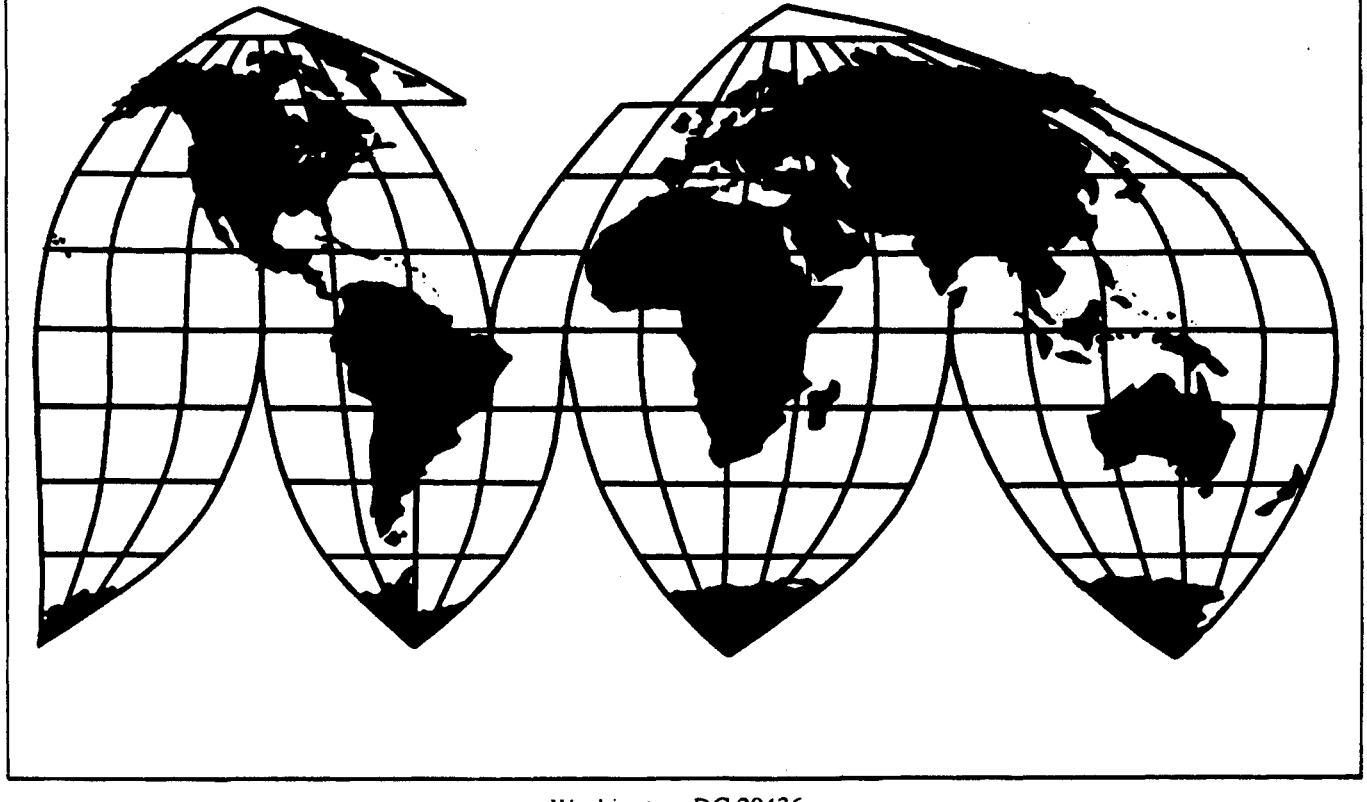
Certain Integrated Repeaters, Switches, Transceivers and Products Containing Same

Investigation No. 337-TA-435

Publication 3547 **October 2002**

U.S. International Trade Commission



Washington, DC 20436

U.S. International Trade Commission

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Certain Integrated Repeaters, Switches, Transceivers and Products Containing Same

Investigation No. 337-TA-435

Publication 3547

October 2002

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.

In the Matter of	
CERTAIN INTEGRATED REPEATERS, SWITCHES, TRANSCEIVERS AND PRODUCTS CONTAINING SAME	Inv. No. 337-TA-43[illegible]

LIMITED EXCLUSION ORDER

The Commission has determined that there is a violation of section 337 of the Tariff Act of 1930 (19 U.S.C. § 1337) in the unlawful importation and sale by respondent Altima Communications Inc. of (1) integrated repeaters that are covered by claims 1-7, or 9 of U.S. Letters Patent 5,742,603, and (2) integrated repeaters and switches in plastic ball grid array packages that are covered by claims 23, 24, 27, or 29 of U.S. Letters Patent 5,894,410.

Having reviewed the record in this investigation, including the written submissions of the parties, the Commission has made its determination on the issues of remedy, the public interest, and bonding. The Commission has determined that the appropriate form of relief is a limited exclusion order. The Commission has also determined that the public interest factors enumerated in 19 U.S.C. § 1337 (d) do not preclude issuance of the limited exclusion order, and that the bond during the Presidential review period shall be in the amount of 100 percent of the entered value of the products in question.

Accordingly, the Commission hereby **ORDERS** that:

1. Integrated repeaters, and circuit boards and carriers containing such devices, covered by claims 1-7, or 9 of U.S. Letters Patent 5,742,603, that are manufactured abroad and/or imported by or on behalf of Altima Communications Inc. or any of its affiliated companies, parents, subsidiaries, or other related business entities, or their successors or assigns, are excluded from entry for consumption into the United States, entry for consumption from a foreign trade zone, or withdrawal from a warehouse for consumption, for the remaining term of the patent, *i.e.*, until April 21, 2015, except under license of the patent owner or as provided by law.

2. Integrated repeaters, switches, and other products in plastic ball grid array packages, and circuit boards and carriers containing such devices, covered by claims 23, 24, 27, or 29 of U.S. Letters Patent 5,894,410, that are manufactured abroad and/or imported by or on behalf of Altima Communications Inc. or any of its affiliated companies, parents, subsidiaries, or other related business entities, or their successors or assigns, are excluded from entry for consumption into the United States, entry for consumption from a foreign trade zone, or withdrawal from a warehouse for consumption, for the remaining term of the patent, *i.e.*, until April 13, 2016, except under license of the patent owner or as provided by law.

3. The products listed in paragraphs 1 and 2 of this Order are entitled to entry for consumption into the United States, entry for consumption from a foreign trade zone, or withdrawal from a warehouse for consumption, under bond in the amount of 100 percent of entered value pursuant to subsection (j) of section 337 of the Tariff Act of 1930, as amended 19 U.S.C. § 1337(j), from the day after this Order is received by the President until such time as the President notifies the Commission that he approves or disapproves this action but, in any event, not later than sixty (60) days after the date of receipt of this action.

4. Pursuant to procedures to be specified by U.S. Customs Service, as the Customs Service deems necessary, persons seeking to import the products listed on paragraphs 1 and 2 of this Order shall certify that they are familiar with the terms of this Order, that they have made appropriate inquiry, and thereupon state that, to the best of their knowledge and belief, the products being imported are not excluded from entry under paragraphs 1 or 2 of this Order. At its discretion, the Customs Service may require persons who have provided the certification described in this paragraph to furnish such records or analyses as are necessary to substantiate the certification.

5. Within fourteen (14) days of the issuance of this Order, Altima Communications, Inc. shall provide the U.S. Customs Service with a list of affiliated companies, parents, subsidiaries, and other related business entities, that manufacture, import, or sell the products that are subject to this Order.

6. The Commission may modify this Order in accordance with the procedures described in section 210.76 of the Commission's Rules of Practice and Procedure, 19 C.F.R. § 210.76.

7. The Secretary shall serve copies of this Order upon each party of record in this investigation and upon the Department of Health and Human Services, the Department of Justice, the Federal Trade Commission, and the U.S. Customs Service.

8. Notice of this Order shall be published in the *Federal Register*.

By Order of the Commission.

Donna R. Koehnke
Secretary

Issued: October 24, 2001

CERTIFICATE OF SERVICE

I, Donna R. Koehnke, hereby certify that the attached **Limited Exclusion Order**, was served upon the following parties via first class mail, and air mail where necessary, on **October 24, 2001.**.

Donna R. Koehnke

Donna R. Koehnke, Secretary
U.S. International Trade Commission
500 E Street, SW - Room 112
Washington, DC 20436

ON BEHALF OF COMPLAINANTS INTEL CORPORATION AND LEVEL ONE COMMUNICATIONS, INC.:

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UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C. 20436

In the Matter of	)	
CERTAIN INTEGRATED REPEATERS, SWITCHES, TRANSCEIVERS, AND PRODUCTS CONTAINING SAME	)	Inv. No. 337-TA-435

NOTICE OF DECISION NOT TO REVIEW A FINAL INITIAL DETERMINATION, AND SCHEDULE FOR FILING OF WRITTEN SUBMISSIONS ON THE ISSUES OF REMEDY, THE PUBLIC INTEREST, AND BONDING

AGENCY: U.S. International Trade Commission.

ACTION: Notice.

SUMMARY: Notice is hereby given that the U.S. International Trade Commission has determined not to review the final initial determination ("Final ID") issued by the presiding administrative law judge ("ALJ") on July 19, 2001, finding a violation of section 337 of the Tariff Act of 1930, 19 U.S.C. §1337, in the above-captioned investigation. The Commission also determined to deny the petition of respondent Altima Communications Inc. to supplement the evidentiary record in the investigation, and to grant the motion of complainants Intel Corporation and Level Communications, Inc. to strike portions of Altima Communications, Inc.'s petition for review.

FOR FURTHER INFORMATION CONTACT: Michael Liberman, Esq., Office of the General Counsel, U.S. International Trade Commission, 500 E Street, S.W., Washington, D.C. 20436, telephone (202) 205-3115. Copies of the public versions of the final ID and all other nonconfidential documents filed in connection with this investigation are or will be available for inspection during official business hours (8:45 a.m. to 5:15 p.m.) in the Office of the Secretary, U.S. International Trade Commission, 500 E Street, S.W., Washington, D.C. 20436, telephone (202) 205-2000. Hearing-impaired persons are advised that information on this matter can be obtained by contacting the Commission's TDD terminal on (202) 205-1810. General information concerning the Commission may also be obtained by accessing its Internet server (*http://www.usitc.gov*). The public record for this investigation may be viewed on the Commission's electronic docket (EDIS -ON-LINE) at http://dockets.usitc.gov/eol/public.

SUPPLEMENTARY INFORMATION: This patent-based section 337 investigation was instituted on August 23, 2000, based upon a complaint filed on July 20, 2000, by Intel Corporation ("Intel") and Level One Communications, Inc. ("Level One"). 65 *Fed. Reg.* 51327 (Aug. 23, 2000). The respondent is Altima Communications, Inc. ("Altima"). A second patent-based section 337 investigation naming Altima as a respondent was instituted on April 24, 2000,

based upon a complaint filed by Level One on March 23, 2000, and supplemented on April 13, 2000. 65 *Fed. Reg.* 21789 (Apr. 24, 2000). On August 24, 2000, the ALJ issued an order consolidating the two investigations. From April 16, 2001, through April 30, 2001, the ALJ held an evidentiary hearing. On July 19, 2001, the ALJ issued a final ID finding that respondent Altima violated section 337 of the Tariff Act of 1930, as amended (19 U.S.C. § 1337), by infringing certain claims of two of the complainants' asserted patents. The ALJ found that: (1) there has been importation and sale of the accused products; (2) complainants practice the patents in controversy and satisfy the domestic industry requirements of section 337; (3) certain of the claims in issue are valid; (4) the accused imported products directly infringe certain of the claims in issue; and (5) respondent has induced infringement of certain of the claims in issue. Based on these findings, the ALJ concluded there was a violation of section 337. The ALJ recommended issuance of a limited exclusion order.

Complainants Intel and Level One and respondent Altima filed petitions for review of various portions of the Final ID, and opposed each others' petitions for review. The Commission investigative attorney (IA) did not petition for review of the Final ID, but he opposed the other parties' petitions for review.

