susmangodfrey.com

8 Marc M. Seltzer (54534)
SUSMAN GODFREY L.L.P.
9 1901 Avenue of the Stars, Suite 950
Los Angeles, CA 90067-6029
10 Telephone: (310) 789-3100
Facsimile: (310) 789-3150
11 Email: mseltzer@susmangodfrey.com

12 [Additional counsel listed below signature line]

13 *Attorneys for Defendants*

14
15 **UNITED STATES DISTRICT COURT**
16 **SOUTHERN DISTRICT OF CALIFORNIA**

17 VIASAT, INC.,

18 Plaintiff,
19 vs.

20 SPACE SYSTEMS/LORAL, INC.,
LORAL SPACE &
COMMUNICATIONS INC.,

21 Defendants/Counterclaim
22 Plaintiffs.

Case No. 3:12-cv-00260-H-WVG

Hon. Marilyn L. Huff

**DEFENDANTS' MOTION FOR
JUDGMENT AS A MATTER OF
LAW (RENEWED), OR A NEW
TRIAL (9 OF 12), REGARDING
THE INVALIDITY OF THE
ASSERTED CLAIMS OF THE '043
PATENT IN LIGHT OF THE
PRIOR ART**

Date: July 22, 2014

Time: 9:00 a.m.

Place: Courtroom 15A

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1 Defendants Space Systems/Loral, LLC and Loral Space & Communications
2 Inc. (collectively, "SS/L") renew their motion for entry of judgment as a matter of
3 law that asserted claims of U.S. Patent Nos. 8,010,043 ("the '043 patent") are
4 invalid as anticipated and/or obvious in light of the prior art.

5 I. INTRODUCTION

6 SS/L presented clear and convincing evidence at trial that the '043 patent is
7 invalid as anticipated and/or obvious in light of a technical paper titled "Capacity
8 Analysis and System Optimization for the Forward Link of Multi-Beam Satellite
9 Broadband Systems Exploiting Adaptive Coding and Modulation," published by
10 Rinaldo and De Gaudenzi in the year 2004 ("Rinaldo"). Ex. A SSL0086818.¹

11 Pre-trial, ViaSat attempted to distinguish Rinaldo by disputing that the paper
12 discloses a required limitation of each of the '043 patent's asserted claims—that C/I
13 (the signal-to-interference ratio) is less than C/N (the signal-to-noise ratio) for at
14 least one subscriber terminal. Indeed, ViaSat spent extensive time during the
15 hearing suggesting that its expert, Mr. Sturza, would argue at trial that SS/L's
16 expert's calculations of C/I being less than C/N in the paper were wrong and that, in
17 fact, C/I is greater than C/N. *See* Jan. 17, 2014 Hr'g Tr. at 79-84. Although after
18 reviewing the reference, the Court indicated during the summary judgment hearing
19 that it thought ViaSat may have "a problem" with Rinaldo at trial, *see* Jan. 17, 2014
20 Hr'g Tr. at 80, the Court denied SS/L's motion for summary judgment of invalidity
21 on the ground that "ViaSat also disputes whether Rinaldo and De Gaudenzi
22 discloses a satellite with C/I less than C/N." Dkt. 652 at 8.

23 ¹ All citations to "Ex." herein refer to the Declaration of Amanda K. Bonn filed
24 herewith.

1 At trial, however, ViaSat's expert Mr. Sturza did precisely the opposite. He
2 conceded that Rinaldo does in fact disclose that C/I is less than C/N, but argued that
3 it teaches away from such a result. This admission is fatal to ViaSat's attempt to
4 escape invalidity of the '043 patent. The Federal Circuit has made clear that
5 "'teaching away' is irrelevant to anticipation." *Leggett & Platt, Inc. v. VUTEk, Inc.*,
6 537 F.3d 1349, 1356 (Fed. Cir. 2008) (emphasis added). In other words, "[a]
7 reference is no less anticipatory if, after disclosing the invention, the reference then
8 disparages it. Thus, the question whether a reference 'teaches away' from the
9 invention is inapplicable to an anticipation analysis." *Celeritas Techs., Ltd. v.*
10 *Rockwell Int'l Corp.*, 150 F.3d 1354, 1361 (Fed. Cir. 1998). Mr. Sturza's admission
11 that Rinaldo discloses C/I less than C/N renders Rinaldo anticipating—and
12 invalidating.

13 Moreover, whereas SS/L presented only one of many prior art references to
14 the Court on summary judgment, the trial record reveals that the '043 patent is
15 anticipated and/or rendered obvious by a multitude of prior art references, including
16 SS/L's previously-built iPSTAR satellite and a series of Japanese papers devoted to
17 the concept of maximizing capacity in an interference-dominated system through
18 the use of ACM—the core teachings of the '043 patent. Clear and convincing
19 evidence demonstrates that the '043 patent is invalid and no substantial evidence
20 supports a finding to the contrary. As a result, SS/L is entitled to entry of judgment
21 as a matter of law (or, in the alternative, a new trial).²

22
23 ² By separate motion, which is incorporated herein by reference, SS/L has moved
24 for JMOL that the '043 patent is indefinite because it mixes method steps in an
 apparatus claim. Dkt. 1055. If the Court grants that motion and enters judgment of

II. LEGAL STANDARD

Judgment as a matter of law ("JMOL") may be granted and a jury verdict can be overturned "if the evidence, construed in the light most favorable to the nonmoving party, permits only one reasonable conclusion, and that conclusion is contrary to the jury's verdict." *Lucent Techs., Inc. v. Gateway Inc.*, 580 F.3d 1301, 1309 (Fed. Cir. 2009) (quoting *Pavao v. Pagay*, 307 F.3d 915, 918 (9th Cir. 2002)). "[O]n posttrial JMOL motions, district court judges must scrutinize the evidence carefully to ensure that the 'substantial evidence' standard is satisfied." *Id.* at 1336. Substantial evidence is "more than a mere scintilla" and is "such relevant evidence as a reasonable mind might accept as adequate to support a conclusion." *The Johns Hopkins Univ. v. Datascope Corp.*, 543 F.3d 1342, 1348 (Fed. Cir. 2008) (quotation marks and citation omitted). "Under Rule 50, a court should render judgment as a matter of law when a party has been fully heard on an issue and there is no legally sufficient evidentiary basis for a reasonable jury to find for that party on that issue." *Reeves v. Sanderson Plumbing Prods.*, 530 U.S. 133, 149 (2000).

III. ARGUMENT

A. SS/L is Entitled to Judgment as a Matter of Law that the Asserted Claims of the '043 Patent are Invalid as Anticipated.

"A patent is invalid for anticipation if a single prior art references discloses each and every limitation of the claimed invention." *Schering Corp. v. Geneva Pharms., Inc.*, 339 F.3d 1373, 1377 (Fed. Cir. 2003). The reference must "expressly

(... cont'd)

invalidity as a matter of law, this motion becomes moot. SS/L makes these arguments in the alternative, in the event the Court declines to find the patent invalid as indefinite.

1 or inherently" disclose every limitation. *Id.* "[T]he inherent disclosure of the entire
2 claimed subject matter anticipates as well as inherent disclosure of a single feature
3 of the claimed subject matter. The extent of the inherent disclosure does not limit its
4 anticipatory effect." *Id.* Thus, "a prior art reference may anticipate without
5 disclosing a feature of the claimed invention if that missing characteristic is
6 necessarily present, or inherent, in the single anticipating reference." *SmithKline*
7 *Beecham Corp. v. Apotex Corp.*, 403 F.3d 1331, 1343 (Fed. Cir. 2005) (quotation
8 marks and citation omitted). Moreover, "inherent anticipation does not require a
9 person of ordinary skill in the art to recognize the inherent disclosure in the prior art
10 at the time the prior art is created." *Id.* (emphasis added).

11 The '043 patent has a July 2007 priority date and is titled "Capacity
12 Maximization for a Unicast Spot Beam Satellite System." At trial, ViaSat asserted
13 Claims 1, 3, and 8. All of the asserted claims have several limitations in common,
14 including:

15 (a) "A satellite for illuminating a geographic area with signals, the
16 satellite comprising":

17 (b) "a power source";

18 (c) "an antenna";

19 (d) "a plurality of spot beams emanating from the antenna to service a
20 plurality of service links, wherein":

21 (e) "the plurality of spot beams includes a first spot beam and a
22 second spot beam";

23 (f) "the first spot beam illuminates a first region within the
24 geographic area, in order to send information to a first plurality of
subscriber terminals";

(g) "the second spot beam illuminates a second region within the
geographic area and adjacent to the first region, in order to send

1 information to a second plurality of subscriber terminals, whereby the
2 first and second regions overlap";

3 (h) "the first spot beam as sent to at least one of the first plurality of
4 subscriber terminals is affected by interference from other signal
5 sources including the second spot beam at a signal-to-interference
6 ratio C/I";

7 (i) "the first spot beam as sent to the at least one of the first plurality
8 of subscriber terminals is further affected by noise at a signal-to-
9 noise ratio C/N, whereby reception of signals from the first spot
10 beam by the at least one of the first plurality of subscriber terminals
11 is interference-dominated such that C/I is less than C/N"

12 '043 Patent, Claims 1, 3, 7 & 8.

13 Claim 1 adds a final limitation that "the satellite is operated to maximize
14 data-carrying capacity of the plurality of spot beams as measured in bits/Hz, by
15 utilizing a beam pattern having a specific number of color(s) of frequency and
16 polarization and specific beam spacing that results in higher data-carrying capacity
17 of the plurality of spot beams than achieved with other alternative numbers of
18 color(s) of frequency and polarization and beam spacings" ("Claim Element 1(j)").
19 *Id.* at Claim 1. Claim 3 is dependent on Claim 1, specifying "wherein the plurality
20 of spot beams comprise adaptive coding and modulation (ACM) signals, and the
21 data-carrying capacity of the plurality of spot beams is maximized by maximizing
22 average data-carrying capacity within the plurality of spot beams." *Id.* at Claim 3.

23 Claim 7 adds two limitations. First, it recites "the first spot beam including at
24 least a first portion sent to a first subscriber terminal from the first plurality of
subscriber terminals utilizing a first coding and modulation combination"
("Claim Element 7(j)"). *Id.* at Claim 7. Second, it recites "the first spot beam
including a second portion sent to a second subscriber terminal in the first plurality
of subscriber terminals utilizing a second coding and modulation combination, the

1 first coding and modulation combination being different from the second coding
2 and modulation combination" ("Claim Element 7(k)"). *Id.* Claim 8 is dependent on
3 Claim 7 and specifies that "the first coding and modulation combination and second
4 coding and modulation combination are selected according to an adaptive coding
5 and modulation (ACM) scheme." *Id.* at Claim 8.

6 **1. Rinaldo Anticipates Every Asserted Claim.**

7 The Rinaldo reference is printed publication prior art under 35 U.S.C. §§
8 102(a) and 102(b). S-11 at SSL0086818. The testimony of Dr. Schindall, along
9 with Exhibit S-11, established that each and every element of the asserted claims of
10 the '043 patent is present and thereby anticipated by Rinaldo, as shown in the chart
11 set forth in Appendix 1. Faced with the overwhelming evidence that Rinaldo
12 anticipates Claim 1, ViaSat's expert made three attempts to identify distinctions in
13 the paper, none of which can save the '043 patent from anticipation as a matter of
14 law.

15 First, contrary to ViaSat's arguments pre-trial, Mr. Sturza was forced to admit
16 at trial that Rinaldo does, in fact, disclose that there are users in the one-color,
17 capacity-maximizing system who are interference-dominated such that C/I is less
18 than C/N—although he argued that the paper "teaches away" from this result by
19 suggesting that a satellite operator may wish to "freeze out" such users. *See, e.g.*,
20 Trial Tr. at 2711-12. Indeed, Mr. Sturza was forced to make this concession
21 because according to his own calculations, Rinaldo discloses that C/I falls into the
22 negative numbers, while the "worst case" C/N is 10.3 dB. Trial Tr. at 2198-99. And
23 yet Mr. Sturza's attempt to distinguish the article on the basis that it nonetheless
24 "teaches away" from this point dooms his anticipation rebuttal—the Federal Circuit

1 has made clear that "teaching away" is legally irrelevant to anticipation. *Leggett*,
2 537 F.3d at 1356.

3 Second, Mr. Sturza attempted to argue that Rinaldo improperly includes
4 something he calls "self-interference"—*i.e.*, interference coming from within the
5 same beam under consideration—rather than interference from "other signal
6 sources." *See, e.g.*, Trial Tr. at 2706-07. Yet Rinaldo itself states that it is only
7 considering "location dependent interference from other beams." Ex. A at
8 SSL0086834 (emphasis added). Moreover, Equation A10 (which is used to
9 generate Figure 5) expressly excludes interference from the beam under
10 consideration (beam "u") by stating that "i" (the *i*th beam) does not equal "u." *E.g.*,
11 Trial Tr. at 2183-84, 2373-74; Ex. A at SSL0086837.

12 Third, despite the fact that Rinaldo expressly discloses "a frequency reuse
13 factor of 1 achieves the maximum average capacity," which "result is significantly
14 dependent . . . on the beam center spacing," Mr. Sturza attempted to dispute that
15 Rinaldo expressly discloses maximizing capacity. *See, e.g.*, Ex. A at SSL0086834
16 (emphasis added); *see also, e.g.*, Trial Tr. at 2712. Mr. Sturza argued that the paper
17 does not teach maximization because it only considers 1, 3, and 4-color systems
18 (and not additional, alternative numbers of colors). *E.g.*, Trial Tr. at 2712. Even
19 accepting Mr. Sturza's argument at face value, it is legally irrelevant. The '043
20 patent includes apparatus claims and the Federal Circuit has made clear it is
21 improper to read process limitations into apparatus claims. *Baldwin Graphic Sys.,*
22 *Inc.*, 512 F.3d at 1344. Thus, it is legally irrelevant whether Rinaldo "considered"
23 every possible number of colors or beam spacing or combination thereof in the
24 process of identifying the combination yielding the maximum capacity—all that

1 matters is that the paper discloses that the "maximum" average transmission
2 capacity is achieved with a frequency reuse factor of one and a beam spacing of 4
3 dB. *E.g.*, Ex. A at Pages 407, 413, 417. Moreover, Mr. Sturza's argument is flatly
4 belied by the face of the paper itself, which includes capacity optimization in the
5 title, discusses at length the "maximization" of average capacity, and performs
6 detailed simulations of various frequency reuse factors at a specified beam
7 spacings. *See generally* Ex. A. Indeed, the paper discloses that "[t]he optimum
8 average system efficiency can be obtained by finding the optimum frequency and
9 polarization reuse factors, which solve for the following," and then provides a
10 generic equation that considers any frequency reuse factor greater than or equal to
11 one. *See, e.g.*, Ex. A at Page 423 & Equation 9.

12 As set forth above, clear and convincing evidence demonstrates that Rinaldo
13 anticipates every asserted claim of the '043 patent. No reasonable jury could
14 disagree, and judgment as a matter of law is required on this basis alone.