On August 1, 2001, Altima petitioned the Commission for leave to supplement the evidentiary record of the investigation. On August 8, 2001, Intel and Level One filed their opposition to Altima's petition to supplement, and moved to strike portions of respondent's petition for review related to materials that have not been admitted into evidence and are not part of the evidentiary record created in connection with the instant investigation. On August 13, 2001, the IA filed his opposition to Altima's petition to supplement.

Having examined the record in this investigation, including the Final ID, the petitions for review, and the responses thereto, the Commission determined not to review the Final ID; thus, the Commission has found a violation of section 337. Having also examined Altima's petition to supplement the evidentiary record, Intel and Level One's opposition to Altima's petition to supplement and Intel and Level One's motion to strike, the Commission has determined to deny Altima's petition to supplement and to grant Intel and Level One's motion to strike.

In connection with the final disposition of this investigation, the Commission may issue (1) an order that could result in the exclusion of the subject articles from entry into the United States, and/or (2) cease and desist orders that could result in respondent being required to cease and desist from engaging in unfair acts in the importation and sale of such articles. Accordingly, the Commission is interested in receiving written submissions that address the form of the remedy, if any, that should be ordered. If a party seeks exclusion of an article from entry into the United States for purposes other than entry for consumption, the party should so indicate and provide information establishing that activities involving other types of entry either are adversely affecting it or likely to do so. For background see the Commission Opinion, In the Matter of Certain Devices for Connecting Computers via Telephone Lines, Inv. No. 337-TA-360, USITC Pub. No. 2843 (December, 1994).

If the Commission contemplates some form of remedy, it must consider the effects of that remedy upon the public interest. The factors the Commission will consider include the effect that an exclusion order and/or cease and desist orders would have on (1) the public health and welfare, (2) competitive conditions in the U.S. economy, (3) U.S. production of articles that are like or directly competitive with those that are subject to investigation, and (4) U.S. consumers. The Commission is therefore interested in receiving written submissions that address the aforementioned public interest factors in the context of this investigation.

If the Commission orders some form of remedy, the President has 60 days to approve or disapprove the Commission's action. During this period, the subject articles would be entitled to enter the United States under a bond, in an amount determined by the Commission and prescribed by the Secretary of Treasury. The Commission is therefore interested in receiving submissions concerning the amount of the bond that should be imposed.

WRITTEN SUBMISSIONS: The parties to the investigation, interested government agencies, and any other interested parties are encouraged to file written submissions on the issues of remedy, the public interest, and bonding. Such submissions should address the July 19, 2001, recommended determination by the ALJ on remedy and bonding. Complainants and the Commission investigative attorney are also requested to submit proposed remedial orders for the Commission's consideration. The written submissions and proposed remedial orders must be filed no later than the close of business on September 19, 2001. Reply submissions must be filed no later than the close of business on September 26, 2001. No further submissions on these issues will be permitted unless otherwise ordered by the Commission. The target date for completion of the investigation is October 23, 2001.

Persons filing written submissions must file with the Office of the Secretary the original document and 14 true copies thereof on or before the deadlines stated above. Any person desiring to submit a document (or portion thereof) to the Commission in confidence must request confidential treatment unless the information has already been granted such treatment during the proceedings. All such requests should be directed to the Secretary of the Commission and must include a full statement of the reasons why the Commission should grant such treatment. See 19 C.F.R. 201.6. Documents for which confidential treatment by the Commission is requested will be treated accordingly. All nonconfidential written submissions will be available for public inspection at the Office of the Secretary.

This action is taken under the authority of section 337 of the Tariff Act of 1930 (19 U.S.C. § 1337) and Subpart G of the Commission's Rules of Practice and Procedure (19 C.F.R. Subpart G).

By order of the Commission.

Donna R. Koehnke
Secretary

Issued: September 5, 2001

CERTAIN INTEGRATED REPEATERS, SWITCHES, TRANSCEIVERS, AND PRODUCTS CONTAINING SAME

337-TA-435

CERTIFICATE OF SERVICE

I, Donna R. Koehnke, hereby certify that the attached **Notice of Decision Not to Review a Final Initial Determination, and Schedule for Filing of Written Submissions on the Issues of Remedy, the Public Interest, and Bonding**, was served upon the following parties via first class mail, and air mail where necessary, on September 5, 2001.

Donna R. Koehnke, Secretary
U.S. International Trade Commission
500 E Street, SW - Room 112
Washington, DC 20436

ON BEHALF OF COMPLAINANTS INTEL CORPORATION AND LEVEL ONE COMMUNICATIONS, INC.:

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PUBLIC VERSION

UNITED STATES INTERNATIONAL TRADE COMMISSION

Washington, D.C.

In the Matter of	
CERTAIN INTEGRATED REPEATERS, SWITCHES, TRANSCEIVERS AND PRODUCTS CONTAINING SAME	**Inv. No. 337-TA-435**

COMMISSION OPINION ON REMEDY, THE PUBLIC INTEREST, AND BONDING

PROCEDURAL BACKGROUND

The Commission instituted this investigation on August 23, 2000, based on a complaint filed by Intel Corporation ("Intel") and Level One Communications, Inc. ("Level One") against Altima Communications, Inc. ("Altima"). The complaint alleged violations of section 337 of the Tariff Act of 1930 (19 U.S.C. § 1337) in the importation into the United States, sale for importation, and/or sale within the United States after importation of certain integrated repeaters, switches, and transceivers by reason of infringement of certain claims of complainants' U.S. Letters Patents Nos. 5,742,603 (the "'603 patent"), 5,894,410 (the "'410 patent"), and 5,608,341 (the "'341 patent").

The presiding administrative law judge ("ALJ") held an evidentiary hearing from April 16, 2001, through April 30, 2001, and issued his final initial determination ("ID") on July 19, 2001, in which he concluded that there was a violation of section 337.

On the same day, July 19, 2001, the ALJ issued his recommended determination ("RD") on remedy and bonding in the event the Commission decides there is a violation of section 337. The ALJ recommended issuance of a limited exclusion order. He also recommended that a bond of 100 percent of entered value be required during Presidential review.

On August 1, 2001, complainants and respondent filed petitions for review of the ID.

The Commission investigative attorney ("IA") did not petition for review of the ID. On August 8, 2001, all the parties to the present investigation filed their responses to petitions for review.

On September 5, 2001, the Commission determined not to review the final ID, thereby finding a violation of section 337, and requested briefs on remedy, the public interest, and bonding. The Commission received main briefs and reply briefs from all the parties to the investigation.

Additionally, on September 27, 2001, non-party Broadcom Corporation (the parent of respondent Altima) filed a motion to intervene to request clarification of the proposed exclusion order. On October 2, 2001, the IA filed a submission in which he sought leave to provide his comments on a proposed limited exclusion order submitted by complainants. No submissions were filed in opposition to the Broadcom motion or the IA's submission.

On October 10, 2001, the Commission determined to issue a limited exclusion order covering, *inter alia*, the accused respondent's integrated repeaters and plastic ball grid array (PBGA) packages, but determined not to issue a cease and desist order. The Commission also determined that the statutory public interest factors do not preclude the issuance of such relief and that respondent's bond during the Presidential review period should be set in the amount of 100 percent of entered value. This opinion explains the basis for our determinations.

DISCUSSION

When the Commission finds a violation of section 337, as it has in this case, it must consider the issues of remedy, the public interest, and bonding. 19 U.S.C. §§ 1337 (d) and (f).

A. Remedy

1. The RD

The ALJ recommended that the Commission issue a limited exclusion order directed to respondent Altima which would include its principals, stockholders, officers, directors,

employees, agents, licensees, distributors, controlled and/or majority owned business entities and their employees, and agents, successors and assigns, and that the order prohibit the importation and sale of infringing products in the United States. The ALJ recommended that "the exclusion order be directed to (1) integrated repeaters, including respondent's AC105R and AC108R series of integrated repeaters, that infringe any of claims 1-7, 9, and 10 of the '603 patent, and (2) PBGA packages, including respondent's AC105RM, AC105RN, AC105RU, AC108RM, AC108Rn [*sic*], AC108RU, AC108RKPB, and AC1085U series of packages that infringe any of claims 23, 24, 27, and 29 of the '410 patent." ID at 206. [1]

With regard to the named parties covered by the exclusion order, the ALJ observed that complainants argue that since respondent Altima was recently acquired by Broadcom, the ALJ should recommend an exclusion order barring importation, not only by respondent Altima but also by any of its affiliated companies, parents, subsidiaries, contractors or other related business entities or their successors or assigns. ID at 200. On the other hand, the ALJ noted that respondent argued that any exclusion order should not be extended to other entities or to other products. *Id.*

Having considered the arguments of both parties, the ALJ recommended an order covering, *inter alia*, respondent's *stockholders*, (as well as respondent's officers. directors, employees, agents, licensees, distributors, controlled and/or majority owned business entities and their employees, and agents, successors and assigns). ID at 206. Broadcom is the only stockholder of respondent Altima.

With regard to the choice of the remedy, the ALJ noted that the Commission has broad

---

[1] We note that the ALJ held (and the Commission affirmed) that only claims 1-7 and 9 of the '603 patent were infringed. ID at 264. *See, also, id.* at 131, n. 53 ("Complainants originally asserted claims 1-10 of the '603 patent, but have withdrawn their assertions concerning claim 10 . . .") Accordingly, our discussion is based on the ALJ's holding, rather than on his recommendation. We further note that the model identified by the ALJ as "AC108Rn" should be identified as "AC108RN." *See* ID at 133.

discretion in selecting the form, scope, and extent of a particular remedy. *Viscofan, S.A. v. U.S. Int'l Trade Comm'n*, 787 F.2d 544, 548 (Fed. Cir. 1986). He further observed that in determining whether to exclude downstream products, the following factors are considered: (1) the value of the infringing articles compared to the value of the downstream products in which they are incorporated; (2) the identity of the manufacturer of the downstream products, *i.e.*, whether it can be determined that the downstream products are manufactured by the respondent or by a third party; (3) the incremental value to the complainant of the exclusion of downstream products; (4) the incremental detriment to respondents of exclusion of such products; (5) the burdens imposed on third parties resulting from exclusion of downstream products; (6) the availability of alternative downstream products that do not contain the infringing articles; (7) the likelihood that the downstream products actually contain the infringing articles and are thereby subject to exclusion; (8) the opportunity for evasion of an exclusion order that does not include downstream products; (9) the enforceability of an order by Customs; and any other factors the Commission determines to be relevant. *Certain Erasable Programmable Read-Only Memories*, USITC Inv. No. 337-TA-276, Comm'n Opinion (May 1989), (*EPROMs*) *aff'd sub. nom. Hyundai v. U.S. Int'l Trade Comm'n*, 899 F.2d 1204, 548 (Fed. Cir. 1990).

The ALJ considered whether there is an evidentiary basis under any of the nine factors set forth by the Commission and affirmed by the Federal Circuit in *Hyundai* to support issuance of an exclusion order covering downstream products. He found that, aside from the fact that certain infringing products are found in downstream products, there is little evidence in the record relating to the factors specifically set out in *EPROMs*. [2]

He specifically found, based on the testimony of Mr. Steven Kubes, [[

[2] ID at 204.

]] [3] In addition, the ALJ concluded that the record is lacking evidence as to factors (3), (4), (5), (6), (7), and (8) of *EPROMs*.

The ALJ further found that, based on the evidence in this investigation, the record is "too spotty" to recommend that the limited exclusion order cover *carriers* [4] containing accused products.[5] However, he recommended that any exclusion order cover *circuit boards* that contain the accused products since the private parties are in agreement that [[

[6]]][7].

With regard to a cease and desist order, the ALJ observed that such an order directs a party to stop its unfair acts, and is generally directed to domestic respondents that maintain substantial inventories of infringing products in the United States. *Certain Flash Memory Circuits And Products Containing Same*, Inv. No. 337-TA-382, Comm'n Opinion (June 1997) at 26. The ALJ further observed that there should be evidence that "significant inventories of infringing articles" are maintained in the United States before a cease and desist order is issued. *Hyundai* 899. F.2d at 1210.

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[3] *Id.*

[4] Carriers are "[h]olders for electronic parts and devices which facilitate handling during processing, production, imprinting, or testing operations and protects such parts during transport." Graf, *Modern Dictionary of Electronics*, at 136 (6th Ed. 1992).

[5] ID at 205.

[6] The ALJ noted that while the private parties are in agreement that devices that infringe the '603 patent can be found in circuit boards, they differ as to whether those devices are confined to a single circuit board or whether they can extend to more than one circuit board. ID at 205.

[7] The ALJ noted that the '410 patent discloses that one type of integrated circuit board is a BGA package which is soldered to a printed circuit board. There is no evidence bearing on whether the packages are or are not easily removable from the circuit boards. Moreover, the record is lacking as to specific downstream products for the BGA packages found to infringe certain claims of the '410 patent. ID at 205.

The ALJ considered whether there is any evidence in the record that establishes a "commercially significant inventory." He found that complainants failed to produce any evidence regarding [[

]] As a result, the ALJ did not recommend issuance of a cease and desist order. [8]

2. Respondent's Position

Respondent Altima argues that no relief should be granted to complainants because they have misappropriated respondent's trade secrets in order to prepare the complaints in the instant investigation. Respondent's Remedy Submission at 31. Respondent further argues that if a remedial order covering the '410 patent is in fact issued, its effective date should be stayed until the decision of the district court is rendered in a jury trial in U.S. District Court for the District of Delaware scheduled for October 29, 2001. Respondent explains that, absent a stay, any Commission remedial order that is inconsistent with the validity determination of the district court would have to be withdrawn in a modification proceeding or by order of another court. *Id.* at 33. Accordingly, respondent requests that the Commission extend its target date for completion of the investigation and stay issuance of its final determination and any remedial orders "until the Delaware judge and jury make the binding determination of the validity of the '410 patent." *Id.*

Respondent Altima's other arguments are as follows.

(a) Excluded Products

Respondent maintains that the limited exclusion order should encompass only its repeater products (as those products were defined in the complaints), particularly the AC105 and AC108

[8] ID at 207.

series, accused of infringing the '603 patent and '410 patent, but not its switch products or transceiver products because none of those transceiver or switch products was found to be in violation of section 337. Respondent's Remedy Submission at 6.

Moreover, respondent argues that the limited exclusion order should include only integrated repeaters according to the definition of such products adopted by the Commission wherein, respondent argues, the Commission distinguished over prior art conventional repeaters by the additional functionality of data monitoring, management, and collection, and data and control interfaces to enable communications with other parts of a repeater management device. Thus, respondent maintains, conventional repeaters and unmanaged repeaters are, by complainants' election, outside the scope of the investigation. Respondent's Remedy Submission at 16. Therefore, respondent contends, any limited exclusion order should be restricted to its managed AC105RM and AC108RM products, or products with the same design.

Respondent further contends that, while it sells three versions of its AC105 and AC108 repeaters (according to respondent, the unmanaged, unstackable RN line; the unmanaged but stackable RU line; and the managed and stackable RM line),[9] only the RM version of its series of devices is sold as a managed repeater. Respondent's Remedy Submission at 17.

Respondent Altima maintains that [[

[10]

[11]

[9] Respondent cites RX-27; Kubes, Tr. 2525.

[10] [[

]] (Kubes Dep. at 473-76), ID at 146.

[11] Respondent cites Kubes, Tr. 2532-33; ID at 134 n.54.

]] those devices could not have been found to infringe the '603 patent as interpreted by the Commission. Furthermore, respondent maintains, [[

]] were not found to infringe and should not be covered by any remedial order.

(b) Named Parties

Respondent Altima maintains that the limited exclusion order should not cover Broadcom products but, instead, should be limited to respondent Altima's products. Respondent submits that, although complainants filed their complaints and the now consolidated investigations were instituted well before respondent Altima was acquired by Broadcom, neither Intel nor Level One sought to add Broadcom as a respondent even after Broadcom acquired Altima. [[

]][12] Respondent further notes that Broadcom's products were not accused or considered during this investigation, [13] and thus Altima was

[12] Respondent submits that its [[

]]

[13] In support, citing Hearing Tr. at 3904, respondent submits that when the ALJ asked Intel and Level One if they sought any remedy against Broadcom, they waived any such request. Altima's Remedy Submission at 4.

relieved of any obligation to submit evidence or argument in opposition to a remedy covering Broadcom's products[14].

Respondent Altima vigorously argues that [[

]]

Respondent's Reply at 7 (emphasis added). It states that "prohibiting Broadcom from importing Altima products is OK, prohibiting Broadcom from importing its own products is not." *Id.* at 11. Respondent submits that complainants waived any remedy against Broadcom at trial. *Id.* at 5. [15] It also emphasizes that neither complainants nor the IA argued that Broadcom sells the integrated repeaters or switches that were found to violate section 337. *Id.* Respondent notes that the ALJ did not include "parents" in his proposed exclusion order and offers its explanation for the fact that the ALJ recommended including "stockholders" among the parties named in the exclusion order, characterizing that inclusion as "inadvertent" on the ALJ's part. *Id.* at 5.

(c) Downstream Products

Respondent maintains that the Commission should not include any downstream products in its exclusion order. It argues that complainants failed to meet the burden of proof set by the Commission for obtaining relief against downstream products. In particular, it argues that complainants failed to establish a record that would support issuance of any remedy against

---

[14] Respondents cited *James L. McCoy, Administrator v. Massachusetts Institute of Technology*, 950 F.2d 13, 25 (1st Cir. 1991).

[15] In support, respondent cites the following portion of the transcript:

> JUDGE LUCKERN: What is Complainants' position? Do – is it Complainants' intent to get these quote, unrelated Broadcom products, close quote, into a potential exclusion order against Altima? Do you intend to so argue in your posthearing submissions, especially with respect to the remedy that you want in this investigation?
>
> MR. CORDELL: Not at this time, Your Honor.

(Hearing Tr. at 3904.)

downstream products, [[

]] In sum, respondent argues that complainants failed to establish substantial evidence of any entitlement to relief against downstream products, whereas it has established that legitimate trade would be disrupted by such a provision.

Respondent disagrees with the ALJ's finding that its devices are [[

]] (ID at 205-06.) It maintains that complainants offered no evidence that its [[

]] and that there is no evidence that Altima has [[

]] Respondent asserts that it is [[

]] Therefore, respondent maintains, circuit boards should not be included in any exclusion order.

With regard to the unmanaged versions of its repeaters, respondent submits that while at trial, both [[

]] Respondent's Remedy Submission at 24. Respondent further maintains that there is no finding or evidence that [[

]] These devices are then [[

]] *Id.* Therefore, respondent contends, downstream products that [[

]] and thus no remedy should issue against unmanaged downstream products.

(d) Cease and Desist Order

With regard to cease and desist order, respondent argues that no such order should be issued where the ALJ found that complainants failed to meet their burden to provide sufficient evidence of commercially significant inventory in the United States.

3. Complainants' Position

Complainants Intel and Level One agree with the ALJ that a limited exclusion order precluding respondent Altima's infringing products from entry into the United States for consumption should be issued. Complainants reject respondent's claim of trade secret misappropriation as lacking any evidentiary support. They argue that respondent failed to show that any confidential or trade secret information was exchanged, or to raise the equitable defense now asserted by respondent for the first time in any of its pleadings. Complainants Reply at 18.

Complainants also oppose delaying any remedy on the '410 patent until after completion of the jury trial in Delaware. They characterize respondent's position as an attempt to circumvent the Commission's denial of respondent's motion to re-open the record on the '410 patent. Complainants specifically point out that respondent stayed the Northern District of California action in which it filed for a declaratory judgment of non-infringement and invalidity

of the '410 patent,[16] and submit that after staying that action respondent cannot now request that the target date be extended until a different district court, naming Broadcom and not respondent, renders judgment. Complainants also argue that delaying Commission relief until the conclusion of a district court proceeding also would be against Commission policies favoring speedy resolution of section 337 investigations.[17] *Id.* at 19.

(a) Excluded Products

Complainants recommend using the term "integrated repeaters and switches" in the exclusion order with regard to the '410 patent, maintaining that this description will assist U.S. Customs in identifying excluded products. They assert that respondent Altima refers to its products by function, *i.e.*, integrated repeaters or switches, and not by their package, *i.e.*, BGA packages. They submit that the language proposed in no way changes the scope of the ALJ's recommendation because the ALJ found that respondent Altima's integrated repeaters (including the 105R and 108R series) and switches (including the 108SU), as included in the caption of the investigation, infringe the '410 patent.

Complainants further argue that, by identifying specific part names, Customs can easily identify infringing parts. They contend that using more general product descriptions ("integrated repeaters" and "switches") will make it more difficult for respondent Altima to circumvent an exclusion order by simply re-labeling identical products with different names. [18]

In their reply submission on remedy, complainants emphasize that the ALJ held that not only respondent's repeaters but also its 108SU switch infringed the '410 patent. Complainants'

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[16] Complainants cite the Altima Complaint and the Altima Motion to Stay attached to Complainants' Reply as Exh.H and Exh.I.

[17] In support, complainants cite 19 U.S.C. § 1337(b)(1); S. Rep. 412, 103d Cong., 2d Sess. at 119 (1994).

[18] In support, complainants cite Inv. No. 337-TA-383, *Certain Hardware Logic Emulation Sys. And Components Thereof*, Comm'n Op. at 9 (March 1998).

Reply at 2 (citing ID at 151, 155, 206, CFF 42, 1254, 1255). Complainants further argue that, contrary to respondent's contention, the Commission has determined that all of respondent's integrated repeaters, including its 105R series (including the 105RU, 105RN, and 105RM) and 108R series (including the 108RU, 108RN, 108RM, and 108RKPB) infringe the '603 and '410 patents, and that respondent's switches, including its 108SU switch, infringe the '410 patent. *Id.* Complainants assert that there is no factual basis for respondent's argument that some portion of its integrated repeaters should not be excluded. Citing the ID at 133-35, complainants state that [[

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Complainants further argue that, contrary to respondent's position, the scope of this investigation is not limited to the products mentioned in the title of the notice of investigation.[19]

Complainants assert that the complaint makes clear that they alleged that "integrated circuits made by Respondent Altima," not just integrated repeaters, switches or transceivers, infringed the '410 patent, and that they accused respondent of infringing the '410 patent, a BGA packaging patent. They also argue that the investigation focused on the BGA packages of respondent's products, not on the type of product packaged in the BGA, and that the investigation covers every type of product made by respondent. Accordingly, complainants maintain, the ALJ's recommendation to exclude BGA packages should be adopted by the Commission.

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[19] In support, complainants cite *Inv. No. 337-TA-152, Certain Plastic Food Storage Containers* (July 3, 1984) (rejecting an argument that a product is within the scope of the investigation just because it is named in the title).

(b) Named Parties

Complainants agree with the ALJ with regard to the named parties. They point out that because Altima is a wholly-owned subsidiary of Broadcom, the ALJ's recommended exclusion order would bind Broadcom as a "shareholder." Complainants further maintain that since respondent Altima's products are marketed and sold by sales representatives and distributors all over the world, and products sold through these entities are routinely imported into the United States,[20] the exclusion order should cover importation facilitated by respondent's agents.

In their reply, complainants request that respondent's products, *i.e.*, products designed by or for respondent Altima, not by Broadcom -- be excluded from importation. [[

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complainants propose modifying the exclusion order to read, in the pertinent parts, "integrated repeaters *designed by or for Altima*, . . . and printed circuit boards containing same, manufactured abroad and/or imported by or on behalf of Altima Communications, Inc., or its principals, stockholders, officers, directors, employees, agents, licensees, distributors, controlled and /or majority owned business entities and their employees, and agents, successors and assigns . . ." (with regard to the '603 patent), and "integrated repeaters, switches and other products, *designed by or for Altima*, . . . and printed circuit boards containing same, manufactured abroad and/or imported by or on behalf of Altima Communications, Inc., or its principals, stockholders, officers, directors, employees, agents, licensees, distributors, controlled and /or majority owned business entities and their employees, and agents, successors and assigns . . ." (with regard to the '410 patent), respectively. Complainants' Reply at 5 (emphasis in the original). [21] Complainants

[20] In support, complainants cite CFF 2318-2320, 2322, 2326.

[21] The first two paragraphs of the limited exclusion order proposed by complainants read as follows (emphasis in the original):

maintain that adding the "designed by or for Altima" language [[

]] while maintaining the integrity of the order.