15 **2. iPSTAR Anticipates Every Asserted Claim.**

16 SS/L itself had sold, built, and launched the iPSTAR satellite by August 11,
17 2005, nearly two years before ViaSat filed for the '043 patent. *See, e.g.*, Trial Tr. at
18 1860, 2089-91 2177-78; Ex. O at SSL0091554. Thus, iPSTAR is prior art under the
19 on-sale bar, 35 U.S.C. § 102(b). *See Special Devices, Inc. v. OEA, Inc.*, 270 F.3d
20 1353, 1354-55 (Fed. Cir. 2001) (quoting *Pfaff v. Wells Elecs., Inc.*, 525 U.S. 55, 67-
21 68 (1998)). The testimony of Dr. Schindall and third party witness Mark
22 Thompson, along with Exhibits B-K established each and every element of the
23 asserted claims of the '043 patent are present and thereby anticipated by iPSTAR, as
24 shown in the chart set forth in Appendix 1.

1 iPSTAR was the first commercial, broadband satellite in the world to use
2 adaptive coding and modulation and it employed a frequency reuse factor of 3—a
3 much more aggressive frequency reuse than the 4-color systems employed in both
4 Jupiter-1 and ViaSat-1. *See, e.g.*, Trial Tr. at 2090-91, 2094-2101. The iPSTAR
5 satellite was designed by Mark Thompson—an independent, third-party consultant
6 for Thaicom—*in* conjunction with SS/L with the express goal of improving
7 system capacity by comparing a 3-color pattern system with a 4-color system,
8 comparing different beam spacings, and determining which would achieve the
9 highest capacity. *Id.*; *see also* Ex. A at SSL0088881-82. The iPSTAR system
10 designers were aware that a 3-color system would "suffer[] from low C/I (adjacent
11 cell interference), especially in the triple point area" meaning "C/I may dominate
12 the link budget" Ex. A at SSL0088881. However, Thaicom nonetheless
13 chose to pursue such an aggressive 3-color system because the area where C/I
14 would dominate "is limited and the new modulation formats being developed by
15 Codespace and the forward error correction turbo codes now available ensure link
16 budgets will close even with the[] high interference adjacent cells." *Id.* The iPSTAR
17 designers expressly recognized that in the system they envisioned, "C/N dominates
18 everywhere but the triple point where C/I is lower than C/N." *Id.* at SSL0088882.

19 Mr. Thompson—a neutral, third party witness—offered extensive
20 documentary evidence that iPSTAR (1) has interference-dominated users due to its
21 aggressive 3-color reuse pattern; (2) uses adaptive coding and modulation to send
22 different modcodes to users in such interference-dominated beams; and (3)
23 maximizes average system capacity, as it was the highest-capacity satellite in the
24 world when it was launched. *See, e.g.*, Trial Tr. at 2090-2104. ViaSat's expert Mr.

1 Sturza raised three principle disputes as to whether iPSTAR anticipates, none of
2 which constitutes substantial evidence as a matter of law.

3 First, Mr. Sturza criticized Professor Schindall and Mr. Thompson's analyses
4 of C/I and C/N in the iPSTAR by stating that they did not show C/I was less than
5 C/N at the same exact location within Beam 207. *See, e.g.*, Trial Tr. at 2709. Mr.
6 Sturza's critique, however, falls apart if one has even a grade-school understanding
7 of basic mathematics. Mr. Sturza did not dispute that the Performance Specification
8 explicitly discloses that 5% of users experience C/I of 13.8 dB or less. Trial Tr. at
9 2187; 2709. Nor does he dispute that the data in the Performance Specification
10 inherently discloses that the "worst case" C/N is 19.9 dB. *Id.* Instead, he states that
11 there is no evidence these numbers occur at the same location. *Id.* at 2709. But if
12 the "worst case" C/N is 19.9 dB, that means C/N at any other point in the beam
13 could only be 19.9 dB or even higher. There can be no point in Beam 207, by
14 definition, where C/N is lower than 19.9 dB. Therefore, for the 5% of users in
15 Beam 207 whose C/I is 13.8 dB, their interference-level is necessarily lower than
16 C/N (whether C/N is 19.9 dB or else some higher C/N number). More importantly,
17 Mr. Sturza did not in any way criticize Mr. Thompson's C/N calculations showing
18 that the worst-case C/N calculations for the as-built satellite is still higher than the
19 worst-case interference for users at the edge of the beam.

20 Second, Mr. Sturza raised conclusory testimony that Professor Schindall's
21 analysis included "self-interference." Trial Tr. at 2706-08. Once again, there is zero
22 evidence to support Mr. Sturza's conclusory assertion. As Mr. Thompson explained,
23 the factory testing data from SS/L showing C/I only included interference coming
24 from other beams. Trial Tr. at 2130 (testifying that Exhibit S-1247 (Ex. H), factory

1 test data, shows only "the amount of interference from the adjacent beams utilizing
2 the same frequency") (emphasis added); *see also* Ex. H. Moreover, the Performance
3 Specification on which Professor Schindall relied explicitly states that "C/I, of an
4 antenna is defined as the ratio of the directivity of the desired beam at a point
5 within its desired angular coverage area to the sum directivity of all interfering
6 beams," and specifies once again in the C/I equation that "Cov" ("the list of co-
7 frequency coverage regions of beams of which *i* is one") does not equal i, the
8 desired beam under consideration. Ex. E at SSL0092665. In other words, the
9 equation for calculating C/I in the iPSTAR performance specification expressly
10 excludes any "self-interference" from the beam under consideration. *See, e.g.*, Trial
11 Tr. at 2184.

12 Third, Mr. Sturza testified that Mr. Thompson's Codespace Memo from 1999
13 does not show iPSTAR maximizes because it used a slightly different beam spacing
14 than the final satellite. *E.g.*, Trial Tr. at 2710-11. But Mr. Sturza said nothing
15 regarding Hampton Chan's analysis that a 3-color system results in higher capacity
16 than a 4-color or 7-color system of the same beam spacing. *E.g.*, Trial Tr. at 2189.
17 Thus, at best, Mr. Sturza applied different standards for infringement and invalidity:
18 while he found Jupiter to infringe based only on the fact that it achieved a higher
19 capacity with a particular beam spacing for a fixed number of colors, he refused to
20 find that iPSTAR anticipates where it maximized average capacity by fixing the
21 beam spacing and choosing the optimal number of colors. Black letter, Federal
22 Circuit law provides "[t]hat which infringes if later anticipates if earlier." *Brown v.*
23 *3M*, 265 F.3d 1348, 1352 (Fed. Cir. 2001) (quotation marks and citation omitted).
24 ViaSat cannot have it both ways—if maximizing over only one of number of colors

1 or beam spacing suffices to establish infringement in Jupiter, then it must also
2 suffice to establish invalidity in iPSTAR.

3 Clear and convincing evidence at trial demonstrates that iPSTAR anticipates
4 every asserted claim of the '043 patent. ViaSat failed to raise any substantial
5 evidence that would support a contrary conclusion.

6 **3. Nakahira Anticipates Claim 8 of the '043 Patent.**

7 Finally, clear and convincing evidence at trial established that a group of
8 researchers in Japan employed by Nippon Telephone & Telegraph Co. ("NTT")
9 published prolifically on the subject of a satellite for mobile applications that they
10 were designing between 2003 and 2007. One such paper published in 2007, "A
11 Resource Allocation Scheme for QoS Provision in Multi-beam Mobile Satellite
12 Communication Systems" ("Nakahira"), is printed publication prior art under §
13 102(a) and anticipates Claim 8 of the '043 patent. *See* Ex. N. The testimony of
14 Professor Schindall, along with Exhibit O, establish that each and every element of
15 Claim 8 of the '043 patent is present and thereby anticipated by Nakahira, as shown
16 in the chart set forth in Appendix 1.

17 Mr. Sturza did not attempt to rebut that Nakahira discloses claim elements
18 7(a) through 7(g), 7(j) and 7(k), or the additional limitation of ACM disclosed in
19 Claim 8. Mr. Sturza's only point of distinction were claim elements 7(h) and 7(i);
20 *i.e.*, that C/I is less than C/N. But Mr. Sturza's purported distinction fails as a matter
21 of law under binding Federal Circuit decisions.

22 First, Mr. Sturza, once again, offered the conclusory statement that all of
23 Professor Schindall's analyses included "self-interference." Trial Tr. at 2706-08.
24 And, once again, the explicit text in Nakahira proves that is not the case, stating

1 explicitly that it considered "inter-beam interference (side lobe)" and mentioning
2 nothing about "self-interference." *E.g.*, Trial Tr. at 2373-74; Ex. N at Fig. 3.

3 Second, Mr. Sturza attempted to argue C/I is not less than C/N based on the
4 insertion of other factors that are neither expressly nor inherently disclosed in the
5 paper itself. Mr. Sturza did not dispute that Nakahira inherently discloses a "worst
6 case" C/I of 6.7 dB and a "worst case" C/N of 11.4 dB based solely on the data
7 contained in the paper itself. *E.g.*, Trial Tr. at 2207-09. He did not dispute that
8 Professor Schindall used link budget equations that are well known to those of skill
9 in the art, nor did he dispute that Professor Schindall made the correct computations
10 using the data disclosed in the paper. However, Mr. Sturza testified that one of
11 ordinary skill in the art would be motivated to add in to the parameters disclosed in
12 Table I of Nakahira an additional factor called "Back Off" that he arbitrarily
13 selected as 3 dB and an additional factor called "Antenna Loss" that he arbitrarily
14 selected as 0.5 dB. *E.g.*, Trial Tr. at 2715. Neither factor is disclosed as being one
15 of the "simulation parameters" in Table 1—Mr. Sturza invents them out of whole
16 cloth.

17 Having essentially admitted that the data in the paper inherently discloses C/I
18 less than C/N, ViaSat cannot save the '043 patent from anticipation by inserting
19 other material that, according to Mr. Sturza, one of ordinary skill in the art would
20 be motivated to add. The Federal Circuit has held that "inherent anticipation does
21 not require a person of ordinary skill in the art to recognize the inherent disclosure
22 in the prior art at the time the prior art is created." *SmithKline Beecham Corp.*, 403
23 F.3d at 1343. Thus, even if it were true that one of skill in the art would believe that
24 the authors of Nakahira failed to appreciate all of the factors that might go into a

1 link budget equation, that does not change the fact that (1) Nakahira disclosed the
2 factors the paper considered relevant to a link budget analysis and (2) those factors
3 inherently disclose C/I is less than C/N. *See, e.g., Schering Corp.*, 339 F.3d at 1377
4 ("Contrary to Schering's contention, [our case law] does not stand for the
5 proposition that an inherent feature of a prior art reference must be perceived as
6 such by a person of ordinary skill before the critical date.") (emphasis added).

7 As set forth above, clear and convincing evidence demonstrates that all of the
8 asserted claims of the '043 patent are invalid as anticipated by Rinaldo and
9 iPSTAR. Furthermore, Claim 8 is invalid as anticipated by Nakahira. ViaSat failed
10 to introduce substantial evidence to the contrary and, thus, SS/L is entitled to
11 judgment as a matter of law that every asserted claim of the '043 patent is invalid as
12 anticipated.

13 **B. SS/L is Entitled to Judgment as a Matter of Law that the Asserted**
14 **Claims of the '043 Patent are Invalid as Obvious.**

15 In the alternative, SS/L is entitled to judgment as a matter of law that the
16 asserted claims of the '043 patent are invalid as obvious in light of the prior art.
17 Given the strength of the numerous prior art references that disclose every single
18 limitation of the '043 patent, to the extent that any one of them is found to be
19 deficient in some narrow respect, it would be obvious to one of ordinary skill in the
20 art to combine them to render the '043 patent's asserted claims obvious.

21 A patent is obvious "if the differences between the subject matter sought to
22 be patented and the prior art are such that the subject matter as a whole would have
23 been obvious at the time the invention was made to a person having ordinary skill
24 in the art to which said subject matter pertains." 35 U.S.C. § 103. "While a jury may

1 render a decision on a question of obviousness when it is considering any
2 underlying fact questions, obviousness is ultimately a question of law" *Boston*
3 *Scientific Scimed, Inc. v. Cordis Corp.*, 554 F.3d 982, 990 (Fed. Cir. 2009). "When
4 [the court] consider[s] that, even in light of a jury's finding of fact, the references
5 demonstrate an invention to have been obvious, [the court] may reverse its
6 obviousness determination." *Id.* "The underlying factual inquiries include: (1) the
7 scope and content of the prior art, (2) the differences between the prior art and the
8 claims at issue, (3) the level of ordinary skill in the art, and (4) any relevant
9 secondary considerations, such as commercial success, long felt but unsolved
10 needs, and the failure of others." *Wyers v. Master Lock Co.*, 616 F.3d 1231, 1237
11 (Fed. Cir. 2010) (citing *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966)).

12 The Supreme Court has held that where "the prior art's content, the patent
13 claim's scope, and the level of ordinary skill in the art are not in material dispute
14 and the claim's obviousness is apparent," judgment as a matter of law is
15 appropriate. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 427 (2007). Moreover, the
16 Supreme Court held that there is a "need for caution in granting a patent based on
17 the combination of elements found in the prior art." *Id.* at 415. Indeed, "[t]he
18 combination of familiar elements according to known methods is likely to be
19 obvious when it does no more than yield predictable results." *Id.* at 416. "When
20 there is a design need or market pressure to solve a problem and there are a finite
21 number of identified, predictable solutions, a person of ordinary skill has good
22 reason to pursue the known options within his or her technical grasp." *Id.* at 421. "If
23 this leads to the anticipated success, it is likely the product not of innovation but of
24 ordinary skill and common sense." *Id.*

1 Post-KSR cases from the Federal Circuit are in accord. *See, e.g., Western*
2 *Union Co. v. MoneyGram Payment Sys., Inc.*, 626 F.3d 1361, 1367 (Fed. Cir. 2010)
3 (reversing denial of JMOL for obviousness where "weak secondary considerations .
4 . . do not overcome a strong prima facie case of obviousness"); *Agrizap, Inc. v.*
5 *Woodstream Corp.*, 520 F.3d 1337, 1344 (Fed. Cir. 2008) ("This is a textbook case
6 of when the asserted claims involve a combination of familiar elements according
7 to known methods that does no more than yield predictable results. . . . In this case,
8 the objective evidence of nonobviousness simply cannot overcome such a strong
9 prima facie case of obviousness."); *Leapfrog Enters., Inc. v. Fisher-Price, Inc.*, 485
10 F.3d 1157, 1162 (Fed. Cir. 2007) (affirming grant of JMOL of obviousness where
11 "given the strength of the prima facie obviousness showing, the evidence on
12 secondary considerations was inadequate to overcome a final conclusion that [the
13 asserted claim] would have been obvious").

14 Here, as in the cases cited above, clear and convincing evidence
15 demonstrates that the asserted claims of the '043 patent are invalid as obvious as a
16 matter of law. No substantial evidence supports any presumed findings of fact to
17 the contrary.

18 **1. The Japanese Art Combinations Disclose Every Limitation**
19 **of Claims 1, 3, and 8.**

20 As discussed above, Nakahira was one of a multi-paper study effort by
21 researchers at NTT in Japan that resulted in over 30 published papers between 2003
22 and 2007. *E.g.*, Trial Tr. at 2169. SS/L presented clear and convincing evidence at
23 trial that one of ordinary skill in the art would be motivated to combine Nakahira
24

1 with two other NTT papers to render obvious every asserted claim of the '043
2 patent.

3 The first such paper is titled "Communication Capacity Maximizing Method
4 using High Density Continuous Multibeam Architecture" ("Nakasuga 2003"). Ex.
5 L. As shown in the chart set forth in Appendix 1, the testimony of Professor
6 Schindall, along with Exhibit M, establish that Nakasuga (2003) discloses claim
7 elements (a) through (g) of the asserted claims, the additional limitation of
8 maximizing average capacity in asserted claim 3, and the additional limitation of
9 the use of ACM per claims 3 and 8.