Complainants agree with the ALJ and the IA who recommend that "Altima, its principals, stockholders, officers, directors, employees, agents, licensees, distributors, controlled and /or majority owned business entities and their employees, and agents, successors and assigns [be prohibited] from importing [Altima's infringing products] into the United States." ID at 206; the IA's Proposed Order at ¶¶ 1, 2. Complainants note that the ALJ expressly recommended that the limited exclusion order apply to respondent's shareholders, and since respondent is a wholly-owned subsidiary of Broadcom, the ALJ understood that Broadcom owns all of respondent Altima's stock. Complainants note that holding stock in a corporation is ownership of the corporation, and thus the ALJ expressly applied the exclusion order to Broadcom for certain activities relating to Altima's products, but not to Broadcom products. Complainants argue that

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1. Integrated repeaters *designed by or for Altima*, including Altima's 105R series of products (105RU, 105RN, 105RM) and 108R series of products (108RU, 108RN, 108RM and 108RKPB), covered by claims 1, 2, 3, 4, 5, 6, 7, and 9 of U.S. Letters Patent 5,742,603, and printed circuit boards containing same, manufactured abroad and/or imported by or on behalf of Altima Communications, Inc., or its principals, stockholders, officers, directors, employees, agents, licensees, distributors, controlled and /or majority owned business entities and their employees, and agents, successors and assigns, whether assembled or unassembled, are excluded from entry for consumption into the United States for the remaining terms of U.S. Letters Patent 5,742,603, i.e., until September 14, 2015, except under license of the patent owner or as provided by law.

2. Integrated repeaters, switches and other products, *designed by or for Altima*, packaged in Ball Grid Array ("BGA") packages, including Altima's 105RU, 105RN, 105RM, 108RU, 108RN, 108RM, 108RKPB and 108SU covered by claims 23, 24, 27, and 29 of U.S. Letters Patent 5,894,410, and printed circuit boards containing same, manufactured abroad and/or imported by or on behalf of Altima Communications, Inc., or its principals, stockholders, officers, directors, employees, agents, licensees, distributors, controlled and /or majority owned business entities and their employees, and agents, successors and assigns, whether assembled or unassembled, are excluded from entry for consumption into the United States for the remaining terms of U.S. Letters Patent 5,894,410, i.e., until March 28, 2016, except under license of the patent owner or as provided by law.

their proposed language will preclude Altima from circumventing an exclusion order by, *inter alia*, licensing infringing technology that it designed to some third party (such as Broadcom), or having some other arrangement whereby a third party manufactures and imports this infringing technology, as well as from renaming Altima's infringing products and importing them through some third party.

(c) Downstream Products

Complainants expressly state that they do not seek an exclusion order extending to downstream products, such as consumer products, for which the nine *EPROM*s factors must be considered. Complainants Reply at 9, n. 5. However, they argue that the exclusion order should cover printed circuit boards and carriers containing respondent Altima's infringing products. Under *Flash Memory*, complainants argue, the Commission excludes printed circuit boards and carriers even where a complainant has not met the nine-factor *EPROM* test. *Certain Flash Memory Circuits And Prods. Containing Same*, Inv. No. 337-TA-382, Comm'n Op. (1997). Complainants argue that, rather than importing separate infringing chips, respondent could mount those chips on printed circuit boards or carriers to circumvent the order. They note that respondent admits that it imports such boards and, thus, the Commission should exclude printed circuit boards and carriers from importation.

(d) Cease and Desist Order

Complainants request that the Commission issue a cease and desist order to respondent Altima to preclude it from circumventing an exclusion order by, *inter alia,* selling and marketing significant volumes of infringing product inventoried in the United States -- [[

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Complainants argue that although the Commission has required "commercially significant" domestic inventories to issue a cease and desist, the Commission often infers a commercially

significant domestic inventory where respondent fails "to provide evidence to the contrary." [22] Citing *Hardware Logic Emulation*, USITC Pub. 3089, Comm'n Op. at 14, complainants further point out that the Commission has in the past defined "commercially significant" as one infringing product.

Complainants argue that the Commission should find that a commercially significant domestic inventory of infringing products exists or, alternatively, require that respondent certify the number of infringing products inventoried in the United States on a product-by-product basis for each month from March 2001 through September 2001. If Altima's certification shows commercially significant inventory, then the Commission should issue the cease and desist order.

4. The IA's Position

The IA asserts that, contrary to respondent's position regarding a stay, immediate relief relating to the '410 patent is appropriate. He characterizes respondent's request that the Commission extend the target date of this consolidated investigation pending a decision in a suit involving Intel and Broadcom related to the '410 patent, which is scheduled to go to trial before a jury on October 29, 2001, as "unprecedented" and urges the Commission to reject it. He specifically points out that the Commission's rules provide for modification of an exclusion order if that should become necessary.

(a) Excluded Products

The IA agrees with the ALJ's recommendations regarding the scope of the limited exclusion order except that the IA believes that (1) the exclusion order need not list specific model numbers, and (2) under Commission precedent, it is appropriate to include "carriers" as well as circuit boards.

The IA submits, however, that in order to facilitate Customs' enforcement of the limited exclusion order, the Commission should either include in its opinion the specific model numbers found by the ALJ to be infringing (in case the Commission issues the limited exclusion order that

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[22] In support, complainants cite *Certain Crystalline Cefadroxil Monohydrate*, Inv. No. 337-TA-293, Comm'n Op. at 41-42 (March 1990); *Certain Erasable Programmable Read Only Memories*, Inv. No. 337-TA-276, Pub. No. 2196 (March 1989).

does not list specific model numbers) or, alternatively, should use the language "including, but not limited to," before listing the specific model numbers in the limited exclusion order. The IA's Remedy Submission at 4.

In his reply brief, the IA asserts that, contrary to respondent Altima's remedy submission, the ALJ expressly stated in his ID that complainants presented evidence relating to integrated repeaters *and* switches.[23] The IA's Reply at 3. The IA further asserts that the ALJ determined that respondent's AC105R and AC108R repeaters infringe the '603 patent, and that each of the foregoing repeaters as well as respondent's AC108SU *switches* infringe the '410 patent. *See, e.g.*, ID at 136, 145, 151, n.58,155-56, 206. Therefore, the IA contends, contrary to respondent's argument, that the scope of any order relating to the '410 patent should encompass both repeaters *and* switches, rather than being limited to repeaters.

The IA also disagrees with respondent's contention that plastic ball grid array (PBGA) packages are not within the scope of this consolidated investigation. He states that PBGA packages are products used as packaging for the repeaters *and* switches that are identified in the notice of investigation. In particular, the IA contends, PBGA packages are clearly encompassed within the scope of the language "products containing same," *i.e.*, packages containing repeaters and switches.

The IA also disagrees with respondent's argument that the scope of any order should be limited to "managed" integrated repeaters. He asserts that [[ ]] respondent's repeater products were found to infringe the '603 patent, and those repeater products and respondent's AC 108SU switches were also determined to infringe the '410 patent. First, the IA argues, the ALJ determined that [[

[23] In support, the IA cites the ID at 151, n.58 ("Although complainants in their complaint, as supplemented, alleged that respondent's AC105, AC108 and [[ ]] series of products infringed the asserted claims of the '410 patent, (435 Complaint at ¶8.3), in their post hearing brief complainants *argued* only that respondent's AC 105RM, AC 105RN, AC 105RU, AC 108RM, AC 108RN, AC 1O8RU, AC1O8RKPB *and AC1O8SU* [[ ]] series of products infringed the asserted claims of the '410 patent and made no mention of the [[ ]] series of products. (CBr at 135)." (Original emphasis omitted and emphasis added in the IA's remedy reply submission)).

]] [24]

Therefore, if respondent Altima's recommendation were to be adopted, Altima would be free to import and sell infringing [[

]]

Second, the IA continues, [[

]] [[ ]] Altima's repeater products were found to infringe both the '603 patent *and* the '410 patent.[25] Thus, *all* of Altima's AC105R and AC108R repeaters would be subject to exclusion because the packaging containing said repeaters infringes the '410 patent.

The IA concludes by stating that, in view of the foregoing, respondent's attempt to [[

]] should be rejected. Furthermore, the IA contends, any exclusion order directed to the '410 patent should cover both integrated repeaters *and* switches in PBGA packages. However, in the IA's view, inclusion of the phrase "other products" in any remedial order would be inappropriate because complainants only presented evidence relating to respondent's integrated repeaters and switches, and the ALJ's infringement determination only relates to those products.

(b) Named Parties

In the IA's opinion, it is not clear from the RD whether the ALJ recommended a limited exclusion order that would cover Broadcom, respondent's parent. He contends that the Commission should include "its standard language in this regard, which encompasses 'parent(s).'" *Id.*

The IA disagrees with respondent's argument to eliminate "parents," "affiliated companies," and "related companies" from the named parties covered by the exclusion order. He argues for the inclusion of the language "affiliated companies, parents, subsidiaries, or other

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[24] In support, the IA cites the ID at 134-35 [[
]]

[25] In support, the IA cites the ID at 155-56, 206.

related business entities, or their successors or assigns" in any exclusion order that is issued. [26]

(c) Downstream Products

With respect to the coverage of downstream products, the IA agrees with the ALJ that the record contains little evidence of the type identified by the Commission in *EPROMs*, Inv. No. 337-TA-276 (May 1989), *aff'd sub. nom., Hyundai v. U.S. Int'l Trade Commission*, 899 F.2d 1204 (Fed. Cir. 1990), necessary to support issuance of an order extending to downstream products.

However, the IA notes that in *Certain Flash Memory Circuits and Products Containing Same*, Inv. No. 337-TA-382, Com. Op. (June 1997) ("*Flash Memories*") at 24, the Commission determined to include circuit boards and carriers even though the record did not contain any evidence that infringing products had been or were imported in that fashion.[27] He therefore asserts that both circuit boards and carriers containing Altima's devices should be included within the scope of any exclusion order.

In his reply brief, the IA agrees with respondent to the extent that it contends the limited exclusion order should not cover downstream products *of third parties*. However, as the Commission stated in *Flash Memories,* the IA believes that any order that issues should include *respondent's* downstream products, such as carriers and circuit boards. Specifically, the IA notes

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[26] On October 2, 2001, the IA sought leave to provide additional comments supporting the "designed by" language proposed by complainants in their reply submission on remedy submission (*see* footnote 25 *supra*). The Commission determined to accept the IA's submission. In his submission, the IA opines that inclusion of the "designed by" language would be appropriate because section 337 relief is for the benefit of complainants and their wishes should be heeded.

[27] In support, the IA quotes the Commission's opinion in *Flash Memories* which stated as follows:

> Samsung could circumvent an exclusion order covering only flash memory chips simply by installing the chips on easy to dis-assemble carriers and circuit boards. We therefore have extended the exclusion order to cover any carriers or circuit boards manufactured by Samsung that contain its infringing chips. We believe this measure is required in order to ensure that the remedy is effective, notwithstanding that Samsung may not currently manufacture or import such intermediate products. We believe that Customs would not find it as difficult to inspect carriers and circuit boards to determine whether they contain the infringing circuits because such intermediate products are not enclosed in the same kind of protective packaging as are final products.

that respondent's arguments relating to the [[

]] (Respondent's Remedy Submission at 22-24) do not apply to "carriers," pointing out that carriers are devices that, *inter alia*, are specifically designed and manufactured for the express purpose of "transporting" chips in bulk. The IA Reply at 6.

(d) Cease and Desist Order

The IA observes that the Commission has stated that cease and desist orders are appropriate where a respondent has accumulated "commercially significant" inventories of the infringing products in the United States. *Certain Condensers, Parts Thereof and Products Containing Same, Including Air Conditioners for Automobiles*, Inv. No. 337-TA-334, Commission Opinion at 26-28 (August 27, 1997); *see also Certain Crystalline Cefadroxil Monohydrate,* Inv. No. 337-TA-293, USITC Pub. 2391 at 37-39 (June 1991). He notes that in *Condensers,* the Commission referenced its "long standing practice of issuing cease and desist orders only against domestic respondents for the purpose of reaching inventories of infringing goods already in the U.S. that are not subject to exclusion." *Condensers* at 26-28.