10 Similarly, another of the Japanese NTT papers, "A study on Multi-Beam
11 Allocation for Next Generation Mobile Satellite Communication Systems"
12 ("Sagawa 2004"), describes maximizing capacity in a 61-beam configuration with a
13 "three-color" pattern and a particular "beam diameter" or beam spacing. *E.g.*, Ex.
14 M. As shown in the chart set forth in Appendix 1, the testimony of Professor
15 Schindall, along with exhibit Exhibit N, establish that Sagawa (2004) discloses
16 claim elements (a) through (g) of the asserted claims, the additional limitation of
17 maximizing average capacity in asserted claim 3, and the additional limitation of
18 the use of ACM per claims 3 and 8. Moreover, the paper inherently discloses that
19 C/I is less than C/N.

20 Mr. Sturza's only points of distinction over Sagawa (2004) are that (1) it
21 supposedly does not consider varying beam spacing and (2) it supposedly includes
22 "self-interference." Neither is accurate. First, the paper clearly discloses in Figure 1
23 that as the number of beams becomes greater, the beam spacing becomes tighter
24 (*i.e.*, the 91 beam configuration has the tightest beam diameter or spacing, the 61

1 beam system has a greater beam spacing, the 37 beam system has an even greater
2 beam spacing, and so on). This is inherent, since fewer beams covering the same
3 coverage area are spaced more widely than a greater number of beams covering the
4 same area. Ex. M at Fig. 1 & n.3-7. Second, Mr. Sturza made his same conclusory
5 statement that all of the references included "self-interference." *E.g., See, e.g.,* Trial
6 Tr. at 2706-07. Once again, this is belied by the face of the paper itself, which states
7 that it includes only "inter-beam interference," which is a defined term in the
8 relevant equation in the paper. *See, e.g.,* Trial Tr. at 2374; Ex. M at SSL0090726.

9 More critically, Mr. Sturza said absolutely nothing to dispute that Nakasuga
10 (2003) when combined with Sagawa (2004) (and, optionally, Nakahira) disclose
11 every asserted claim of the '043 patent. Professor Schindall explained that to the
12 extent either Nakasuga (2003) or Sagawa (2004) failed to adequately disclose
13 ACM, one would be motivated to combine them with Nakahira to supply the
14 missing limitations. *See, e.g.,* Trial Tr. at 2213-14. Professor Schindall further
15 explained that to the extent Nakasuga (2003) did not explicitly disclose C/I less
16 than C/N, one of ordinary skill in the art would be motivated to combine it with
17 Sagawa (2004). Sagawa 2004 explicitly discloses that the average C/N in the
18 system NTT was researching is 10 dB or greater. *See* Ex. M at SSL0090727. Using
19 that C/N number from Sagawa (2004), Professor Schindall was able to discern from
20 Figure 1 of Nakasuga (2003) that C/I is less than C/N. *E.g.,* Trial Tr. at 2210. More
21 specifically, Figure 3 of Nakasuga (2003) discloses that capacity is maximized for a
22 4-color system with a beam spacing of 1.5 dB. *E.g.,* Trial Tr. at 2210; Ex. L at Fig.
23 3. Figure 1, in turn, discloses that the average C/N+I for a 4-color system with a
24 beam spacing of 1.5 dB is 5 dB. *E.g.,* Trial Tr. at 2210; Ex. L at Fig. 1. Knowing

1 the average C/N value of 10 dB from Sagawa (2004), Professor Schindall
2 calculated the average C/I to be 6.7 dB and the worst case C/N to be 8.5 dB, thus
3 demonstrating that C/I is inherently less than C/N. *E.g.*, Trial Tr. at 2210; Ex. L at
4 Fig. 1; Ex. M at SSL0090727.

5 Mr. Sturza did not dispute any of the above analysis, except to protest that it
6 is somehow improper to combine Sagawa (2004) with Nakasuga (2003). Indeed,
7 Mr. Sturza apparently believed that if one needed to combine Sagawa (2004) with
8 Nakasuga (2003) that, per se, would suggest a lack of clear and convincing
9 evidence of invalidity. *E.g.*, Trial Tr. at 2713. But the entire purpose of an
10 obviousness analysis is to combine multiple references to show what would be
11 obvious to one of ordinary skill in the art. Mr. Sturza offered no rationale why one
12 of ordinary skill in the art wouldn't be motivated to combine Nakasuga (2003) with
13 Sagawa (2004), particularly since they are by researchers at the same company,
14 about the same satellite system, during the same time period, and sharing a same
15 author. *E.g.*, Trial Tr. at 2169, 2203-04, 2213-14. To the contrary, it is difficult to
16 imagine a stronger motivation to combine references than this one.

17 Mr. Sturza's only remaining attempt to dispute that the combination of
18 Nakasuga (2003) and Sagawa (2004) disclosed every limitation of every claim was
19 a single sentence in which he conclusorily asserted that Nakasuga (2003) "fails to
20 maximize capacity." *E.g.*, Trial Tr. at 2713. Mr. Sturza offered literally zero
21 explanation why Nakasuga (2003) does not maximize capacity; nor could he, since
22 the title of the paper is "Communication Capacity Maximizing Method using High
23 Density Continuous Multibeam Architecture," and the paper's entire purpose is to
24

1 disclose a design-flow for identifying the maximum capacity by varying the number
2 of colors and beam spacing. *See generally* Ex. L (emphasis added).

3 **2. Multiple Other Prior Art Combinations Render Every**
4 **Asserted Claim of the '043 Patent Obvious.**

5 As described more fully above, Rinaldo and iPSTAR anticipate every
6 asserted claim of the '043 patent, while Nakahira anticipates Claim 8. As Professor
7 Schindall explained, to the extent any one of those references is lacking any
8 limitation, it would have been obvious to one of ordinary skill in the art to make
9 whatever slight modification is required such that it would fully practice the
10 asserted '043 patent claims. *See, e.g.*, Trial Tr. at 2212. Moreover, Professor
11 Schindall testified it would be obvious to combine Rinaldo with Sagawa, to
12 combine iPSTAR with Nakasuga, to combine iPSTAR with Rinaldo, or to combine
13 Nakahira and Nakasuga and Sagawa. *E.g.*, Trial Tr. at 2212-14. As Professor
14 Schindall testified, one of ordinary skill in the art would be motivated to combine
15 these references because they all pertain to maximizing capacity in a spot beam
16 communication satellite. *E.g., id.*

17 Mr. Sturza made no attempt to dispute that combinations of such prior art
18 would disclose every limitation of the '043 patent's claims. Indeed, with respect to
19 obviousness, Mr. Sturza did not seem to apprehend the law—that the entire point of
20 obviousness is that a patent can be invalidated by a combination of multiple
21 references. Instead, Mr. Sturza seemed to believe that one cannot find obviousness
22 by clear and convincing evidence simply by virtue of the fact that multiple
23 references are combined. Trial Tr. at 2713. As a result, ViaSat offered no evidence
24 why, in light of the extensive prior art that discloses the core teachings of the '043

1 patent, the patent should be viewed as anything other than a combination of familiar
2 elements, using known methods, to yield predictable results. *KSR*, 550 U.S. at 416.
3 Every single one of the '043 claim limitations is expressly taught in multiple
4 references—most clearly, perhaps, in Rinaldo.

5 The best Mr. Sturza could do to distinguish Rinaldo—or combinations of
6 Rinaldo with other references—was to suggest that it was not enough for it to
7 consider frequency reuse factors of 1, 3, and 4. Trial Tr. at 2712. Alternatively, he
8 suggested that Rinaldo "teaches away" by recognizing that a satellite operator may
9 wish to simply not serve the most disadvantaged users rather than provide a poor
10 QoS. *E.g.*, Trial Tr. at 2711-12. Rinaldo only states that "for the (few) users
11 experiencing strong adverse propagation conditions," it "may be more efficient to
12 'freeze' them 'out'" in what is called an "outage" in which "their data [is] not
13 transmitted." Ex. A at SSL0086824 (emphasis added). But Figure 5 indicates there
14 is more than a "few" number of users with C/I less than C/N in a one-color
15 system—instead, it reveals that the majority of the users will be interference-
16 dominated. *See, e.g.*, Trial Tr. at 2198-99; *see also* Ex. A at Fig. 5. Nevertheless,
17 the paper discloses that a signal will be available to even the worst case users in
18 such a system 99.7% of the time, and the "freeze out" or "outage" would thus only
19 occur 0.3% of the time. Ex. A at SSL0086829 (Table II). The paper plainly does not
20 teach away from an aggressive frequency reuse factor, which results in more
21 interference-dominated users. To the contrary, it discloses that "[a]s Figure 5
22 indicates, C/I values over the satellite coverage region are subject to a significant
23 spread that can be readily exploited by the ACM adaptive physical layer," that such
24 "physical layer adaptability allows exploitation of a higher frequency reuse factor,"

1 and that "the average capacity is improving until an interference-limited situation is
2 reached." Ex. A at SSL0086833. Quite the contrary from teaching away, the paper
3 advocates using a much more aggressive frequency reuse factor, which will result
4 in interference-limited locations, precisely because ACM will help mitigate such
5 conditions. *Id.* Similarly, it states that "a frequency reuse factor of 1 achieves the
6 maximum average capacity," and that while it also results in "large, location-
7 dependent interference level from other beams," that issue "is however mitigated by
8 the reduced channel quality dependency on the propagation fading in the presence
9 of high interference levels." *Id.* at SSL0086834. Rinaldo does not discourage
10 adoption of a one-color system, which will plainly have a large number of
11 interference-dominated users who nevertheless receive a signal 99.7% of the time.
12 The fact that it mentions users "may" not be transmitted a signal 0.3% of the time
13 does not constitute teaching away. *Galderma Labs., L.P. v. Tolmar, Inc.*, 737 F.3d
14 731, 739 (Fed. Cir. 2013) ("A reference does not teach away . . . if it . . . does not
15 'criticize, discredit, or otherwise discourage' investigation into the invention
16 claimed.") (quotation marks and citation omitted).

17 In short, there is an exceedingly strong prima facie case of obviousness.
18 Multiple references disclose every limitation of the '043 patent's asserted claims. To
19 the extent that any one of them is distinguishable based on the trivial objections
20 raised by Mr. Sturza, they would be obvious to combine with other references
21 supplying the missing limitation.

1 **3. Secondary Factors Cannot Overcome This Strong Prima**
2 **Facie Case of Obviousness.**

3 In light of the strong prima facie case of obviousness, secondary factors
4 cannot save the '043 patent. *Master Lock*, 616 F.3d at 1237 (holding "secondary
5 considerations of nonobviousness—considered here by the district court—simply
6 cannot overcome a strong prima facie case of obviousness"); *see also, e.g., Boston*
7 *Scientific*, 554 F.3d at 991 (same).

8 It is not even clear what secondary factors ViaSat may attempt to rely on
9 regarding this patent. Certainly, it spent much of the trial touting the commercial
10 success of the ViaSat-1 satellite and awards it won such as the Guinness Book
11 Record for highest-capacity satellite. But there is no testimony or evidence in the
12 record that ViaSat-1 was commercially successful, or was praised, because of some
13 advancement over the prior art that is taught in the '043 patent. ViaSat-1 was not the
14 first broadband satellite to use ACM—iPSTAR was. *See, e.g., Trial Tr. at 2177.*³
15 ViaSat-1 was not the first satellite to use aggressive frequency reuse to increase
16 capacity—it used a 4-color system while iPSTAR used a more aggressive 3-color
17 system. And ViaSat has no evidence that anyone praised ViaSat-1—or that it was
18 commercially successful—because it had interference-dominated user locations. In
19 short, there is simply no nexus between any of the secondary considerations ViaSat
20 identified at trial and the claims of the '043 patent. Where, as here, the patentee fails
21 to "establish a nexus between the evidence of commercial success [or praise] and
22 the patented invention," the "evidence of secondary considerations [is] irrelevant in

23 ³ Indeed, unlike ViaSat-1, iPSTAR actually won an award specifically for its use of
24 ACM. Trial Tr. at 2177.

1 supporting the jury verdict of nonobviousness." *W. Union Co. v. MoneyGram*
2 *Payment Sys., Inc.*, 626 F.3d 1361, 1372 (Fed. Cir. 2010).

3 **C. Alternatively, SS/L is Entitled to a New Trial.**

4 In the alternative, SS/L is entitled to a new trial because the verdict is against
5 the weight of the evidence.

6 Whether to grant a new trial on some or all issues, pursuant to Fed. R. Civ. P.
7 59, is a matter of the trial court's discretion. *City Solutions, Inc. v. Clear Channel*
8 *Commc'ns*, 365 F.3d 835, 843 (9th Cir. 2004). Courts apply a lower standard of
9 proof to motions for new trial than they do to JMOL motions. *William Inglis v. ITT*
10 *Cont'l Baking Co.*, 668 F.2d 1014, 1026–7 (9th Cir. 1981) "[T]he trial court may
11 grant a new trial, even though the verdict is supported by substantial evidence, if
12 'the verdict is contrary to the clear weight of the evidence or is based upon evidence
13 which is false, or to prevent, in the sound discretion of the trial court, a miscarriage
14 of justice.'" *Wordtech Sys. v. Integrated Networks Solutions, Inc.*, 609 F.3d 1308,
15 1313 (Fed. Cir. 2010) (quoting *United States v. 4.0 Acres of Land*, 175 F.3d 1133,
16 1139 (9th Cir. 1999)). In deciding a motion for new trial, the court "has the right,
17 and indeed the duty, to weigh the evidence" and may evaluate the credibility of the
18 witnesses. *Murphy v. City of Long Beach*, 914 F.2d 183 (9th Cir. 1990); *United*
19 *States v. Kellington*, 217 F.3d 1084, 1095 (9th Cir. 2000). The court is not required
20 to view the evidence from the perspective most favorable to the prevailing party.
21 *Kellington*, 217 F.3d at 1095.

22 For the reasons set forth above, SS/L is, at the very least, entitled to a new
23 trial on invalidity of the '043 patent because the verdict is against the clear weight
24 of the evidence.

IV. CONCLUSION

SS/L is entitled to entry of judgment as a matter of law that the asserted claims of the '043 patent are invalid as anticipated and obvious in light of the prior art. In the alternative, SS/L is entitled to a new trial on invalidity of the '043 patent because the verdict is against the clear weight of the evidence.

Dated: June 13, 2014

By: /s/ Amanda K. Bonn

Marc M. Seltzer
Amanda K. Bonn
SUSMAN GODFREY L.L.P.
1901 Avenue of the Stars, Suite 950
Los Angeles, CA 90067-6029
Telephone: (310) 789-3100
Fax: (310) 789-3150
Email: abonnn@susmangodfrey.com

William Christopher Carmody
(Admitted *Pro Hac Vice*)
Jacob W. Buchdahl
(Admitted *Pro Hac Vice*)
SUSMAN GODFREY L.L.P.
560 Lexington Avenue, 15th Floor
New York, NY 10022
Telephone: (212) 336-8330
Fax: (212) 336-8340

Joseph S. Grinstein
(Admitted *Pro Hac Vice*)
William R. H. Merrill
(Admitted *Pro Hac Vice*)
SUSMAN GODFREY L.L.P.
1000 Louisiana Street, Suite 5100
Houston, Texas 77002-5096
Telephone: 713-653-7856
Facsimile: 713-654-6666

Email: jgrinstein@susmangodfrey.com
Email: bmerrill@susmangodfrey.com

Ian B. Crosby
(Admitted *Pro Hac Vice*)
Rachel S. Black
(Admitted *Pro Hac Vice*)
Patrick C. Bageant (275135)
SUSMAN GODFREY L.L.P.
1201 Third Avenue, Suite 3800
Seattle, WA 98101
Telephone: (206) 516-3861
Fax: (206) 516-3883
Email: icrosby@susmangodfrey.com
Email: rblack@susmangodfrey.com
Email: pbageant@susmangodfrey.com

*Attorneys for Defendants/Counterclaim
Plaintiffs Space Systems/Loral, LLC (f/k/a
Space Systems/Loral, Inc.) and Loral Space
& Communications Inc.*

CERTIFICATE OF SERVICE

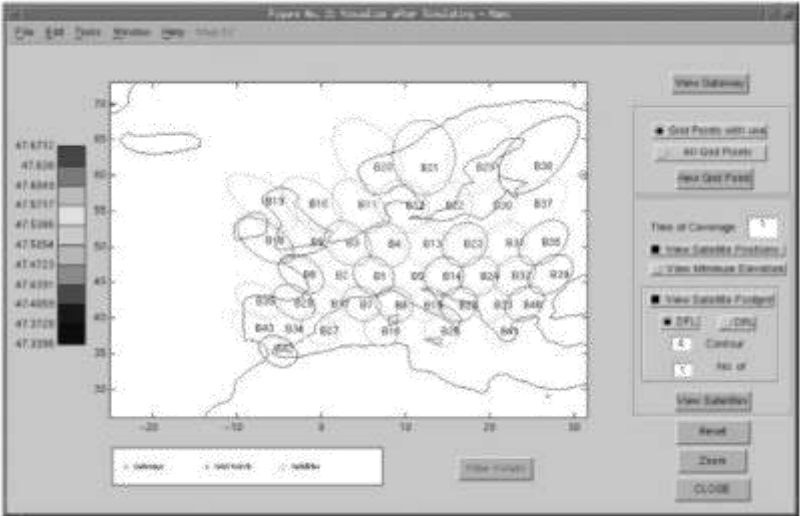
I hereby certify that, on June 13, 2014, I caused the foregoing **DEFENDANTS' MOTION FOR JUDGMENT AS A MATTER OF LAW (RENEWED), OR A NEW TRIAL (9 OF 12), REGARDING THE INVALIDITY OF THE ASSERTED CLAIMS OF THE '043 PATENT IN LIGHT OF THE PRIOR ART**, along with Appendix 1, to be served on opposing counsel via the Court's CM/ECF system.

Dated: June 13, 2014

By: /s/ Amanda K. Bonn

APPENDIX 1

Exemplary Trial Evidence for Invalidity of U.S. Patent No. 8,010,043

Claim 1	Rinaldo (Anticipatory)																																		
1. [a] A satellite for illuminating a geographic area with signals, the satellite comprising:	<u>See, e.g., Trial Tr. at 2175-77, 2195-98 (Dr. Schindall Testimony).</u> <u>See, e.g., S-11 at Table 1 & Fig. 4:</u> Table II. Ka-band multibeam study case system parameters. <table border="1" data-bbox="548 478 1360 884"> <thead> <tr> <th>Parameter</th><th>Value</th></tr> </thead> <tbody> <tr> <td>Satellite orbit</td><td>GEO</td></tr> <tr> <td>Carrier frequency</td><td>20.0 GHz</td></tr> <tr> <td>Total bandwidth (B)</td><td>500 MHz</td></tr> <tr> <td>Fading profile</td><td>As for Nola (I) see Figure 6</td></tr> <tr> <td>Satellite antenna beams</td><td>43</td></tr> <tr> <td>Antenna peak gain</td><td>52.18 dBi</td></tr> <tr> <td>Antenna efficiency</td><td>100%</td></tr> <tr> <td>Frequency reuse factor (f_R)</td><td>1, 3, 4</td></tr> <tr> <td>Polarization reuse factor (N_P)</td><td>1</td></tr> <tr> <td>RF power/beam</td><td>5–20 dBW</td></tr> <tr> <td>Availability requirement (P_{avail})</td><td>99.7% EOC</td></tr> <tr> <td>Receiver antenna gain</td><td>41.7 dBi</td></tr> <tr> <td>Clear sky receiver temp. (T_{CS})</td><td>252.44 K</td></tr> <tr> <td>Receiver rain delta temp. (ΔT_r)</td><td>221.83 K</td></tr> <tr> <td>Signal to intermodulation noise ratio (C/I)^{int}</td><td>15 dB</td></tr> <tr> <td>Other systems interference power spectral density I_0^{other}</td><td>–203.4 dBW/Hz</td></tr> </tbody> </table>  Figure 4. GEO 43 beams satellite antenna footprint.	Parameter	Value	Satellite orbit	GEO	Carrier frequency	20.0 GHz	Total bandwidth (B)	500 MHz	Fading profile	As for Nola (I) see Figure 6	Satellite antenna beams	43	Antenna peak gain	52.18 dBi	Antenna efficiency	100%	Frequency reuse factor (f_R)	1, 3, 4	Polarization reuse factor (N_P)	1	RF power/beam	5–20 dBW	Availability requirement (P_{avail})	99.7% EOC	Receiver antenna gain	41.7 dBi	Clear sky receiver temp. (T_{CS})	252.44 K	Receiver rain delta temp. (ΔT_r)	221.83 K	Signal to intermodulation noise ratio (C/I) ^{int}	15 dB	Other systems interference power spectral density I_0^{other}	–203.4 dBW/Hz
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[b] a power source;	<u>See above.</u>																																		

Exemplary Trial Evidence for Invalidity of U.S. Patent No. 8,010,043

Claim 1	Rinaldo (Anticipatory)
[c] an antenna;	<i>See above.</i>
[d] a plurality of spot beams emanating from the antenna to service a plurality of service links, wherein:	<i>See above.</i>
[e] the plurality of spot beams includes a first spot beam and a second spot beam, the first spot beam illuminates a first region within the geographic area, in order to send information to a first plurality of subscriber terminals, the second spot beam illuminates a second region within the geographic area and adjacent to the first region, in order to send information to a second plurality of subscriber terminals, whereby the first and second regions overlap,	<i>See above.</i>

Exemplary Trial Evidence for Invalidity of U.S. Patent No. 8,010,043

Claim 1	Rinaldo (Anticipatory)
[f] the first spot beam as sent to at least one of the first plurality of subscriber terminals is affected by interference from other signal sources including the second spot beam at a signal-to-interference ratio C/I,	<u>See, e.g., Trial Tr. at 2198-2201 (Dr. Schindall Testimony)</u> (Testifying that Figure 5 discloses C/I values for a 1-color system far less than worst-case C/N of 11.9 dB as calculated by Dr. Schindall, or 10.3 dB as calculated by Mr. Sturza.) <u>See also, e.g., S-11 at Pages 413-14, 417 & Fig. 5:</u> (“The resulting satellite antenna C/I probability density function** (pdf) defined by (A10) in Appendix A.3 has been numerically derived for the different frequency reuse factors and corresponding results are reported in Figure 5. . . . As expected, frequency reuse factor 1 results in the widest range of C/I values and in the minimum C/I value.”). (“It should be noted that the full frequency reuse, although achieving the highest system average capacity, also causes the largest bit rate fluctuations over the coverage region (due to the large, location-dependent interference level from other beams).”). R. RINALDO AND R. DE GAUDENZI Figure 5. PDF for the forward link C/I for frequency reuse factors 1, 3 and 4.

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Exemplary Trial Evidence for Invalidity of U.S. Patent No. 8,010,043

Claim 1	Rinaldo (Anticipatory)
[h]and the satellite is operated to maximize data-carrying capacity of the plurality of spot beams as measured in bits/Hz, by utilizing a beam pattern having a specific number of color(s) of frequency and polarization and specific beam spacing that results in higher data-carrying capacity of the plurality of spot beams than achieved with other alternative numbers of color(s) of frequency and polarization and beam spacings.	<u>See also, e.g., Trial Tr. at 2200-01 (Dr. Schindall Testimony):</u> (Testifying that Rinaldo “selects a number of colors” or “the optimum frequency and polarization reuse factors,” then “select[s] the beam spacing,” where “they mostly relied on the 4 dB overlapping point at the beam triple intersection point, but they did consider other beam spacing,” and “then you maximize capacity, and that’s what they did where they came up with the result of a frequency reuse factor of one achieves the maximum average capacity. And they also point out that it’s dependent upon the [b]ea[m] center spacing.”). <u>See also, e.g., S-11 at Pages 407, 413, 417:</u> (“The optimum average system efficiency can be obtained by finding the optimum frequency and polarization reuse factors, which solve the following: [equation], where [factor 1] and [factor 2] are the frequency and polarization reuse factors, respectively.”) (“The beam boresights have been arranged in a hexagonal pattern, with distances corresponding to a 4dB overlapping point at the beam triple intersection point. . . .”) (“In the present study case, a frequency reuse factor of 1 achieves the maximum average capacity. This result is significantly dependent on the antenna design and in particular on the beam center spacing adopted. . . .”)

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Claim 7	Rinaldo (Anticipatory)
7. [a] A satellite for illuminating a geographic area with signals, the satellite comprising:	<u>See, e.g., Trial Tr. at 2201 (Dr. Schindall Testimony):</u> (Testifying that he relied on the same evidence for identical limitations in Claims 1 & 7). <i>See Claim 1 above.</i>
[b] a power source;	<i>See Claim 1 above.</i>
[c] an antenna;	<i>See Claim 1 above.</i>
[d] a plurality of spot beams emanating from the antenna to service a plurality of service links, wherein:	<i>See Claim 1 above.</i>
[e] the plurality of spot beams includes a first spot beam and a second spot beam, the first spot beam illuminates a first region within the geographic area, in order to send information to a first plurality of subscriber terminals, the second spot beam illuminates a second region within the geographic area and adjacent to the first region, in order to send information to a second plurality of subscriber terminals, whereby the first and second regions overlap,	<i>See Claim 1 above.</i>
[f] the first spot beam as sent to at	<i>See Claim 1 above.</i>

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Claim 7	Rinaldo (Anticipatory)
least one of the first plurality of subscriber terminals is affected by interference from other signal sources including the second spot beam at a signal-to-interference ratio C/I,	
[g] the first spot beam as sent to the at least one of the first plurality of subscriber terminals is further affected by noise at a signal-to-noise ratio C/N, whereby reception of signals from the first spot beam by the at least one of the first plurality of subscriber terminals is interference-dominated such that C/I is less than C/N,	<i>See Claim 1 above.</i>
[h] the first spot beam including at least a first portion sent to a first subscriber terminal from the first plurality of subscriber terminals utilizing a first coding and modulation combination, and	<u>See, e.g., Trial Tr. at 2201-02:</u> (Testifying that Rinaldo “talks about adjusting the physical layer parameters,” which “means adjusting the mod code in real time, meaning at every instant . . . to meet the needs of each individual user,” meaning “they’re optimizing each individual user separately . . . [t]hat’s what ACM is all about.”) <u>See also, e.g., S-11 at Pages 405-06, 418:</u> (“This paper proposes a methodology for evaluating the performance of ACM point-to-point satellite systems, where the physical layer parameters are adjusted in real time to meet the needs of each individual user. In order to simplify both resource management and receiver implementation, the adaptation considered varies only the modulation and coding, whiel keeping the chip rate and beam power constant”)

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Claim 7	Rinaldo (Anticipatory)
	(“The UT SNIR reports allow the forward link scheduler to match the current physical layer of individual packets to the current link conditions.”) (“Since the bit rate is dependent on user location and propagation channel conditions, the optimization of the physical layer parameters is performed on each active link.”).
[i] the first spot beam including a second portion sent to a second subscriber terminal in the first plurality of subscriber terminals utilizing a second coding and modulation combination,	<i>See above.</i>
[j] the first coding and modulation combination being different from the second coding and modulation combination.	<i>See above.</i>

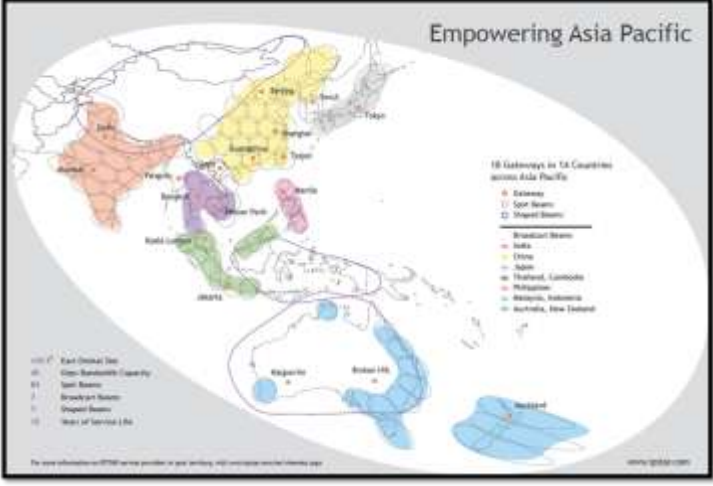
Exemplary Trial Evidence for Invalidity of U.S. Patent No. 8,010,043

Claim 8	Rinaldo (Anticipatory)
8. The satellite for illuminating a geographic area with signals of claim 7, wherein the first coding and modulation combination and second coding and modulation combination are selected according to an adaptive coding and modulation (ACM) scheme.	<i>See above Claim 7.</i>

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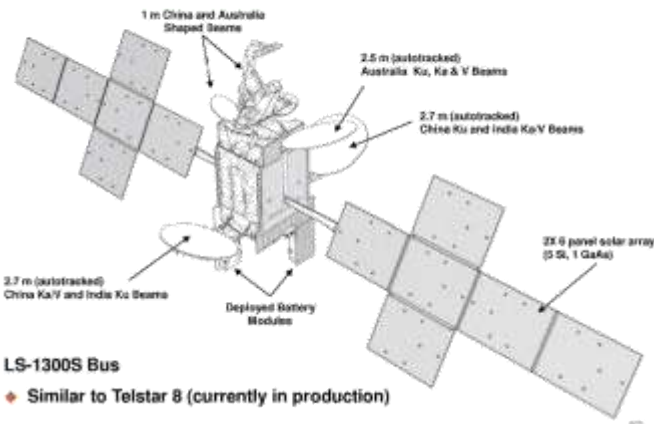
Claim 3	Rinaldo (Anticipatory)
3. [a] The satellite for illuminating a geographic area with signals of claim 1, wherein the plurality of spot beams comprise adaptive coding and modulation (ACM) signals, and	<i>See Claims 1 & 8 above.</i> <u>See also, e.g., Trial Tr. at 2202-03 (Dr. Schindall Testimony):</u> (Testifying Rinaldo discloses maximizing “normalized average beam capacity” and “they’re talking about ACM with Shannon”)
[b] the data-carrying capacity of the plurality of spot beams is maximized by maximizing average data-carrying capacity within the plurality of spot beams.	<u>See, e.g., Trial Tr. at 2202-03 (Dr. Schindall Testimony):</u> (Testifying Rinaldo discloses maximizing “normalized average beam capacity” and “they’re talking about ACM with Shannon”) <u>See also, e.g., S-11 at Page 415:</u> (“Simulated normalized average beam capacity for various frequency reuse factors as a function of the satellite RF power/carrier bandwidth [variable] for DVB-S and ACM with Shannon bound, discrete modulations and continuous coding rate, discrete modulations and coding rates.”) Figure 7. Simulated normalized average beam capacity for various frequency reuse factors as a function of the satellite RF power/carrier bandwidth (W/Mcps) for DVB-S and ACM with Shannon bound, discrete modulations and continuous coding rate, discrete modulations and coding rates.