The IA states that because the record is devoid of any evidence demonstrating the existence of inventories in the United States, much less the quantity of any such inventories, he concurs with the ALJ's recommendation against issuance of a cease and desist order.

In his reply brief, the IA [[

]] He distinguishes the investigations cited by complainants on the facts. In contrast with the cited cases, respondent in this investigation has not refused to provide information regarding its actual inventories — [[

]] Furthermore, although a cease and desist order was appropriate in *Hardware Logic Emulators* where only a single unit existed in inventory, the devices at issue in that case were very expensive. The products at issue in the instant investigation are relatively inexpensive. Therefore, the IA submits that the rationale relied on by complainants is not applicable here.

5. Views of the Commission

We agree with the ALJ's recommendation that issuance of a limited exclusion order is

appropriate in this investigation, and we are of the view that the remedy relating to the '410 patent should not be delayed until after completion of the jury trial in the U.S. district court in Delaware. We agree with the IA that the Commission's rules provide adequate means for modification of an exclusion order if and when that should become necessary. We are also of the opinion that respondent Altima failed to raise in timely fashion any equitable defense based on the claimed trade secret misappropriation by complainants and to present any timely evidence of such misappropriation. As a result, we see no merit in respondent's argument in this regard (which was raised for the first time in its remedy submission).

(a) Excluded Products

With regard to the '603 patent, we agree in general with the IA's proposed draft exclusion order and thus have issued a limited exclusion order that covers integrated repeaters, including but not limited to respondent Altima's 105R series of products (the AC105RU, AC105RN, and AC105RM models) and its 108R series of products (AC108RU, AC108RN, AC108 RM, and AC108RKPB models) covered by claims 1-7 or 9 of the '603 patent. Respondent's argument that the order should be limited to 105RM and 108RM products is without merit because the ALJ specifically found that "all of the accused respondent's [[

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ID at 136.

With regard to the '410 patent, we conclude that the ALJ's finding that respondent is in violation of section 337, based on its importation into the United States, sale for importation, and sale within the United States after importation of, *inter alia*, PBGA packages and products containing same, ID at 264, warrants a broader scope for the exclusion order than the one proposed by the IA. For that reason, our limited exclusion order covers integrated repeaters, switches, *and other products* in PBGA packages, including but not limited to respondent Altima's AC105RU, AC105RN, AC105RM, AC108RU, AC108RN, AC108RM, AC108RKPB, and AC108SU products covered by claims 23, 24, 27, or 29 of the '410 patent. We reject respondent's contention that only *integrated repeaters* were found to infringe the '410 patent,

because the ALJ held that, among other devices, respondent's AC108SU *switch* infringed the asserted claims of the '410 patent. ID at 151, n. 58; 155; 206. Furthermore, we note that the term of the '410 patent extends until April 13, 2016, *i.e.*, for more than 14 years. We have taken into consideration the possibility that new infringing devices, other than integrated repeaters and switches, will in the future be packaged in PBGA packages and imported into the United States before the expiration of the '410 patent.

The above lists of the models of the devices covered by the limited exclusion order are not intended to be exhaustive and are not included in the order itself. The lists do not purport to limit the scope of the order, but merely enumerate particular devices already found to infringe the asserted claims of the two patents. Any other devices, including those that are not specifically mentioned in the Commission's opinion but which nevertheless fall within the scope of the limited exclusion order, would also be excluded from entry into the United States.

(b) Named Parties

We agree with the IA that, with regard to the named parties, the scope of the exclusion order should include "affiliated companies, parents, subsidiaries, or other related business entities, or their successors or assigns." We interpret the RD to cover Broadcom as a "stockholder" that owns stock of respondent Altima. ID at 206. Therefore, the exclusion order proposed by the IA is consistent with the ALJ's recommendation in this respect.

Complainants and the IA take position that the inclusion of "parents" in an exclusion order will preclude respondent from circumventing the order by having an arrangement whereby a third-party (potentially including Broadcom) manufactures and imports the infringing products or by renaming its infringing products and importing them through some third party.
[[

]] Both sides argue that if a modification of the order becomes necessary in the future, the other side can resort to the appropriate procedure under the Commission's rules. Compare the IA's Reply at 11 ("In any event, the Commission's rules provide for modification of an

exclusion order if that becomes necessary") with Respondent's Remedy Submission at 5 (respondent argues that prevention of circumventing the order by re-labeling its products as Broadcom products is "a far-fetched hypothetical that—if and when it occurred—could be handled by modification of the exclusion order under 19 C.F.R. § 210.76.").

With regard to the draft of the order proposed by complainants, we note that their "designed by" language narrows the scope of the exclusion as it relates to the named parties. Where practicable the Commission takes the desire of a section 337 complainant into account and tries to accommodate it because section 337 relief is for the benefit of the patentholder. However, we decline to adopt the language proposed by complainants because, in our view, it will make the exclusion order unadministrable by Customs. Customs will have no way to know whether a particular imported product was "designed by or for Altima." Even if the persons seeking to import the products in question comply with the certification requirement, Customs will have to exclusively rely on such representation and would have great difficulty to verify whether such products are in fact "designed by or for Altima." Thus, adoption by the Commission of the proposed "designed by or for Altima" language would place a heavy burden on Customs to determine whether to allow importation of a given product, and could unnecessarily disrupt legitimate trade in articles not intended to be covered by the exclusion order.

Having considered the respective arguments of the parties, we determine to include "parents" in the exclusion order for the following reasons. First, rule 210.76(a) allows *any* party to petition for modification of exclusion orders, irrespective of whether such party has or has not been found in violation of section 337. However, rule 210.76(b) specifically makes a distinction between the parties (and their respective burdens) with regard to petitioning for modification of exclusion orders depending on whether a particular party has or has not been found in violation of section 337. In particular, "[i]f the petitioner previously has been found by the Commission to be in violation of section 337 of the Tariff Act of 1930 and if its petition requests . . . modification . . . of an order issued pursuant to section 337 (d), (e), (f), (g), or (i) of the Tariff Act of 1930, the burden of proof in any proceeding initiated in response to the petition pursuant

to paragraph (b) of this section shall be on the petitioner." 19 C.F.R. § 210.76(b). Consistent with Commission rule 210.76(b), while at the present moment there is no certainty as to if or when a need for modification of the exclusion order may arise, if such need does arise in the future, the burden to petition the Commission for modification and to prove that it is warranted should be placed on respondent because it is the one that has been found in violation of section 337.

Second, Altima vigorously argues that [[

]] Respondent's Reply at 7. *See, also, id.* at 8 ([[

]]); Respondent's Remedy Submission at 4 ("[[

]] Therefore, based on the record, there is no current danger of disrupting Broadcom business by inclusion of "parents" in the exclusion order because the order simply will not affect Broadcom.[28] In other words, the issue that Altima is attempting to raise is premature.

Moreover, based on the statements of respondent, it appears that this issue is unlikely to arise in the foreseeable future. In its petition for review of the final ID, respondent stated as follows: [[

]] Respondent's Petition at 1 (emphasis added). Therefore, while a danger of circumventing the

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[28] *See, also*, the ID's Reply at 7:

> [[
>
>]] [sic]. Thus, OUII is perplexed by Altima's professed concern. [[
>
>]] that are covered by either the '603 or '410 patents.
>
> In view of the foregoing, the Commission should include the language "affiliated companies, parents, subsidiaries, or other related business entities, or their successors or assigns" in any exclusion order that is issued.

exclusion order if "parents" are not included as named parties in the exclusion order is immediately foreseeable, because only a short time would be needed to effectuate such circumvention, a danger of unwarranted disruption of Broadcom business is more remote.[29]

(c) Downstream Products

We conclude that, under the nine factors outlined in the *Hyundai* decision, our exclusion order should not encompass downstream products. The ALJ was well equipped to assess whether any evidence was presented to satisfy the nine-factor *Hyundai* test, and we agree with his recommendation that there was insufficient evidence to support an exclusion order covering the downstream products.

However, we agree with the IA's position that both circuit boards and carriers containing respondent's devices should be included within the scope of the exclusion order even where the nine-prong *Hyundai* inquiry is not satisfied. Under *Certain Flash Memory Circuits And Products Containing Same*, Inv. No. 337-TA-382 Comm'n Opinion (June 1997), at 24, circuit boards and carriers are not regarded as true downstream products. We disagree with respondent's argument that circuit boards should not be covered by the exclusion order [[

]] In this regard, we rely on the testimony of complainants' witness Mr. Stephen McConnell who testified that whether it is difficult to remove the devices depends on "whether you want to preserve the part or the [circuit] board. It is difficult to preserve *both*." (McConnell Dep. Tr. At 207) (emphasis added). Thus, infringing devices could be removed from circuit boards if an importer were willing to sacrifice the boards. Moreover, Mr. McConnell testified that while "it is difficult," "it can be done." *Id.* Therefore, if the goal is to remove the devices without damaging them, it can be done, and if simultaneously preserving the printed board is not important, then the former task will not necessarily be difficult, much less impossible. Finally,

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[29] At least with regard to integrated repeaters at issue, respondent appears to share a view that [[
]] Respondent's Submission on Remedy at 29. Therefore, consistent with the respondent's apparent position, a situation where [[
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Mr. McConnell opined that removing a BGA part without damaging it can be accomplished by an outside contractor.

(d) Cease and Desist Order

Under section 337(f)(1), the Commission has discretion to issue cease and desist orders in addition to, or instead of, an exclusion order. The Commission issues cease and desist orders where "commercially significant" inventories of infringing products are present in the United State, and complainants bear the burden of proving that respondent has such an inventory. Because complainants failed to sustain their burden, we have determined not to issue a cease and desist order. *See* ID at 207 ("There was no evidence before the administrative law judge which showed whether [[

]])

B. The Public Interest

1. Complainants' Position

Complainants argue that the public interest favors entry of full relief in this case. They contend that to allow respondent to continue to infringe their patents would contradict the incentive to innovate that Congress sought to promote by granting patent protection.[30]

Complainants note that pursuant to section 337(d), an exclusion order will issue to those violating the statute, absent four overriding public interest factors: (1) the public health and welfare; (2) competitive conditions in the United States economy; (3) the production of like or directly competitive articles in the United States; and (4) United States consumers. 19 U.S.C. § 337(d).

Complainants further state that no public interest factors exist in the instant case that would override the public's interest in precluding respondent from infringing their two valid and enforceable U.S. patents. Thus, complainants contend, excluding respondent's integrated

[30] In support, complainants cite H.R. Rep. No. 40, 100th Cong., 1st Sess., pt. 1 at 156 (1987); S. Rep. No. 71, 100th Cong., 1st Sess. at 128-29 (1987) ("Any sale in the United States of an infringing product is a sale that rightfully belongs only to the holder or licensee of that property. The importation of any infringing merchandise derogates from the statutory right, diminishes the value of the intellectual property, and thus indirectly harms the public interest.").

repeaters and switches will not harm public health or welfare because (1) the products that incorporate these chips, networking hubs, do not directly affect the public health or welfare; (2) "competitive conditions" favor protection of intellectual property rights, not inexpensive copies; (3) exclusion of respondent's products would not harm competition of like or directly competitive products because complainants, and others, can supply similar products; and (4) U.S. consumers would not be harmed by an exclusion order since other manufactures, including complainants, can supply the products at issue. Complainants Remedy Submission at 9.

2. Respondent's Position

Respondent argues that complainants' arguments related to public interest turn the facts upside down, because Altima did not copy Intel's products but rather built a different and better product. Respondent also argues that complainants used documents misappropriated from respondent to formulate the complaint that gave rise to the instant investigation, and that the public has a strong interest in ensuring that the proceedings of its governmental agencies are not premised on improperly obtained information.

3. The IA's Position

The IA submits that entry of relief in the form of a limited exclusion order would not raise any public interest concerns under section 337(d). In this regard, the IA notes that there is no evidence that the U.S. demand for such products cannot be met by entities other than respondent that also manufacture integrated repeaters and switches. The IA states that he is not aware of any other public interest concerns that would militate against entry of ~~a~~ limited exclusion order against Respondent.