Exemplary Trial Evidence for Invalidity of U.S. Patent No. 8,010,043

Claim 1	iPSTAR (Anticipatory) ¹
1. [a] A satellite for illuminating a geographic area with signals, the satellite comprising:	<u>See, e.g., Trial Tr. at 2177-79 (Dr. Schindall Testimony):</u> (Testifying that iPSTAR is a satellite built by SS/L to illuminate the geographic area of Asia). <u>See, e.g., S-1286 at SSL0087547:</u> 
[b] a power source;	<u>See, e.g., Trial Tr. at 2180-81 (Dr. Schindall Testimony):</u> (Testifying that iPSTAR has a power source and antenna) <u>See also, e.g., S-655 (Proposal Section 3) at SSL2234017:</u>

¹ For purposes of this exemplary chart, SS/L includes exemplary citations to exhibits and Dr. Schindall's testimony. In addition, the testimony of Mark Thompson further demonstrates that iPSTAR anticipates every asserted claim of the '043 patent. *See, e.g., Trial Tr. 2088-2105, 2118-2152.*

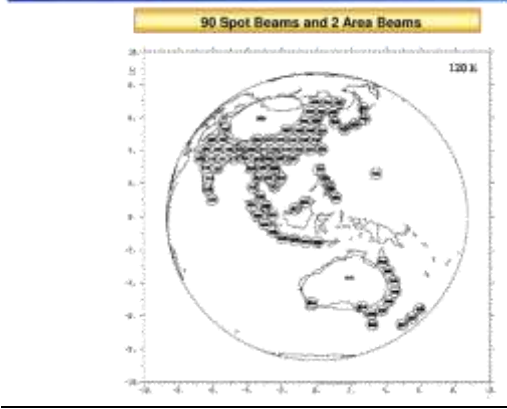
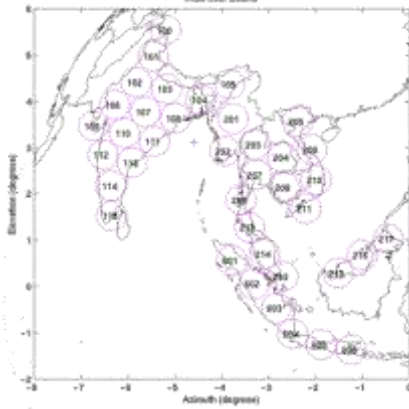
Exemplary Trial Evidence for Invalidity of U.S. Patent No. 8,010,043

Claim 1	iPSTAR (Anticipatory) ¹
	Thaicom Broadband Satellite  LS-1300S Bus ♦ Similar to Telstar 8 (currently in production) <u>See also, e.g., S-890 (Performance Spec.) at SSL0092666, SSL092821:</u> 10.2 SOLAR ARRAY The primary power source shall be a solar array consisting of solar cells with cover slips with adequate ultraviolet filtering. The active area of each solar cell shall be fully protected by cover glass to provide radiation protection. 4.4 COMMUNICATIONS PAYLOAD ANTENNA COVERAGE 4.4.1 Antenna Coverage Definitions Ku-band spot beams and shaped beams are employed to provide coverage to the Users. Ka-band spot beams are employed to provide coverage to the Gateways. 4.4.1.1 Forward Payload (Ka-band Uplinks and Ku-band Downlinks) The forward payload has 84 D/L Ku-band Spot Beams and 3 D/L Ku-band Shaped Beams. 4.4.1.2 Return Payload (Ku-band Uplinks and Ka-band Downlinks) The return payload has 84 U/L Ku-band Spot Beams and 3 U/L Ku-band Shaped Beams.

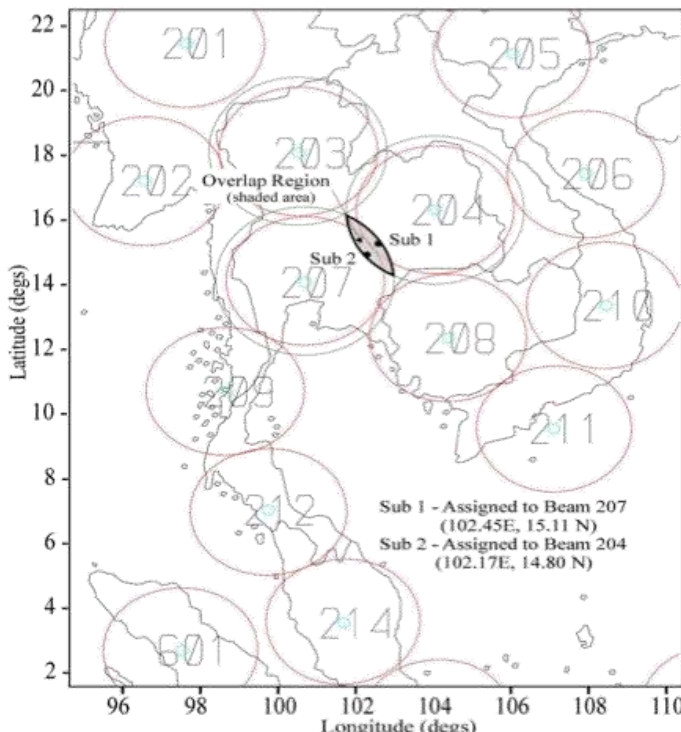
Exemplary Trial Evidence for Invalidity of U.S. Patent No. 8,010,043

Claim 1	iPSTAR (Anticipatory) ¹
[c] an antenna;	See above.
[d] a plurality of spot beams emanating from the antenna to service a plurality of service links, wherein:	<u>See, e.g., Trial Tr. at 2180-81 (Dr. Schindall Testimony):</u> (Testifying iPSTAR has a plurality of spot beams emanating from the antenna to service a plurality of service links). <u>See also, e.g., S-655 (Proposal Section 3) at SSL2234013:</u> Configuration 2: Satellite System Concept <u>See also, e.g., S-890 (Performance Spec.) at SSL0092666:</u> 4.4.1.1 Forward Payload (Ka-band Uplinks and Ku-band Downlinks) The forward payload has 84 D/L Ku-band Spot Beams and 3 D/L Ku-band Shaped Beams.

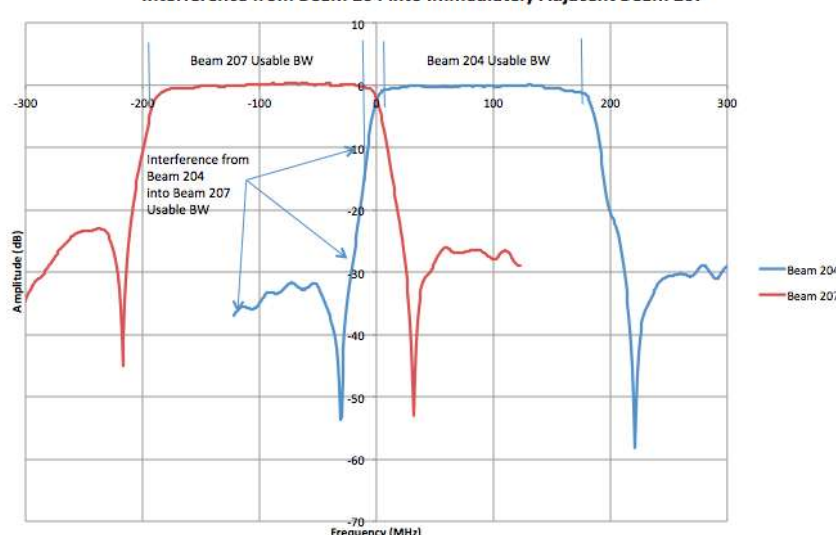
Exemplary Trial Evidence for Invalidity of U.S. Patent No. 8,010,043

Claim 1	iPSTAR (Anticipatory) ¹
[e] the plurality of spot beams includes a first spot beam and a second spot beam, the first spot beam illuminates a first region within the geographic area, in order to send information to a first plurality of subscriber terminals, the second spot beam illuminates a second region within the geographic area and adjacent to the first region, in order to send information to a second plurality of subscriber terminals, whereby the first and second regions overlap,	<u>See, e.g., Trial Tr. at 2181-83 (Dr. Schindall Testimony):</u> (Testifying that Beams 207 and 208 satisfy claim limitation 1(e)). <u>See also, e.g., S-655 (Proposal Section 3) at SSL2234014:</u> Ku-Band Beams  <u>See also, e.g., S-890 (Performance Spec.) at SSL0092670:</u> 

Exemplary Trial Evidence for Invalidity of U.S. Patent No. 8,010,043

Claim 1	iPSTAR (Anticipatory) ¹																																																																																					
	<u>See also, e.g., S-1315:</u>  Subset of Subscribers on Beams 203, 204, 207 - March 2006 <table><tr><th></th><th>Cell</th><th>Long</th><th>Lat</th><th>MAC</th></tr><tr><td colspan="5">...</td></tr><tr><td>Sub 2</td><td>204</td><td>102.1688</td><td>14.8012</td><td>00079327B1D4</td></tr><tr><td></td><td>204</td><td>104.0141</td><td>16.2202</td><td>000793127EF6</td></tr><tr><td></td><td>204</td><td>103.9122</td><td>16.4064</td><td>00079313FDB1</td></tr><tr><td></td><td>204</td><td>104.1524</td><td>16.2278</td><td>00079315F8C8</td></tr><tr><td></td><td>204</td><td>103.6179</td><td>15.8844</td><td>000793166E12</td></tr><tr><td></td><td>204</td><td>103.8593</td><td>16.0733</td><td>000793185CEC</td></tr><tr><td colspan="5">...</td></tr><tr><td>Sub 1</td><td>207</td><td>102.4488</td><td>15.1162</td><td>0007931BD7CD</td></tr><tr><td></td><td>207</td><td>100.6711</td><td>14.8343</td><td>00079310BF47</td></tr><tr><td></td><td>207</td><td>100.0548</td><td>15.0148</td><td>000793119D5B</td></tr><tr><td></td><td>207</td><td>100.6365</td><td>15.0739</td><td>0007931F88B5</td></tr><tr><td></td><td>207</td><td>99.6768</td><td>15.1006</td><td>0007931436AD</td></tr><tr><td></td><td>207</td><td>99.9956</td><td>15.3101</td><td>000793131A48</td></tr><tr><td></td><td>207</td><td>99.9217</td><td>12.1469</td><td>0007931E6817</td></tr><tr><td colspan="5">...</td></tr></table>		Cell	Long	Lat	MAC	...					Sub 2	204	102.1688	14.8012	00079327B1D4		204	104.0141	16.2202	000793127EF6		204	103.9122	16.4064	00079313FDB1		204	104.1524	16.2278	00079315F8C8		204	103.6179	15.8844	000793166E12		204	103.8593	16.0733	000793185CEC	...					Sub 1	207	102.4488	15.1162	0007931BD7CD		207	100.6711	14.8343	00079310BF47		207	100.0548	15.0148	000793119D5B		207	100.6365	15.0739	0007931F88B5		207	99.6768	15.1006	0007931436AD		207	99.9956	15.3101	000793131A48		207	99.9217	12.1469	0007931E6817	...				
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Exemplary Trial Evidence for Invalidity of U.S. Patent No. 8,010,043

Claim 1	iPSTAR (Anticipatory) ¹					
[f] the first spot beam as sent to at least one of the first plurality of subscriber terminals is affected by interference from other signal sources including the second spot beam at a signal-to-interference ratio C/I,	<u>See, e.g., Trial Tr. at 2182-85 (Dr. Schindall Testimony):</u> (Testifying Beam 207 has “95-percent C over I beam 13.8 dB,” which means “95-percent of users have more than that value, but 5-percent of users, the ones toward the edge of the beam most likely, would have less than that value”. Further testifying that evidence from Mark Thompson “show[s] how the adjacent beam is actually interfering” in S-1212 and S-1311.).					
	<u>See also, e.g., S-1311 (Codespace Memo):</u> (“3-color reuse has the clear advantage of increased bandwidth in the cell, but suffers from low C/I (adjacent cell interference), especially in the triple point area where gain roll-off is highest. In these areas, C/I may dominate the link budget . . .”).					
	<u>See also, e.g., S-1312:</u>					
	Interference from Beam 204 into Immediately Adjacent Beam 207 					
	<u>See also, e.g., S-1430 (Proposal Section 3.3.1) at SSL0100622.</u> <u>See also, e.g., S-890 (Performance Spec.) at SSL0092718, SSL0092723:</u> <table><tr><th>Beam ID</th><th>95% C/I, dB</th><th>50% C/I, dB</th></tr><tr><td>207</td><td>13.8</td><td>17.2</td></tr></table>	Beam ID	95% C/I, dB	50% C/I, dB	207	13.8
Beam ID	95% C/I, dB	50% C/I, dB				
207	13.8	17.2				

Exemplary Trial Evidence for Invalidity of U.S. Patent No. 8,010,043

Claim 1	iPSTAR (Anticipatory) ¹
	<u>See also, e.g., S-890 (Performance Spec.) at SSL0092665:</u> o. Transmit Aggregate Carrier to Interference Isolation (C/I) — The transmit aggregate Carrier to Interference Isolation, C/I, of an antenna is defined as the ratio of the directivity of the desired beam at a point within its desired angular coverage area to the sum directivity of all interfering beams at the same point within the desired coverage: $\frac{C}{I}(\theta_i) = 10 \log_{10} \left(\frac{D_i(\theta_i)}{\sum_{j \in Cov} D_j(\theta_i)} \right), \text{ where}$ ➤ C/I_i is the Carrier to Interference Ratio for the ith beam in dB ➤ θ_i is the angular coverage area of the ith beam ➤ D_i is the directivity of the ith beam in power equivalent ➤ Cov is the list of co-frequency coverage regions of beams of which i is one.
[g] the first spot beam as sent to the at least one of the first plurality of subscriber terminals is further affected by noise at a signal-to-noise ratio C/N, whereby reception of signals from the first spot beam by the at least one of the first plurality of subscriber terminals is interference-dominated such that C/I is less than C/N,	<u>See, e.g., Trial Tr. at 2185-87 (Dr. Schindall Testimony):</u> (Testifying that S-1311 discloses C/I less than C/N explicitly. Testifying that performance specification discloses “the worst-case C over N . . . was 19.9 dB” while “[f]or 5-percent of users,” their C/I is “less than 13.8 dB,” thus disclosing C/I less than C/N. Testifying that factory data spreadsheet S-1247 further shows C/N is 14.5 dB and C/I is 12.8 dB in Beam 207, disclosing C/I less than C/N). <u>See also, e.g., S-1311 at SSL0088881-82:</u> (“3-color reuse has the clear advantage of increased bandwidth in the cell, but suffers from low C/I (adjacent cell interference), especially in the triple point area where gain roll-off is highest. In these areas, C/I may dominate the link budget and yield low capacity efficiency in that area. However, this area is limited and the new modulation formats being developed by Codespace and the forward error correction turbo codes now available ensure link budgets will close even with thee [sic] high interference adjacent cells. In both the 3 and 4-color reuse patterns, interference from peak to mid-cell is minimal and does not have a large effect on capacity.”) (“The best thing we could do for increasing capacity would be to increase the TWT power as the C/N dominates everywhere but triple point where C/I is lower than C/N.”)

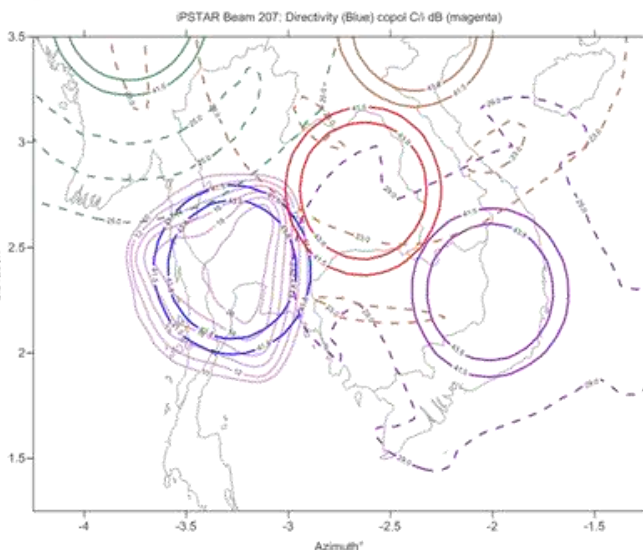
Exemplary Trial Evidence for Invalidity of U.S. Patent No. 8,010,043

Claim 1**iPSTAR (Anticipatory)¹**

See also, e.g., S-890 (Performance Spec.) at SSL0092718:

Table 4.4-7(a) Ku-Band User Spot Beams Transmit C/I											
Ku-Standard Band ID	Beam ID	95% C/I, dB	50% C/I, dB	Ku-Standard Band ID	Beam ID	95% C/I, dB	50% C/I, dB	Ku-Standard Band ID	Beam ID	95% C/I, dB	50% C/I, dB
Standard-1	100	15.6	21.0	Standard-2	301	12.0	18.7	Standard-3	501	27.0	27.0
	207	13.8	17.2		323	12.4	16.4				

See also, e.g., S-1247 (Factory Data Spreadsheet):



Carrier to Composite Interference for Beam 207
(Calculated from Measured Antenna Data)

Beam 207 Forward Downlink Budget

Parameter	Value
D/L Freq. (GHz)	12.25
EIRP, Edge of Coverage, at Sat	56.1
Number of 54 Mbps Carriers	3.0
Output Backoff (dB)	-3.0
EIRP per Carrier (dBW)	48.3
Flux Density (dBW/m ²)	-113.8
Chan B'W (MHz)	37.5
Atmospheric Atten. (dB)	-0.5
Grid Antenna Dia (m)	1.2
Grid Ant Gain (dB)	41.5
Grid G/T (dB-K)	21.0
C/N D/L (dB)	14.5

Beam 207 Composite C/I

C/I Forward Downlink (dB)*	12.8
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* As read from composite C/I measured at SSL factory (see "C/I Composite Plot" tab)

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Claim 1	iPSTAR (Anticipatory) ¹									
[h] and the satellite is operated to maximize data-carrying capacity of the plurality of spot beams as measured in bits/Hz, by utilizing a beam pattern having a specific number of color(s) of frequency and polarization and specific beam spacing that results in higher data-carrying capacity of the plurality of spot beams than achieved with other alternative numbers of color(s) of frequency and polarization and beam spacings.	<u>See, e.g., Trial Tr. at 2187-89 (Dr. Schindall Testimony):</u> (Testifying that iPSTAR maximizes capacity by achieving greater capacity with a 3-color pattern than a 4-color or 7-color pattern based on S-1311 (CodeSpace Memo) and analysis by Hampton Chan. <u>See also, e.g., S-1311 at SSL0088880-82:</u> (“Codespace has been working on antenna design to maximize gain over the desired area, while minimizing the spill-over interference into adjacent cells using the same frequency bands. This optimization coupled with the best frequency reuse pattern should yield the highest forward link capacity system.”) (“3-color reuse maximizes overall capacity to each cell.”) Total Forward Link Capacity (100 Cells) <table><tr><th></th><th>0.5 degree, 3 dB bandwidth</th><th>0.7 degree, 3 dB bandwidth</th></tr><tr><td>3-color Reuse</td><td>43 Gbps</td><td>39 Gbps</td></tr><tr><td>4-color Reuse</td><td>36 Gbps</td><td>33 Gbps</td></tr></table>		0.5 degree, 3 dB bandwidth	0.7 degree, 3 dB bandwidth	3-color Reuse	43 Gbps	39 Gbps	4-color Reuse	36 Gbps	33 Gbps
	0.5 degree, 3 dB bandwidth	0.7 degree, 3 dB bandwidth								
3-color Reuse	43 Gbps	39 Gbps								
4-color Reuse	36 Gbps	33 Gbps								

Exemplary Trial Evidence for Invalidity of U.S. Patent No. 8,010,043

Claim 7	iPSTAR (Anticipatory)
7. [a] A satellite for illuminating a geographic area with signals, the satellite comprising:	<i>See Claim 1 above.</i>
[b] a power source;	<i>See Claim 1 above.</i>
[c] an antenna;	<i>See Claim 1 above.</i>
[d] a plurality of spot beams emanating from the antenna to service a plurality of service links, wherein:	<i>See Claim 1 above.</i>
[e] the plurality of spot beams includes a first spot beam and a second spot beam, the first spot beam illuminates a first region within the geographic area, in order to send information to a first plurality of subscriber terminals, the second spot beam illuminates a second region within the geographic area and adjacent to	<i>See Claim 1 above.</i>

Exemplary Trial Evidence for Invalidity of U.S. Patent No. 8,010,043

Claim 7	iPSTAR (Anticipatory)
the first region, in order to send information to a second plurality of subscriber terminals, whereby the first and second regions overlap,	
[f] the first spot beam as sent to at least one of the first plurality of subscriber terminals is affected by interference from other signal sources including the second spot beam at a signal-to-interference ratio C/I,	<i>See Claim 1 above.</i>
[g] the first spot beam as sent to the at least one of the first plurality of subscriber terminals is further affected by noise at a signal-to-noise ratio C/N, whereby reception of signals from the first spot beam by the at least one of the first plurality of	<i>See Claim 1 above.</i>

Exemplary Trial Evidence for Invalidity of U.S. Patent No. 8,010,043

Claim 7	iPSTAR (Anticipatory)																																																																																														
subscriber terminals is interference-dominated such that C/I is less than C/N,																																																																																															
[h] the first spot beam including at least a first portion sent to a first subscriber terminal from the first plurality of subscriber terminals utilizing a first coding and modulation combination, and	<u>See, e.g., Trial Tr. at 2190-93 (Dr. Schindall Testimony):</u> (Testifying iPSTAR sent two different codings and modulations to two users in Beam 207 at the same time based on Mark Thompson’s Mod/Code Chronology S-2621 and published paper describing its use of ACM). <u>See also, e.g., S-2621 (Mod/Code Chronology):</u> Mod/Code Chronology for Two Terminals: Both Terminals in Beam 207 14-Jan-06 <table><tr><th>Start Time</th><th>End Time</th><th>Mod/Code for MAC 000793CA2505</th></tr><tr><td>16:09:56</td><td>16:09:59</td><td>01</td></tr><tr><td>16:09:59</td><td>16:10:22</td><td>EB</td></tr><tr><td>16:10:22</td><td>16:16:47</td><td>8D</td></tr><tr><td>16:16:47</td><td>16:48:11</td><td>EB</td></tr><tr><td>16:48:11</td><td>16:51:26</td><td>8D</td></tr><tr><td>16:51:26</td><td>17:27:33</td><td>EB</td></tr><tr><td>17:27:33</td><td>17:29:05</td><td>E0</td></tr><tr><td>17:29:05</td><td>17:41:41</td><td>8D</td></tr><tr><td>17:41:41</td><td>17:49:57</td><td>BB</td></tr><tr><td>17:49:57</td><td>18:08:46</td><td>8D</td></tr><tr><td>18:08:46</td><td>18:29:34</td><td>E0</td></tr><tr><td>18:29:34</td><td>18:43:21</td><td>8D</td></tr></table> <table><tr><th>Start Time</th><th>End Time</th><th>Mod/Code for MAC 0007931627A0</th></tr><tr><td>16:09:57</td><td>16:10:01</td><td>01</td></tr><tr><td>16:10:01</td><td>16:10:31</td><td>EB</td></tr><tr><td>16:10:31</td><td>16:18:29</td><td>BB</td></tr><tr><td>16:18:29</td><td>16:21:13</td><td>EB</td></tr><tr><td>16:21:13</td><td>16:21:46</td><td>8D</td></tr><tr><td>16:21:46</td><td>16:23:06</td><td>E0</td></tr><tr><td>16:23:06</td><td>16:23:44</td><td>8D</td></tr><tr><td>16:23:44</td><td>16:27:52</td><td>EB</td></tr></table> Mod/Codes Differed During the Following Times: <table><tr><th>Start Time</th><th>End Time</th><th>Mod/Code for MAC 000793CA2505</th><th>Mod/Code for MAC 0007931627A0</th></tr><tr><td>16:09:59</td><td>16:10:01</td><td>EB</td><td>01</td></tr><tr><td>16:10:31</td><td>16:16:47</td><td>8D</td><td>BB</td></tr><tr><td>16:16:47</td><td>16:18:29</td><td>EB</td><td>BB</td></tr><tr><td>16:21:13</td><td>16:21:46</td><td>EB</td><td>8D</td></tr><tr><td>16:21:46</td><td>16:23:06</td><td>EB</td><td>E0</td></tr><tr><td>16:23:06</td><td>16:23:44</td><td>EB</td><td>8D</td></tr></table>	Start Time	End Time	Mod/Code for MAC 000793CA2505	16:09:56	16:09:59	01	16:09:59	16:10:22	EB	16:10:22	16:16:47	8D	16:16:47	16:48:11	EB	16:48:11	16:51:26	8D	16:51:26	17:27:33	EB	17:27:33	17:29:05	E0	17:29:05	17:41:41	8D	17:41:41	17:49:57	BB	17:49:57	18:08:46	8D	18:08:46	18:29:34	E0	18:29:34	18:43:21	8D	Start Time	End Time	Mod/Code for MAC 0007931627A0	16:09:57	16:10:01	01	16:10:01	16:10:31	EB	16:10:31	16:18:29	BB	16:18:29	16:21:13	EB	16:21:13	16:21:46	8D	16:21:46	16:23:06	E0	16:23:06	16:23:44	8D	16:23:44	16:27:52	EB	Start Time	End Time	Mod/Code for MAC 000793CA2505	Mod/Code for MAC 0007931627A0	16:09:59	16:10:01	EB	01	16:10:31	16:16:47	8D	BB	16:16:47	16:18:29	EB	BB	16:21:13	16:21:46	EB	8D	16:21:46	16:23:06	EB	E0	16:23:06	16:23:44	EB	8D
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Exemplary Trial Evidence for Invalidity of U.S. Patent No. 8,010,043

Claim 7	iPSTAR (Anticipatory)
	<u>See also, e.g., S-165 at SSL0085854:</u> (“Efficient Channel Coding (ECC), Inc. has developed a system using advanced error correction and higher-level modulations that greatly improves on the ACTS technique. The ECC system was developed in conjunction with CodeSpace LLC and Shin Satellite Public Company. It is incorporated into Shin Satellite’s iPSTAR satellite service.”) <u>1. Dynamic Links Using Adaptive Modulation and Coding</u> <u>Dynamic Link Assignment (DLA)</u> For dynamic links, variable modulation and TPC codes rates are utilized in an adaptive fashion. The signal to noise ratio (SNR) for the forward link is constantly monitored by each user terminal. The SNR for the return link from each user terminal is monitored by the gateway. As the SNR varies with changes in link attenuation, the modulation and/or code rate is automatically changed on both the forward and return links on an individual user terminal basis to ensure that its BER requirement is maintained.
[i] the first spot beam including a second portion sent to a second subscriber terminal in the first plurality of subscriber terminals utilizing a second coding and modulation combination,	<i>See above.</i>
[j] the first coding and modulation combination being different from the second coding and modulation combination.	<i>See above.</i>

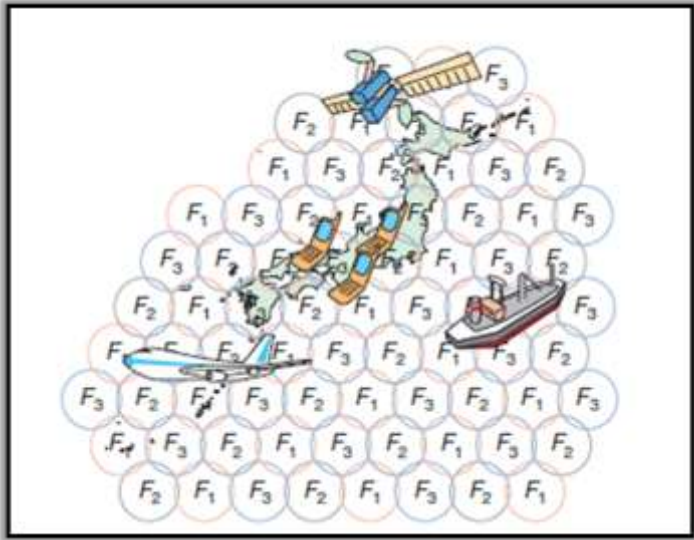
Exemplary Trial Evidence for Invalidity of U.S. Patent No. 8,010,043

Claim 8	iPSTAR (Anticipatory)
8. The satellite for illuminating a geographic area with signals of claim 7, wherein the first coding and modulation combination and second coding and modulation combination are selected according to an adaptive coding and modulation (ACM) scheme.	<i>See above Claim 7.</i>

Exemplary Trial Evidence for Invalidity of U.S. Patent No. 8,010,043

Claim 3	iPSTAR (Anticipatory)
3. [a] The satellite for illuminating a geographic area with signals of claim 1, wherein the plurality of spot beams comprise adaptive coding and modulation (ACM) signals, and	<i>See Claims 1 & 8 above.</i>
[b] the data-carrying capacity of the plurality of spot beams is maximized by maximizing average data-carrying capacity within the plurality of spot beams.	<u>See, e.g., Trial Tr. at 2193-94 (Dr. Schindall Testimony):</u> (Testifying iPSTAR maximized average data-carrying capacity based on evidence discussed above). <u>See also, e.g., S-165 at SSL0085854:</u> (“Since only a low percentage of user terminals in a beam will encounter large rain attenuation at any time, this technique, called Dynamic Link Assignment (DLA), significantly increases average information throughput per unit bandwidth.”).