4. Views of the Commission

Under section 337(d), the Commission must consider the effect of any remedy on the public interest before issuing an exclusion order. We are aware of no public interest concerns presented in the instant investigation that should prevent the issuance of a limited exclusion order. We disagree with respondent's claim of trade secret misappropriation because we find no support for such claim in the record.

C. Bonding

1. The RD

At the outset, the ALJ observed that section 337(j) provides for the entry of infringing articles and sales of such articles from inventory upon the payment of a bond during the 60-day Presidential review period, and that the bond should be set at a level sufficient to "protect complainant from any injury" during the Presidential review period. 19 U.S.C. §1337(j). *See also,* Commission rule 210.50(a)(3).

The ALJ stated that where the evidence shows [[

]]

Certain Neodymium-Iron-Boron Magnets, Inv. No. 337-TA-372, Comm'n Opinion on Remedy, the Public Interest and Bonding at 15, USITC Pub. No. 2964 (1996). [31]

The ALJ considered the evidence regarding [[

[32]

[33]

]] the ALJ recommended a bond during the Presidential review period of 100 percent of the entered value of the products covered by the limited exclusion order. [34]

2. Complainants' Position

Complainants agree with the ALJ that the Commission should impose a 100 percent bond for any importation of infringing products during the 60-day Presidential review period because a wide range of products was found to be infringing and [[

]][35]

[31] ID at 208.

[32] ID at 209.

[33] *Id.* We interpret this statement to refer to a royalty for the use of patents infringed by the excluded products.

[34] *Id.*

[35] In support, complainants cite *Certain Neodymium-Iron-Boron Magnets*, Inv. No. 337-TA-372, Comm'n Op. at 15, Pub. No. 2964 (1996); *In re Reclosable Plastic Bags and Tubing*, ITC Inv. No. 337-TA-266 (1987); *In re*

3. Respondent's Position

Respondent Altima disagrees with the complainants' suggestion that a 100 percent bond is necessary in the absence of other relevant evidence. It submits that the Commission should set bonds equal to a reasonable royalty for the products at issue.[36] [[

]][37] According to respondent, [[

]][38]

Respondent asserts that because pricing in the semiconductor market is [[

]]

Respondent also asserts that the ALJ inferred the need for a bond from the August 22, 2000, declaration of Intel's witness McConnell that integrated repeaters are "in a declining overall market" that "will likely diminish over the next few years" and that the "economic life cycle of repeaters is nearing its end." [39] Respondent argues that [[

]] and, as a result, Level One should be required to report to the Commission its quarterly unit volume and dollar value of sales of the LXT980 family of products that were found to constitute the domestic industry in order to assure the Commission and public of the continued existence of a domestic

---

Flash Memory Circuits, Inv. No. 337-TA-382, Comm'n Op. at 26-27.

[36] In support, respondent cites *Certain Dynamic Random Access Memories*, Inv. No. 337-TA-242, Comm'n Action and Order at 39 (1987); *Certain Acid-Washed Denim Garments*, Inv. No. 337-TA-324, Comm'n Op. at 51 (1992); *Certain Plastic Encapsulated Integrated Circuits*, Inv. No. 337-TA-315, Comm'n Op. at 44 (1992); *Certain Digital Satellite System (DSS) Receivers*, Inv. No. 337-TA-392, Comm'n Op. at 245 (1997).

[37] In support, respondent cites *Standard Mfg. Co., Inc. v. United States*, 42 Fed. Cl. 748, 766 (1999); *W.L. Gore & Assocs., Inc. v. Int'l. Med. Prosthetics Research Assocs., Inc.*, 1990 WL 180490, at *23 (D. Ariz. July 9, 1990).

[38] Respondent reasons that while the [[

]]

[39] Respondent cites ID at 209.

industry that requires protection.[40]

In its reply submission, respondent argues against the 100 percent bond. It contends that while such bond may be a useful approach for investigations involving cheap "knock-off" imports sold at a much lower price than the domestic products, the reality of the present investigation is far different. Respondent further argues that [[

]]

4. The IA's Position

The IA noted that if the Commission enters an exclusion or cease and desist order, the respondent may continue to import and sell its products during the pendency of Presidential review under a bond in an amount determined by the Commission to be "sufficient to protect the complainant from any injury." 19 U.S.C. § 1337(j)(3); 19 C.F.R. § 210.50. He agrees with the ALJ who recommended a bond of 100 percent of entered value based upon the ALJ's finding that the market for managed repeaters is diminishing, [[

]] The IA's Remedy Submission at 8.

In his reply brief, the IA disagrees with respondent's recommendations regarding bond because, unlike the cases relied on by respondent, the record in the instant investigation does not contain evidence of royalties charged by respondent. He notes that the ALJ rejected respondent's "royalty argument" below.[41] He further observes that, as respondent admits, the [[

]] (Respondent's Remedy Submission at 27-28). The IA also contends that [[

]]. Under these circumstances, the IA submits, the ALJ was correct in determining that [[ ]] and that a bond of

[40] In support, respondent cites *Certain Variable Speed Wind Turbines*, Inv. No. 337-TA-376, Order at para. 4.

[41] In support, the IA cites ID at 208.

100 percent should be imposed. [42]

5. Views of the Commission

We agree with the ALJ's recommendation and have determined to set the bond equal to 100 percent of entered value during the Presidential review period. The record in the instant investigation indicates that the infringing products have [[ ]][43] Based on the evidence of record, the ALJ made a finding that the market for the integrated repeaters will likely diminish over the next few years. Moreover, he concluded that this diminishing market is likely to [[ ]]

Under such circumstances, we determine that the record does not contain reliable price evidence, [[ ]] and set a 100 percent bond, as we have done in some past investigations. *See, e.g., Certain Neodymium-Iron-Boron Magnets*, Inv. No. 337-TA-372, Comm'n Opinion on Remedy, the Public Interest and Bonding at 15, USITC Pub. No. 2964 (1996). [44]

[42] In support, the IA cites *Certain Flash Memory Circuits and Products Containing Same*, Inv. No. 337-TA-382, Com. Op. at 26-27 (1997); *Certain Microsphere Adhesives, Process For Making Same, and Products Containing Same, Including Self-Stick Repositionable Notes*, Inv. No. 337-TA-366, Com. Op. at 25 (1995).

[43] ID at 208.

[44] ID at 208.

CERTIFICATE OF SERVICE

I, Marilyn R. Abbott, hereby certify that the attached **COMMISSION OPINION ON REMEDY, THE PUBLIC INTEREST, AND BONDING PROCEDURAL BACKGROUND**, was served upon the following parties via first class mail, and air mail where necessary, on August 16, 2002.

Marilyn R. Abbott

Marilyn R. Abbott, Secretary
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500 E Street, SW - Room 112
Washington, DC 20436

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UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C. 20436

In the Matter of	)	
CERTAIN INTEGRATED REPEATERS, SWITCHES, TRANSCEIVERS, AND PRODUCTS CONTAINING SAME	)	Inv. No. 337-TA-435

NOTICE OF ISSUANCE OF LIMITED EXCLUSION ORDER

AGENCY: U.S. International Trade Commission.

ACTION: Notice.

SUMMARY: Notice is hereby given that the U.S. International Trade Commission has issued a limited exclusion order in the above-captioned investigation.

FOR FURTHER INFORMATION CONTACT: Michael Liberman, Esq., Office of the General Counsel, U.S. International Trade Commission, 500 E Street, S.W., Washington, D.C. 20436, telephone (202) 205-3115. Copies of the public versions of the Commission's opinion and all other nonconfidential documents in the record of this investigation are or will be available for inspection during official business hours (8:45 a.m. to 5:15 p.m.) in the Office of the Secretary, U.S. International Trade Commission, 500 E Street, S.W., Washington, D.C. 20436, telephone (202) 205-2000. Hearing-impaired persons are advised that information on this matter can be obtained by contacting the Commission's TDD terminal on (202) 205-1810. General information concerning the Commission may also be obtained by accessing its Internet server (*http://www.usitc.gov*). The public record for this investigation may be viewed on the Commission's electronic docket (EDIS -ON-LINE) at http://dockets.usitc.gov/eol/public.

SUPPLEMENTARY INFORMATION: This patent-based section 337 investigation was instituted on August 23, 2000, based upon a complaint filed on July 20, 2000, by Intel Corporation ("Intel") and Level One Communications, Inc. ("Level One"). 65 *Fed. Reg.* 51327 (Aug. 23, 2000). The respondent is Altima Communications, Inc. ("Altima"). A second patent-based section 337 investigation naming Altima as a respondent was instituted on April 24, 2000, based upon a complaint filed by Level One on March 23, 2000, and supplemented on April 13, 2000. 65 *Fed. Reg.* 21789 (Apr. 24, 2000). On August 24, 2000, the presiding administrative law judge (ALJ) issued an order consolidating the two investigations. From April 16, 2001, through April 30, 2001, the ALJ held an evidentiary hearing. On July 19, 2001, the ALJ issued a final initial determination (ID) finding that respondent Altima has violated section 337 of the Tariff Act of 1930, as amended (19 U.S.C. § 1337), by infringing certain claims of two of complainants' asserted patents. Specifically, the ALJ found that: (1) there has been importation and sale of the accused products; (2) complainants practice the patents in controversy and satisfy

the domestic industry requirements of section 337; (3) certain of the claims in issue are valid; (4) the accused imported products directly infringe certain of the claims in issue; and (5) respondent has induced infringement of certain of the claims in issue. Based on these findings, the ALJ concluded there was a violation of section 337. The ALJ recommended issuance of a limited exclusion order.

Complainants Intel and Level One and respondent Altima filed petitions for review of various portions of the ALJ's final ID, and opposed each others' petitions for review. The Commission investigative attorney (IA) did not petition for review of the final ID, but opposed the other parties' petitions for review. On September 5, 2001, the Commission determined not to review the ALJ's final ID and issued a notice to that effect. 66 *Fed. Reg.* 47037 (Sep. 10, 2001).

Having determined that a violation of section 337 has occurred in the importation, sale for importation, or sale in the United States of the accused integrated repeaters, as well as integrated repeaters and switches in plastic ball grid array (PBGA) packages, the Commission considered the issues of the appropriate form of relief, whether the public interest precludes issuance of such relief, and the bond during the 60-day Presidential review period.

The Commission determined that a limited exclusion order prohibiting the importation of the accused integrated repeaters, and circuit boards and carriers containing such devices, as well as integrated repeaters, switches and other products in PBGA packages, and circuit boards and carriers containing such devices, and directed to respondent Altima is the appropriate form of relief. The Commission further determined that the statutory public interest factors do not preclude the issuance of such relief, and that respondent's bond under the limited exclusion order shall be in the amount of 100 percent of the entered value of the imported articles.

This action is taken under the authority of section 337 of the Tariff Act of 1930 (19 U.S.C. § 1337) and section 210.50 of the Commission's Rules of Practice and Procedure (19 C.F.R. § 210.50).

By order of the Commission.

Donna R. Koehnke

Donna R. Koehnke
Secretary

Issued: October 24, 2001

CERTAIN INTEGRATED REPEATERS, SWITCHES, TRANSCEIVERS, AND PRODUCTS CONTAINING SAME **337-TA-435**

CERTIFICATE OF SERVICE

I, Donna R. Koehnke, hereby certify that the attached Notice, was served upon the following parties via first class mail, and air mail where necessary, on **October 24, 2001.**.

Donna R. Koehnke, Secretary
U.S. International Trade Commission
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PUBLIC VERSION

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.

In the Matter of CERTAIN INTEGRATED REPEATERS, SWITCHES, TRANSCEIVERS, AND PRODUCTS CONTAINING SAME	)	Investigation No. 337-TA-435

Final Initial and Recommended Determinations

This is the administrative law judge's final initial determination, under Commission rule 210.42, in Inv. Nos. 337-TA-430 and 337-TA-435.[1] The administrative law judge, after a review of the record developed, finds that a violation by respondent of section 337 of the Tariff Act of 1930, as amended (19 U.S.C. § 1337), has occurred.

This is also the administrative law judge's recommended determination on remedy and bonding, pursuant to Commission rule 210.42(a)(1)(ii). The administrative law judge recommends that the Commission issue a limited exclusion order and further recommends a bond of 100% of entered value during Presidential review.

[1] As the Procedural History (Section I, infra) states, Inv. Nos. 337-TA-430 and 337-TA-435 were consolidated. The caption for Inv. No. 337-TA-430 is "Certain Integrated Repeaters And Products Containing Same."

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ABBREVIATIONS

CBr	Complainants' Post hearing Brief
CFF	Complainants' Proposed Findings Of Fact
CORFF	Complainants' Objection To Respondent's Proposed Finding
CRBr	Complainants' Post hearing Reply Brief
CReCFF	Complainants' Reply To Respondent's Proposed Finding
CRRFF	Complainants' Rebuttal Findings
CX	Complainants' Exhibit
FF	Administrative Law Judge's Findings Of Fact
RBr	Respondent's Post hearing Brief
RFF	Respondent's Proposed Finding Of Fact
ROCFF	Respondent's Objection To Complainant's Proposed Finding
RPre	Respondent's Prehearing Brief
RRBr	Respondents' Post hearing Reply Brief
RRCFF	Respondent's Rebuttal Finding
RReCFF	Respondent's Reply To Complainants' Proposed Findings
RX	Respondent's Exhibit
SBr	Staff's Post hearing Brief
SFF	Staff's Proposed Finding
SRBr	Staff's Post hearing Reply Brief
SX	Staff's Exhibit
Tr.	Transcript of Hearing

OPINION

I. Procedural History

By notice, which issued on April 18, 2000, the Commission instituted an investigation (337-TA-430), pursuant to subsection (b) of section 337 of the Tariff Act of 1930, as amended, and based on a complaint, as supplemented, filed by Level One Communications Inc. (Level One), to determine whether there is a violation by respondent Altima Communications, Inc. (Altima) of subsection (a)(1)(B) of section 337 in the importation into the United States, the sale for importation, or the sale within the United States after importation of certain integrated repeaters and products containing same by reason of infringement of claims 1, 2, 3, 4, 5, 6, 7, 8, 9, or 10 of U.S. Letters Patent 5,742,603 ('603 patent) and whether there exists an industry in the United States as required by subsection (a)(2) of section 337.

By notice, which issued on August 17, 2000, the Commission instituted an investigation (337-TA-435), pursuant to subsection (b) of section 337 of the Tariff Act of 1930, as amended, and based on a complaint filed by Level One and Intel Corporation (Intel), to determine whether there is a violation by respondent of subsection (a)(1)(B) of section 337 in the importation into the United States, the sale for importation, or the sale within the United States after importation of certain integrated repeaters, switches, transceivers, or products containing same by reason of infringement of claims 1, 3, 7-8, 13-19, or 23-29 of U.S. Letters Patent 5,894,410 ('410 patent), claims 1, 3, 10-13, 15-16, or 19 of U.S. Letters Patent 5,608,341 ('341 patent), or claims 1, 3, 5, 10, or 11 of U.S. Letters Patent 5,726,860 ('860 patent) and whether there exists an industry in the United States as required by subsection (a)(2) of section 337.

Order No. 3, which issued on August 24, 2000, granted respondent's Motion Nos. 430-

6 and 435-1 to consolidate Inv. Nos. 337-TA-430 and 337-TA-435. On September 7, Order No. 4 set a target date, of October 23, 2001, for the consolidated investigation.

On December 28, 2000, an initial determination (Order No. 8) granted Intel's Motion No. 435-6 to terminate partially the consolidated investigation through Intel's withdrawal of all allegations relating to the '860 patent. On February 14, 2001, the Commission issued a notice not to review Order No. 8. Order No. 24, which issued on March 8, denied respondent's Motion No. 435-33 to extend the target date, but reset certain dates of the procedural schedule.

Order No. 28, which issued on March 15, 2001, was an initial determination which granted complainants' Motion No. 435-29 finding that complainants satisfied the economic prong of the domestic industry requirement regarding the '410 patent. Order No. 29, which issued on March 16, granted complainants' Motion No. 435-30 finding that complainants satisfied the economic prong of the domestic industry requirement as for the '603 and '341 patents. On April 2, the Commission determined not to review Order No. 29.

Order No. 39, which issued on April 12, 2001, granted in part respondent's Motion No. 435-15 for sanctions. Order No. 40, which also issued on April 12, denied respondent's Motion No. 435-25 for sanctions. Respondent, on March 29, filed a Motion No. 435-49 in limine to preclude complainants from switching their domestic industry allegations to assert different devices for the '341 and '603 patents. Order No. 45, which issued on July 19, denied said motion. Respondent, on April 19, filed Motion No. 435-100 for sanctions pursuant to Commission rule 210.4. Order No. 46, which issued on July 19, denied said motion.

On April 16, 2001, the hearing was commenced and continued on April 17, 18, 19, 20, 21, 23, 24, 25, 26, 27, 28 and 30. Post hearing submissions have been made. In addition,

closing arguments were heard on May 25. The matter is now ready for decision.

The final initial and recommended determinations are based on the record compiled at the hearing and the exhibits admitted into evidence. The administrative law judge has also taken into account his observation of the witnesses who appeared before him during the hearing. Proposed findings submitted by the parties not herein adopted, in the form submitted or in substance, are rejected as either not supported by the evidence or as involving immaterial matter and/or as irrelevant. The findings of fact included herein have references to supporting evidence in the record. Such references are intended to serve as guides to the testimony and exhibits supporting the findings of fact. They do not necessarily represent complete summaries of the evidence supporting said findings.

II. Parties

See FF 1-18

III. Importation

Respondent has admitted that the accused products are imported into the United States. (RPre at 112).

IV. Claim Construction

Claim construction is a question of law. Markman v. Westview Instruments, Inc., 52 F.3d 967, 978, 34 U.S.P.Q.2d 1321, 1323 (Fed. Cir. 1988). (Markman) The construction of the language of a claim should be made independently of what is being alleged to infringe the claim. See Donald S. Chisum, Patents § 18.03 (Chisum).

Proper claim construction requires that

the intrinsic evidence of record [] be considered first, i.e., the patent itself,

> including the claims, the specification and if in evidence the prosecution history. Such intrinsic evidence is the most significant source of the legally operative meaning of disputed claim language.

Vitronics Corp. v. Conceptronic Inc., 90 F.3d 1576, 1582, 39 U.S.P.Q.2d 1573, 1576 (Fed. Cir. 1996) (Vitronics). The specification contains a written description of the invention that must enable one of ordinary skill in the art to make and use the invention. For claim construction purposes, the written description may act as a sort of dictionary, which explains the invention and may define terms used in the claims. Words in a claim are generally given their ordinary and customary meaning. A patentee however is free to be his own lexicographer, although any special definition given to a word must be clearly defined in the specification. Markman, 52 F.3d at 978, 979, 34 U.S.P.Q.2d at 1328, 1329; Vitronics, 90 F.3d at 1580.

The administrative law judge may, in his discretion, receive extrinsic evidence to aid him in coming to a correct conclusion as to the true meaning of language employed in a patent. Markman, 52 F.3d at 981, 34 U.S.P.Q.2d at 1331. Extrinsic evidence consists of all evidence external to the patent and prosecution history, including expert and inventor testimony, dictionaries and learned treatises. The evidence may be helpful to explain scientific principles and the meaning of technical terms, and terms of art that appear in the patent and prosecution history. It may also demonstrate the state of the prior art at the time of the invention. Extrinsic evidence, however, is not for the purpose of clarifying ambiguities in claim terminology. Markman, 52 F.3d at 81, 34 U.S.P.Q.2d at 1331. Moreover, neither the patentee nor the alleged infringer may alter the scope of the claims:

> where the public record unambiguously describes the scope of the patented

> invention, reliance on any extrinsic evidence is improper. The claims, specification, and file history, rather extrinsic evidence, constitute the public record of the patentee's claim, a record on which the public is entitled to rely.

Vitronics, 90 F.3d at 1538, 39 U.S.P.Q.2d at 1577. The testimony of an inventor on the proper construction of claims, based on the text of the patent, is entitled to no deference because it amounts to no more than legal opinion which is the process of construction that the administrative law judge must undertake. No inquiry as to the subjective intent of the inventor or of the Patent Office is appropriate or even possible in the context of a patent infringement action. In fact, commonly the claims are drafted by the inventor's patent solicitor and they may even be drafted by the patent examiner in an examiner's amendment subject to the approval of the inventor's solicitor. Markman, 52 F.3d at 985, 34 U.S.P.Q.2d at 1334, 1335.

Only the disputed claim elements need to be interpreted by the administrative law judge. See In the Matter Certain Hardware Logic Emulation Systems and Components Thereof, Inv. No. 337-TA-383, (July 31, 1997) (Hardware Logic); and In the Matter of Certain Ion Trap Mass Spectrometers and Components Thereof, Inv. 337-TA-393 at p. 24-25 (February 25, 1998).[1]

A. The '603 Patent

The '603 patent, entitled "Method And Apparatus For Integrating Repeater

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[1] This course of action has been sanctioned by the Court of Appeals for the Federal Circuit, which referring to Hardware Logic, stated that "by agreement, the appeal turns on the proper construction of certain disputed terms in the three asserted claims. The operation and structure of the accused device are neither uncertain nor disputed. In sum we adopt the claim construction of the Commission which was correct and derived according to our case law on appropriate methodology." Mentor Graphics Co. v. United States International Trade Commission, 124 F.3d 226 (Fed. Cir. 1997).

Management, Media Access Control, And Bridging Function" issued on April 21, 1998 (CX-2). The named inventors, Hain Shafir and Mark T. Feuerstraeter, assigned the patent to Level One (CX-2). Said patent is based on application Ser. No. 528,205 field September 14, 1995 (CX-2). The '603 patent contains ten claims.

In issue are independent claim 1 and dependent claims 2-9.[2] They read (CX-2):

> 1. A repeater management device for communication networks, and repeater management device controlling repeaters and routing data packets between a receiving port and a destination port, comprising:
>
> repeater management means for controlling and monitoring repeater functions related to the retransmission of the data packets and for providing status of and control over repeater functions via an external repeater management interface;
>
> bridging support means, coupled to the repeater management means, for receiving the data packets on the receiving port and for forwarding the received data packets to the destination port in accordance with a destination address; and
>
> media access controller, coupled to the repeater management means, for providing signal framing of the data packets and for controlling access to a repeater data interface.
>
> 2. The repeater management device of claim 1 wherein the repeater management means further comprises an access port for providing access to attributes relating to repeater functions.
>
> 3. The repeater management device of claim 1 wherein the bridging support means are controlled by the repeater management means.
>
> 4. The repeater management device of claim 1 wherein

[2] While the notice of investigation put all claims of the '603 patent in issue, complainants have limited the claims in issue to independent claim 1 and dependent claims 2-9. (CBr at 26).

the management means further comprises a plurality of counters for traffic control.

5. The repeater management device of claim 1 wherein the media access controller further comprises means for generating preambles and error correcting codes, means for handling deferrals and collisions, means for controlling and handling backoff conditions, and means for retrying data transmission.

6. The repeater management device of claim 1 wherein the repeater management means further comprises registers for storing the attributes relating to repeater functions.

7. The repeater management device of claim 1 further comprising a media access control port for providing data packets received by the media access controller via the repeater data interface to memory.

8. The repeater management device of claim wherein the media access controller determines whether a data packet is to be sent to the bridge for forwarding to a destination address connected to the bridge port or whether a data packet is to be transmitted via the repeater data interface.[3]

9. The repeater management device of claim 1 wherein the repeater data interface comprises an inter-repeater back plane.

In issue are the location of the repeaters with respect to the claimed repeater management device and also whether the claimed subject matter is limited to "out-of-band" IEEE compliant repeater management. Respondent has also challenged the expertise of complainants' proffered expert Colin Mick. Also, in closing argument respondent represented that while it is not advancing 35 U.S.C. § 112 defenses with respect to the claimed "repeater management means" found in independent claim 1, there is the issue of whether "IEEE

[3] At the hearing all parties agreed that the first line of claim 8 should be interpreted as follows: "The repeater management device of claim 1 wherein the . . . ."

standards" provides adequate structural support for said means.