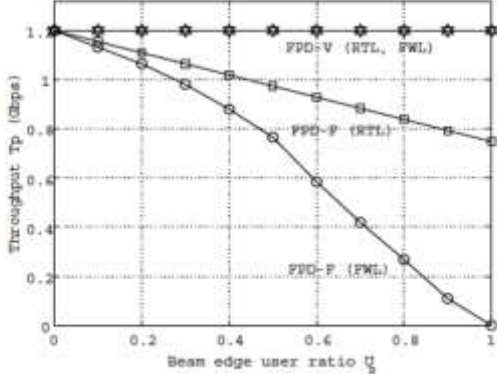
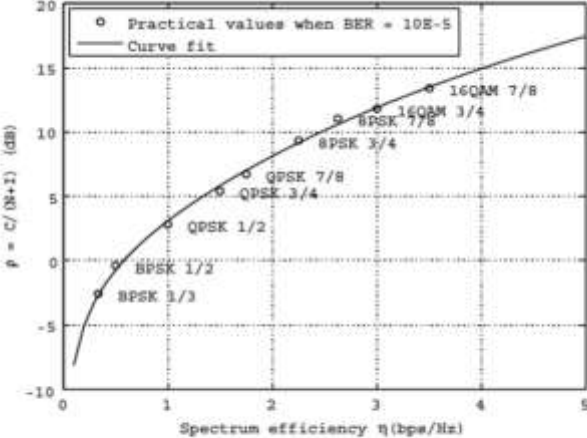
Exemplary Trial Evidence for Invalidity of U.S. Patent No. 8,010,043

Claim 7	Nakahira (Anticipatory)
7. [a] A satellite for illuminating a geographic area with signals, the satellite comprising:	<u>See, e.g., Trial Tr. at 2206-08 (Dr. Schindall Testimony).</u> <u>See also, e.g., S-1302 at Fig. 1 on Page 4012:</u>  <u>See also, e.g., S-1302 at Section 1 on Page 4011:</u> (“In the system we are proposing, a geostationary satellite The most suitable frequency band is the S-band, which is generally assigned to mobile satellite services (MSS).”)
[b] a power source;	<i>See above.</i>
[c] an antenna;	<i>See above.</i>
[d] a plurality of spot beams emanating from the antenna to service a plurality of service links, wherein:	<i>See above.</i>
[e] the plurality of spot beams includes a first spot beam and a second spot	<i>See above.</i>

Exemplary Trial Evidence for Invalidity of U.S. Patent No. 8,010,043

Claim 7	Nakahira (Anticipatory)
beam, the first spot beam illuminates a first region within the geographic area, in order to send information to a first plurality of subscriber terminals, the second spot beam illuminates a second region within the geographic area and adjacent to the first region, in order to send information to a second plurality of subscriber terminals, whereby the first and second regions overlap,	
[f] the first spot beam as sent to at least one of the first plurality of subscriber terminals is affected by interference from other signal sources including the second spot beam at a signal-to-interference ratio C/I,	<u>See, e.g., Trial Tr. at 2207-08 (Dr. Schindall Testimony).</u> (Testifying that “by first calculating the spectrum efficiency C over N plus I and then C over N, I was able to determine that the worst-case C over I is less than 6.7 dB, and the worst-case C over N is 11.4 dB. So once again, that condition is substantial, if met with margin.” Further testifying that “Mr. Sturza added some additional numbers to the calculation,” but that “[t]he values that are quoted here in the data in the paper stand by themselves, and I see no rationale for introducing sort of arbitrary adjustments to their numbers. . . .”).

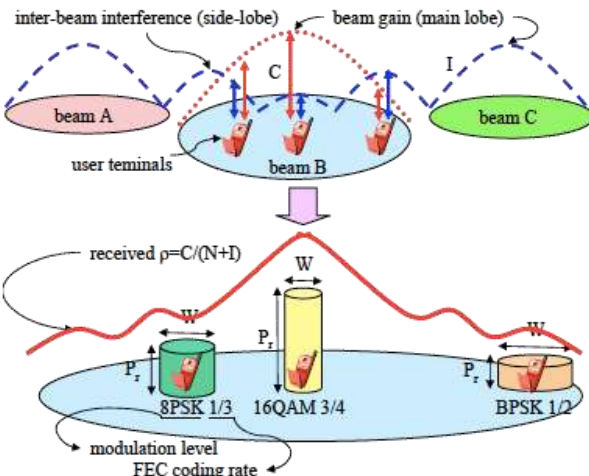
Exemplary Trial Evidence for Invalidity of U.S. Patent No. 8,010,043

Claim 7	Nakahira (Anticipatory)
	<u>See also, e.g., S-1302 at Figs. 4 & 11, Table I:</u>  Fig. 11. Throughput performance 2.  Fig. 4. Adaptive satellite modem performance.

Exemplary Trial Evidence for Invalidity of U.S. Patent No. 8,010,043

Claim 7	Nakahira (Anticipatory)																
	TABLE I SIMULATION PARAMETERS <table> <tr> <td>Beam number N_B</td><td>69</td></tr> <tr> <td>System bandwidth W_{sys}</td><td>35 MHz (FWL/RTL)</td></tr> <tr> <td>Satellite antenna pattern (Fig. 2)</td><td>47.5 dB (beam center) 45.0 dB (beam edge)</td></tr> <tr> <td>Satellite transmission power</td><td>600 W</td></tr> <tr> <td>User terminal G/T</td><td>-11.3 dB/K</td></tr> <tr> <td>User terminal EIRP</td><td>11.5 dBW</td></tr> <tr> <td>Users in each beam U_T</td><td>10</td></tr> <tr> <td>Modulation and coding</td><td>9 sets, shown in Fig. 4</td></tr> </table>	Beam number N_B	69	System bandwidth W_{sys}	35 MHz (FWL/RTL)	Satellite antenna pattern (Fig. 2)	47.5 dB (beam center) 45.0 dB (beam edge)	Satellite transmission power	600 W	User terminal G/T	-11.3 dB/K	User terminal EIRP	11.5 dBW	Users in each beam U_T	10	Modulation and coding	9 sets, shown in Fig. 4
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[g] the first spot beam as sent to the at least one of the first plurality of subscriber terminals is further affected by noise at a signal-to-noise ratio C/N, whereby reception of signals from the first spot beam by the at least one of the first plurality of subscriber terminals is interference-dominated such that C/I is less than C/N,	<i>See above.</i>																
[h] the first spot beam including at least a first portion sent to a	<u>See, e.g., Trial Tr. at 2206-08 (Dr. Schindall Testimony):</u> (Testifying that Nakahira discloses ACM, with the below figure showing “Beam B with three users in the beam. And at the bottom, you can see that each of the – right below those cylinders, which																

Exemplary Trial Evidence for Invalidity of U.S. Patent No. 8,010,043

Claim 7	Nakahira (Anticipatory)
first subscriber terminal from the first plurality of subscriber terminals utilizing a first coding and modulation combination, and	represent the individual user, one of them is using APSK one-third coding, one is using 16 and three-quarters coding, one is using BPSK one-half coding. So they're all using different coding.”). <u>See also, e.g., S-1302 at Fig. 3 & Section III on Page 4012:</u> (“This scheme manages the frequency bandwidth W and power density P simultaneously based on an adaptive modulation and coding (AMC).”).  Fig. 3. Radio propagation in a multi-beam system and resource allocation image.
[i] the first spot beam including a second portion sent to a second subscriber terminal in the first plurality of subscriber terminals utilizing a second coding and modulation combination,	See above.

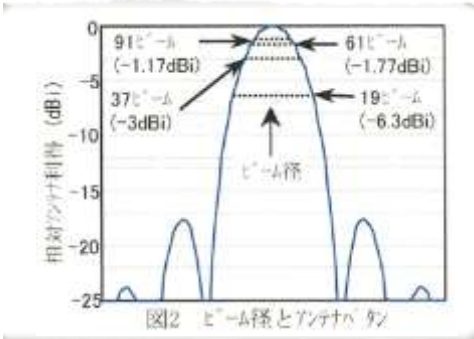
Exemplary Trial Evidence for Invalidity of U.S. Patent No. 8,010,043

Claim 7	Nakahira (Anticipatory)
[j] the first coding and modulation combination being different from the second coding and modulation combination.	<i>See above.</i>

Exemplary Trial Evidence for Invalidity of U.S. Patent No. 8,010,043

Claim 8	Nakahira (Anticipatory)
8. The satellite for illuminating a geographic area with signals of claim 7, wherein the first coding and modulation combination and second coding and modulation combination are selected according to an adaptive coding and modulation (ACM) scheme.	<i>See above Claim 7.</i>

Exemplary Trial Evidence for Invalidity of U.S. Patent No. 8,010,043

Claim 1	Sagawa (Obviousness)
1. [a] A satellite for illuminating a geographic area with signals, the satellite comprising:	<u>See, e.g., Trial Tr. at 2204-06 (Dr. Schindall Testimony).</u> <u>See also, e.g., S-2427 at Sections 1, 3, 4 & Fig. 2:</u>  (“Figure 2 illustrates the relationship between the beam diameter and the antenna pattern. As shown, this study envisioned four different multi-beam configurations, which concentrically cover the same area using 19-91 beams.”). (“For the purpose of providing low-cost broadband environments for future mobile satellite communication system, studies are being conducted on an adaptive resource allocation control method that effectively allocates limited satellite system resources such as satellite transmission power and system frequency bandwidth.”) (“This shows that the system capacity is at its peak in a 61-beam configuration.”).
[b] a power source;	<u>See above.</u>

Exemplary Trial Evidence for Invalidity of U.S. Patent No. 8,010,043

Claim 1	Sagawa (Obviousness)
[c] an antenna;	<u>See above.</u>
[d] a plurality of spot beams emanating from the antenna to service a plurality of service links, wherein:	<u>See above.</u>
[e] the plurality of spot beams includes a first spot beam and a second spot beam, the first spot beam illuminates a first region within the geographic area, in order to send information to a first plurality of subscriber terminals, the second spot beam illuminates a second region within the geographic area and adjacent to the first region, in order to send information to a second plurality of subscriber terminals, whereby the first and second regions overlap,	<u>See above.</u>

Exemplary Trial Evidence for Invalidity of U.S. Patent No. 8,010,043

Claim 1	Sagawa (Obviousness)
[f] the first spot beam as sent to at least one of the first plurality of subscriber terminals is affected by interference from other signal sources including the second spot beam at a signal-to-interference ratio C/I,	<u>See, e.g., Trial Tr. at 2204-06 (Dr. Schindall Testimony).</u> (Testifying that Sagawa discloses “maximizing capacity where C over I is less than C/N . . . [W]hen you talk about an N over I ratio, that’s another way of expresisng it. And the amount of the negative number is basically telling you that C over I is less than C over N by somewhere between 3.5 and 4.5 dB, at least a factor of two.”). <u>See also, e.g., S-2427 at Sections 3:</u> (“A greater number of beams will lead to a greater number of frequency reuses, but because of the small beam diameter, this will result in inter-beam interference.”)
[g] the first spot beam as sent to the at least one of the first plurality of subscriber terminals is further affected by noise at a signal-to-noise ratio C/N, whereby reception of signals from the first spot beam by the at least one of the first plurality of subscriber terminals is interference-dominated such that C/I is less than C/N,	<u>See, e.g., Trial Tr. at 2204-06 (Dr. Schindall Testimony).</u> (Testifying that Sagawa discloses “maximizing capacity where C over I is less than C/N . . . [W]hen you talk about an N over I ratio, that’s another way of expresisng it. And the amount of the negative number is basically telling you that C over I is less than C over N by somewhere between 3.5 and 4.5 dB, at least a factor of two.”). <u>See also, e.g., S-2427 at Sections 3 & 5:</u> (“A greater number of beams will lead to a greater number of frequency reuses, but because of the small beam diameter, this will result in inter-beam interference.”) (“The study makes clear that the maximum capacity is attained by considering the N/I ratio in a concentric multi-beam configuration for optimal resource allocation, and that system capacity reaches a peak in an N/I ratio ranging from -3.5 dB to -4.5 dB, in particular under conditions with a C/NoWsys value of 10 dB and an even distribution of traffic.”).

Exemplary Trial Evidence for Invalidity of U.S. Patent No. 8,010,043

Claim 1	Sagawa (Obviousness)
[h] and the satellite is operated to maximize data-carrying capacity of the plurality of spot beams as measured in bits/Hz, by utilizing a beam pattern having a specific number of color(s) of frequency and polarization and specific beam spacing that results in higher data-carrying capacity of the plurality of spot beams than achieved with other alternative numbers of color(s) of frequency and polarization and beam spacings.	<u>See, e.g., Trial Tr. at 2205-06 (Dr. Schindall Testimony):</u> (Testifying that Sagawa is “talking about 61 points per beam, where they use the average value. And with a continuously variable code rate would refer to the use of ACM.”). <u>See also, e.g., S-2427 at Sections 3 & 5:</u> (“A greater number of beams will lead to a greater number of frequency reuses, but because of the small beam diameter, this will result in inter-beam interference.”) (“The study makes clear that the maximum capacity is attained by considering the N/I ratio in a concentric multi-beam configuration for optimal resource allocation, and that system capacity reaches a peak in an N/I ratio ranging from -3.5 dB to -4.5 dB, in particular under conditions with a C/NoWsys value of 10 dB and an even distribution of traffic.”).

Exemplary Trial Evidence for Invalidity of U.S. Patent No. 8,010,043

Claim 7	Sagawa (Obviousness)
7. [a] A satellite for illuminating a geographic area with signals, the satellite comprising:	<i>See Claim 1 above.</i>
[b] a power source;	<i>See Claim 1 above.</i>
[c] an antenna;	<i>See Claim 1 above.</i>
[d] a plurality of spot beams emanating from the antenna to service a plurality of service links, wherein:	<i>See Claim 1 above.</i>
[e] the plurality of spot beams includes a first spot beam and a second spot beam, the first spot beam illuminates a first region within the geographic area, in order to send information to a first plurality of subscriber terminals, the second spot beam illuminates a second region within the geographic area and adjacent to the first region, in order to send information to a second plurality of subscriber terminals, whereby the first and second regions overlap,	<i>See Claim 1 above.</i>
[f] the first spot beam as sent to at	<i>See Claim 1 above.</i>

Exemplary Trial Evidence for Invalidity of U.S. Patent No. 8,010,043

Claim 7	Sagawa (Obviousness)
least one of the first plurality of subscriber terminals is affected by interference from other signal sources including the second spot beam at a signal-to-interference ratio C/I,	
[g] the first spot beam as sent to the at least one of the first plurality of subscriber terminals is further affected by noise at a signal-to-noise ratio C/N, whereby reception of signals from the first spot beam by the at least one of the first plurality of subscriber terminals is interference-dominated such that C/I is less than C/N,	<i>See Claim 1 above.</i>
[h] the first spot beam including at least a first portion sent to a first subscriber terminal from the first plurality of subscriber terminals utilizing a first coding and modulation combination, and	<u>See, e.g., Trial Tr. at 2205-06 (Dr. Schindall Testimony):</u> (Testifying that Sagawa is “talking about 61 points per beam, where they use the average value. And with a continuously variable code rate would refer to the use of ACM.”). <u>See also, e.g., S-2427 at Section 4:</u> (“...modem with a continuously variable code rate was presumed...”)
[i] the first spot beam including a second portion sent	<i>See above.</i>

Exemplary Trial Evidence for Invalidity of U.S. Patent No. 8,010,043

Claim 7	Sagawa (Obviousness)
to a second subscriber terminal in the first plurality of subscriber terminals utilizing a second coding and modulation combination,	
[j] the first coding and modulation combination being different from the second coding and modulation combination.	<i>See above.</i>

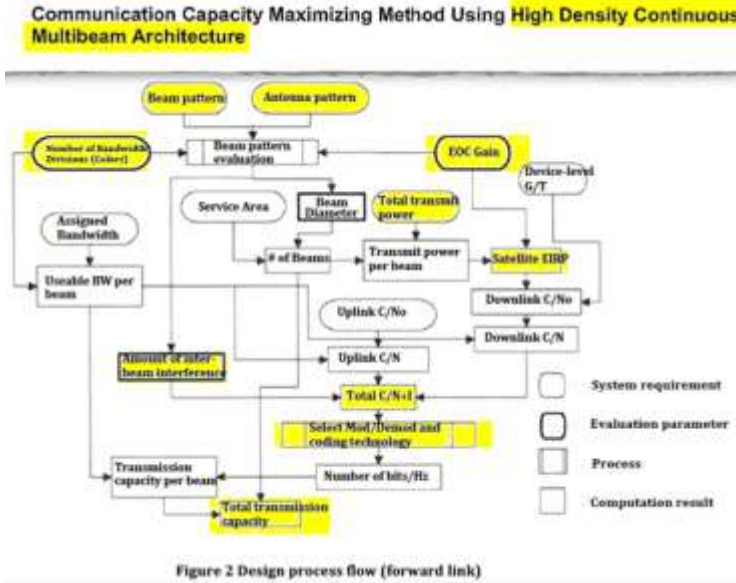
Exemplary Trial Evidence for Invalidity of U.S. Patent No. 8,010,043

Claim 8	Sagawa (Obviousness)
8. The satellite for illuminating a geographic area with signals of claim 7, wherein the first coding and modulation combination and second coding and modulation combination are selected according to an adaptive coding and modulation (ACM) scheme.	<i>See above Claim 7.</i>

Exemplary Trial Evidence for Invalidity of U.S. Patent No. 8,010,043

Claim 3	Sagawa (Obviousness)
3. [a] The satellite for illuminating a geographic area with signals of claim 1, wherein the plurality of spot beams comprise adaptive coding and modulation (ACM) signals, and	<i>See Claims 1, 7 & 8 above.</i>
[b] the data-carrying capacity of the plurality of spot beams is maximized by maximizing average data-carrying capacity within the plurality of spot beams.	<u>See, e.g., Trial Tr. at 2205-06 (Dr. Schindall Testimony):</u> (Testifying that Sagawa is “talking about 61 points per beam, where they use the average value. And with a continuously variable code rate would refer to the use of ACM.”). <u>See also, e.g., S-2427 at Sections 4-5:</u> (“For the power of each beam, the <u>average value</u>, calculated by dividing the beam by 61, was used.”) (emphasis added). (“This study makes clear that the <u>maximum capacity</u> is attained by considering the N/I ratio in a concentric multi-beam configuration for optimal resource allocation, and that system capacity reaches a peak in an N/I ratio ranging from -3.5 dB to -4.5 dB, in particular under conditions with a C/NiWsys value of 10 dB and an <u>even distribution of traffic</u>.”) (emphasis added).

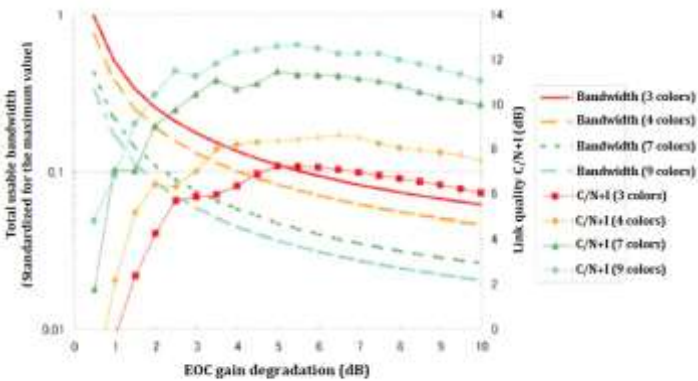
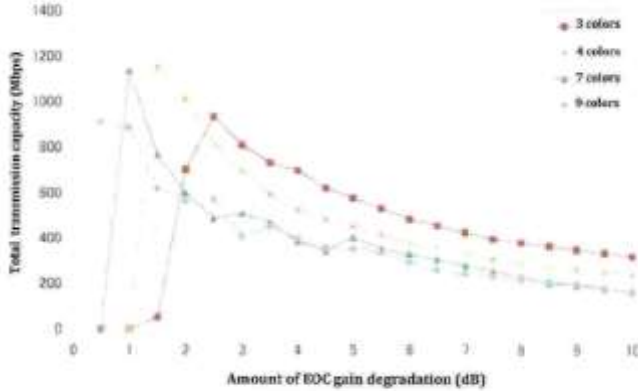
Exemplary Trial Evidence for Invalidity of U.S. Patent No. 8,010,043

Claim 1	Nakasuga (Obviousness)
1. [a] A satellite for illuminating a geographic area with signals, the satellite comprising:	<u>See, e.g., Trial Tr. at 2209-2210 (Dr. Schindall Testimony).</u> <u>See, e.g., S-2428 at Title & Fig. 2:</u>  Figure 2 Design process flow (forward link)
[b] a power source;	<u>See above.</u>
[c] an antenna;	<u>See above.</u>

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Claim 1	Nakasuga (Obviousness)
[d] a plurality of spot beams emanating from the antenna to service a plurality of service links, wherein:	<i>See above.</i>
[e] the plurality of spot beams includes a first spot beam and a second spot beam, the first spot beam illuminates a first region within the geographic area, in order to send information to a first plurality of subscriber terminals, the second spot beam illuminates a second region within the geographic area and adjacent to the first region, in order to send information to a second plurality of subscriber terminals, whereby the first and second regions overlap,	<i>See above.</i>
[f] the first spot beam as sent to at least one of the first plurality of subscriber terminals is affected by interference from other signal sources including the second spot beam at a signal-to-interference ratio C/I,	<u>See, e.g., Trial Tr. at 2209-2210 (Dr. Schindall Testimony).</u> (Testifying that he determined C/I is less than C/N because “the capacity is maximized using four colors and 1.5 dB beam spacing. That allowed me to calculate the C over N plus I, getting the C over I at 6.7 dB, the C over N at 10 dB. And at the edge of - - in worst case, C over N would be 8.5 dB. So we’re talking about a C over I of 6.7, a C over N of 8.5, which means that C over I is less than C over N.”).

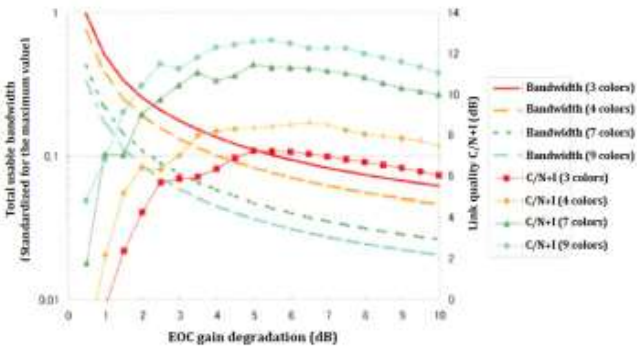
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Claim 1	Nakasuga (Obviousness)
	<u>See also, e.g., S-2428 at Fig. 1:</u>  Figure 1 Usable bandwidth and link quality <u>See also, e.g., S-2428 at Fig. 3:</u>  Figure 3 EOC gain degradation and total transmission capacity
[g] the first spot beam as sent to the at least one of the first plurality of subscriber terminals is further affected by noise at a signal-to-noise ratio C/N, whereby reception of signals from the first spot beam by the at least one of the first	<i>See above.</i> <u>See also, e.g., S-2428 at Section 1:</u> ("[W]ith a high-density multiple beam system it can be expected that the total transmission capacity is expanded as more beams will provide more total usable bandwidth and as power is more efficiently used due to suppression of the gain deviation margin within a service area. The increase of inter-beam interference will, however, reduce the total transmission capacity at the same time. In this report, this trade-off in high-density multiple beam patterns with respect to total transmission capacity is studied and a design to maximize the

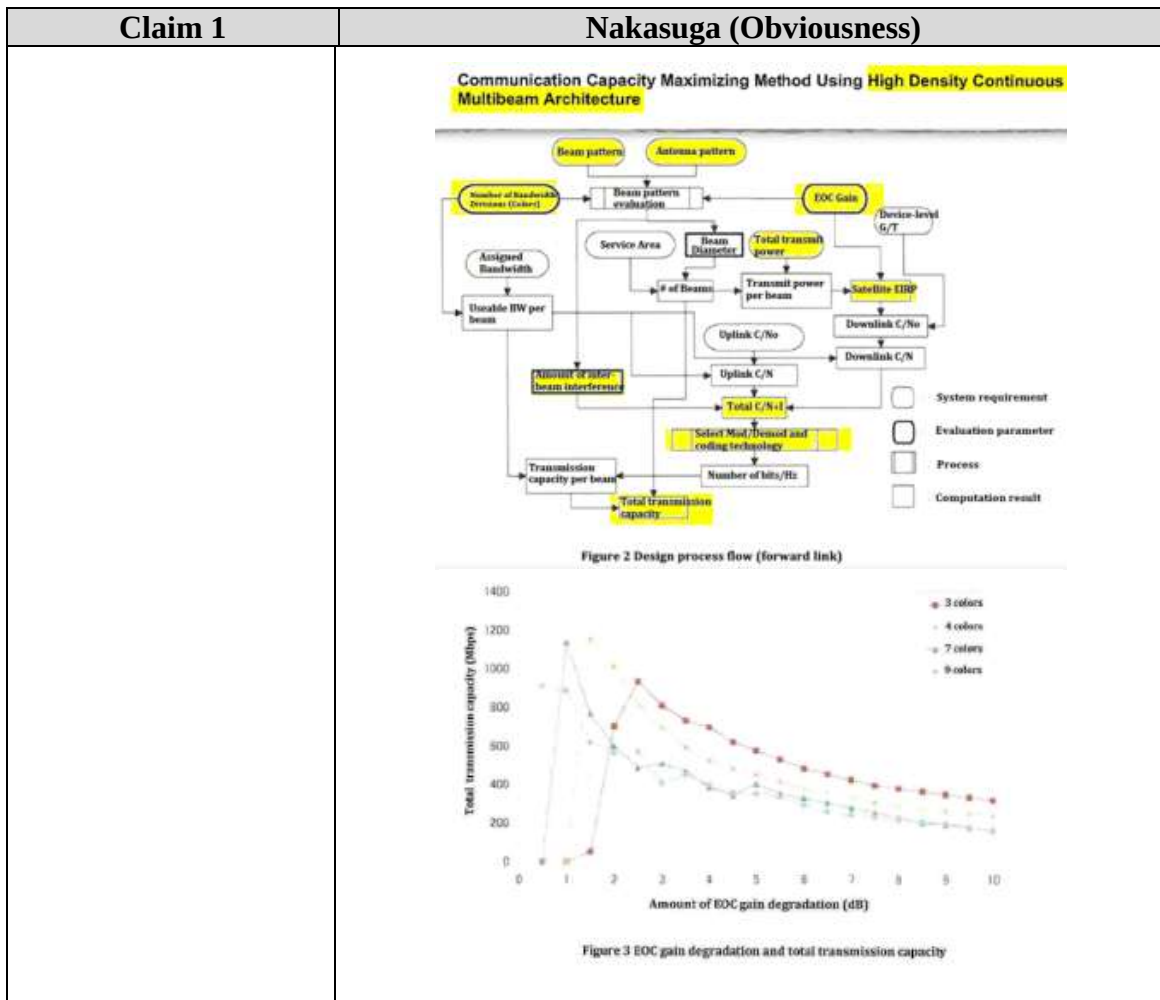
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Claim 1	Nakasuga (Obviousness)
plurality of subscriber terminals is interference-dominated such that C/I is less than C/N,	total transmission capacity is proposed.”) <u>See also, e.g., above combined with Sagawa (2004)</u> (disclosing C/N of 10 dB).
[h]and the satellite is operated to maximize data-carrying capacity of the plurality of spot beams as measured in bits/Hz, by utilizing a beam pattern having a specific number of color(s) of frequency and polarization and specific beam spacing that results in higher data-carrying capacity of the plurality of spot beams than achieved with other alternative numbers of color(s) of frequency and polarization and beam spacings.	<u>See also, e.g., Trial Tr. at 2209-11 (Dr. Schindall Testimony):</u> (Explaining Nakasuga 2003 discloses “communication capacity maximizing, using high-density continuous multi-beam architecture” and shows “the capacity is maximized using four colors and 1.5 dB beam spacing”) (Explaining that disclosures of “EOC gain degradation” is “referring to beam spacing”). (Explaining that Figure 2 discloses process flow for maximizing capacity including number of colors and beam spacing). <u>See also, e.g., S-2428 at Title:</u> 2003 The Institute of Electronics, Information, and Communication Engineers General Conference B-3-28 Communication Capacity Maximizing Method Using High Density Continuous Multibeam Architecture Yoshinori Nakasuga, Jin Mitsugi, and Masazumi Ueba NTT Network Innovation Laboratories, NTT Corporation <u>See also, e.g., S-2428 at Section 2:</u> (“The total usable bandwidth (without a marker) increases monotonically as EOC gain degradation decreases, i.e., a high-density beam pattern, and as the number of bandwidth divisions (the allocated bandwidth divided by the bandwidth

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Claim 1	Nakasuga (Obviousness)
	per beam, ‘number of colors’ hereinafter) decreases. . . . Taking these two characteristics, it could be said that the total usable bandwidth and the link quality have opposing characteristics with respect to the number of colors and the EOC gain degradation thus, the total transmission capacity can be expected to have a maximum value.”). <u>See also, e.g., S-2428 at Section 3:</u> (“This paper proposes a design method to determine the maximum total transmission capacity using the design flow as shown in Figure 2 In this design method, the EOC gain degradation and the number of colors are used as variables for a given service area and bandwidth allocation. . . . This process flow is repeated to determine the EOC gain degradation and the number of colors that yield the maximum total transmission capacity. Figure 3 shows an example of the total transmission speed calculation. In this example, the maximum total transmission capacity is achieved by dividing the allocated bandwidth into four colors and repeatedly using the frequency in a high-density beam pattern where the EOC gain degradation is 1.5 dB.”). <u>See also, e.g., S-2428 at Section 4:</u> (“This paper proposes a design method to maximize the total transmission capacity by using a high-density beam pattern. This design method enables a multi-beam design that maximizes the total transmissison capacity by efficient use of resource power. In particular, this proposed method is effective for achieving high-speed and large capacity for a mobile satellite communication system that uses a low frequency spectral band with narrow allocated frequency bandwidth.”).  Figure 1 Usable bandwidth and link quality

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Claim 3	Nakasuga (Obviousness)
3. [a] The satellite for illuminating a geographic area with signals of claim 1, wherein the plurality of spot beams comprise adaptive coding and modulation (ACM) signals, and	<i>See Claim 1 above.</i> <u>See also, e.g., Trial Tr. at 2211-12 (Dr. Schindall Testimony):</u> (explaining “adaptive coding and modulation is where you select the mod, demod and coding technology” in the “box near the bottom” of the Figure 2 flow chart) <u>See also, e.g., S-2428 at Fig. 2:</u> (disclosing the optimization step of “select Mod/Demod and coding technology”).
[b] the data-carrying capacity of the plurality of spot beams is maximized by maximizing average data-carrying capacity within the plurality of spot beams.	<i>See Claim 1 above.</i> <u>See also, e.g., Trial Tr. at 2211-12 (Dr. Schindall Testimony):</u> (explaining paper discloses maximizing average capacity because of the iterative flow described in Figure 2)