1. Colin Mick

Complainants proffered Colin Mick as an expert in Ethernet network[4] technology. (Tr. at 655). Respondent argued that Mick is not qualified to offer expert opinion regarding the subject matter of the '603 patent. (ROCFF-394). It was also argued by respondent, in closing argument, that Mick was only a "facilitator," relying on the following testimony of Mick:

> Q As you interpreted your role in the 802.3 committees of the IEEE, was as a facilitator; isn't that correct?
>
> A Probably more of a problem solver, problem solver and facilitator, together.
>
> Q Facilitator was your testimony, right?
>
> A Again, you would have to - - you would have to give me detail. I can't recall precise words used on the testimony given sometime past. [Tr. at 2103]

Respondent defined "facilitator" as a person retained by various companies to get the ball rolling and to act as a technical writer. (Tr. at 4343). The word "facilitator," however, is a broad term. Thus, Random House College Dictionary (1980) at 473 has the following definition:

> fa-cil-i-tate (...), *v.t.*, -tat-ed, -tat-ing. 1. to make easier or less difficult; help forward (an action, a process, etc.). 2 to assist the progress of (a person). - fa-cil/i-ta/tion. *n.* - fa-cil/i-ta/tive, *adj.* - fa-cil/i-ta/tor, *n.*

At the hearing the administrative law judge reserved a ruling on how, if at all, Mick should be

---

[4] The word "network" is defined as to "[l]ink (computers) together to allow the sharing of data and efficient utilization of resources.' The New Shorter Oxford English Dictionary at 1909 (1993).

qualified to offer expert opinion. However, he did permit complainants to rely on Mick's testimony in their post hearing submissions, subject to striking the testimony.

A trial court is a gatekeeper, in that the court will allow in testimony based on technical and other specialized knowledge that the court finds both reliable and relevant in reaching a conclusion. Daubert v. Merrell Dow Pharmaceuticals, Inc., 509 U.S. 579 (1993) (Daubert). The law grants the court the same broad latitude when it decides how to determine reliability as it enjoys with respect to its ultimate reliability determination, Kumho Tire Company, Ltd. v. Carmichael 526 U.S. 137, 142 (1999) (Kumho).[5] The record establishes that Mick has many years of hands-on experience in the Ethernet networking industry, including:

> building networks, both commercial and leading edge demonstrations;
> defining IEEE Ethernet standards that are key to understanding the '603 patent;
>
> specifying product at the system level;
>
> designing leading edge system design tools; and
>
> creating network simulation tools (another aspect of system level design), for which

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[5] Effective December 1, 2000, Fed.R.Evid. 702 was amended to reflect the Daubert inquiry and now reads:

> If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise, if (1) the testimony is based upon sufficient facts or data, (2) the testimony is the product of reliable principles and methods, and (3) the witness has applied the principles and methods reliably to the facts of the case.

The language, added by the amendment, follows the gatekeeping function established by Dauber and Kumho. The Advisory Committee Notes explain that no specific factors were articulated in the new rule because the factors mentioned in Daubert are neither exclusive, nor dispositive, and do not apply to all types of expert testimony.

Mick received a patent himself. (Mick, Tr. at 2105-2115, FF 19 to 26).

Moreover, this administrative law judge had ample opportunity to observe the demeanor of Mick during his testimony at the hearing. Based on Mick's background, testimony of Mick at the hearing and the administrative law judge's observations of Mick, the administrative law judge rejects respondent's argument that Mick is a mere "facilitator" as that word was defined by respondent. To the contrary, Mick "contributed technical content" to the IEEE standards, and his IEEE work required "going out and obtaining . . technology proposals, developing criteria for evaluating them, developing standards just for evaluating the proposals, selecting the technical solution to be used, and then modifying it so that it was acceptable to all members of the group." (Tr. at 2111). Accordingly, the administrative law judge accepts Mick as an expert in Ethernet network technology and further finds, in view of Mick's expertise, that the testimony of Mick relied on in this final initial determination has sufficient reliability as evidence.

2. Background

The invention of the '603 patent relates in general to a repeater management device, and in particular, to a method and apparatus for integrating repeater management, media access control (MAC), and bridging support functions into a single device. (CX-2, col. lns. 6-12). It is undisputed, as the '603 patent acknowledges, that attaching repeater management, bridging and MACs to an Ethernet network was known at the time the application for the '603 patent was filed on Sept. 14, 1995. (RReCFF at 180). Hence the claimed subject matter in issue does not merely involve attaching repeater management, bridging and MACs to an Ethernet network.

According to the '603 patent (col. 1, lns. 26-31):

> ["t]he standard for Local and Metropolitan Area Network technologies is governed by IEEE Std. 802. IEEE Std. 802 describes the relationship among the family of 802 standards and their relationship to the ISO Open System Interconnection Basic Reference Model and is incorporated by reference into the '603 patent. [Emphasis added] [6]

Generally, IEEE Std. 802 [7] prescribes the functional, electrical and mechanical protocols, and the physical and data link layers for Local and Metropolitan Area Networks (LAN/MAN). The specification of the '603 patent augments network principles, conforming to the International Standards Organization (ISO) seven-layer model for open systems interconnection

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[6] Complainants argued that the '603 patent incorporates the entire IEEE 802 specification by reference, citing CX-2 at col., lns. 27-31. (CFF 488). Respondent, citing the identical portion of the '603 patent, argued that the '603 patent does not incorporate all portions of the entire IEEE 802 specification by reference but rather incorporates portions of the IEEE Std. 802 that "describes the relationship among the family of 802 standards and their relationship to the ISO Open System Interconnection Basic Reference Model." (RR CFF-488-A). The administrative law judge finds that the plain language of col. 1 lns. 26-31 shows that the entire IEEE Std. 802 is incorporated by reference into the '603 patent.

[7] IEEE stands for the Institute of Electrical and Electronics Engineering which is an international professional association. The association has a very broad standards program that produces standards in a wide variety of technologies, much broader than networking. The IEEE 802 project, which is called the LAN/MAN standards committee, develops standards for the low level local area network and metropolitan area network devices, particularly for the lower two layers of the International Standards Organization (ISO) model. Within the IEEE 802 project, there are a number of working groups, each of which prepares standards on a very specific local area networking technology Those standards are living documents that expand as new technologies grow. The term "clauses" is used in IEEE 802.3 to refer to chapters. Each clause represents a specific chunk of information that is added. For example, a 10BASE-T repeater technology would be defined in a single clause. There are approximately 40 or so clauses that represent the IEEE 802.3 document. (Mick, Tr. at 2111-12).

(OSI),[8] commonly referred to as "Ethernet".[9] In the hierarchy of the seven-layer model, the lowest layers, the so-called physical and data link layers, comprise functional modules that specify the physical transmission media and the way network nodes interface to it, the mechanics of transmitting information over the media in an error-free manner, and the format the information must take in order to be transmitted. (CX-2, col. 1, lns. 27-44).

A repeater is defined in numerous different clauses of the IEEE 802.3 standard.[10] In layman's terms, a repeater receives data from one source and transmits it to all attached sources. It does not look at destinations. (Feuerstraeter, Tr. at 308-309). A repeater is a very simple device. It has a number of "ports," which are the actual physical connections that

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[8] CDX-34 is a representation of the ISO's seven-layer model. The layers are referred to by numbers, with number one being the lowest, the physical layer, and the number seven the application layer. The various layers are well-defined within the communications system, and their functionalities are also defined. More importantly, communication with adjacent layers is defined by the protocol stack. On Exhibit CDX-34, layer one is depicted at the bottom and layer seven is depicted at the top. An example of an application might be something like a web browser, which would be both layers seven and six. Physical layer products are devices that connect to the transmission medium in a communication channel. (McConnell, Tr. at 108, 110).

[9] Ethernet is a communications system of local area networking communications system that is defined by the IEEE project 802. (McConnell, Tr. at 116). The drawing marked as CDX-150 is a typical configuration of an Ethernet system where multiple computers can exchange data with each other. They are interconnected through a repeater. To pass information back and forth between various elements, the information was sent from one computer to the repeater which, in turn, forwarded it to its ultimate destination. (McConnell, Tr. at 117-118). On the drawing, marked as CDX-150, the lines drawn at the bottom of the box are connection ports to other computers or other peripherals such as printers and shared resources. (McConnell, Tr. at 118-119).

[10] CX-1066 is the IEEE standard 802.3 dated 1993 and CX-1067 is the IEEE standard, 802.3u, dated 1995 and those standards were the then-current standard for repeaters in September of 1995. (Feuerstrater, Tr. at 309-310).

connect to the other devices in the network. A repeater allows one device to send data into it and electronically amplifies and reconditions the signal and simply retransmits it to all the other ports. (McConnell, Tr. at 118). A repeater performs several functions and has evolved over the history of IEEE. One of the earliest functions of repeaters was to reamplify signals to span greater distances, and this developed into acting as a facilitator of communications between different nodes on a network or different personal computers (PCs) on a network. Thus, a repeater handles functions like collision detection and notification. If two PCs in a network attempted to communicate at the same time, the repeater would notify all of the appropriate ports on that repeater that a collision had occurred and that they should stop transmitting.

Repeater management is defined by the IEEE standards. Specifically the IEEE standard (CX-1067 at 297) states that "there are two distinct aspects of repeater management. The second aspect provides the means to monitor traffic from attached segments." In general, repeater management refers to the collection of statistics from and control over the repeater. (Feuerstraeter, Tr. at 312).

A media access controller, or MAC, is defined by the IEEE 802.3 standard.[11] Its purpose is to add some of the framing onto the actual data of the packet. One of the things that

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[11] The '603 patent, under the subheading "Background Of The Invention," states (col. 1, lns. 56-62):

> A Media Access Control (MAC) function converts digital information, typically stored in memory in the from of a packet, into an actual Ethernet frame which can be transmitted on an Ethernet connection, or a frame received from the network connection which is stored in memory as a packet.

the MAC will do typically is add the preamble of a packet. This is also where the destination and source addresses are, depending on the direction that the packet is traveling, added or checked, as well as where an error code is added to the end of the packet to make sure it is sent and received properly. (Feuerstraeter, Tr. at 313-314). Typically a MAC is associated with a bridge. Within the context of an IEEE 802.1d bridge, a MAC has to do only a few things, viz, it needs to look and check the cyclic redundancy check (CRC) and see if it is actually a good packet. The CRC is an error code that is added to make sure something did not get corrupted along the way. Hence one of the first functions is to see if the packet coming into the bridge is valid. That would be done as part of the MAC function. If the packet is good, the MAC must next decide whether it needs to send the packet to an outgoing port of the bridge, by looking at the destination address. If the packet is good coming in, the MAC does not need to modify that packet, because the packet is completely and validly formed already. (Feuerstraeter, Tr. at 314-315).

The term "inter-repeater backplane" (backplane) is a term that is generally used for something that connects and allows what is connected to share their functions so that a series of chips can act as a single repeater and not be limited to the number of ports on a single chip. Basically, the backplane shares information about the functions of the repeaters across it to act as one repeater. (Feuerstraeter, Tr. at 332-333). Stacking refers to the ability to have a single repeater, once again with large number of ports, through an inter-repeater back plane. (Feuerstraeter, Tr. at 410-411).

An Ethernet bridge is a device with two or more physical ports that is capable of forwarding a packet received on any port to any other single port based on the destination

address of the packet. A packet that is not forwarded to a port is considered filtered. (CX-2, col. 1, lns. 51-54).

An Ethernet network is sometimes likened to conversations in a crowded room. It is defined in the standard as CSMA/CD protocol, and that is the communication protocol which is used in the Ethernet system. The CSMA/CD stands for "carrier sense multiple access collision detect," and it is very much like a conversation in a room where there is a group of people who, as human courtesy, listen before other people speak. If two or more people begin to talk simultaneously, there is a collision Everybody remains silent for a few moments, and then after a random time one person will attempt to communicate again, and the communication will go through. (McConnell, Tr. at 119).

One of the weaknesses in the CSMA/CD protocol is if one has a large number of people in a room, then there will be many people trying to attempt to communicate simultaneously, and consequently there will be a large number of collisions, and not very much data will get through. One way to address that problem is to separate people into separate rooms, but still allow the groups to communicate with each other. (McConnell, Tr. at 120; 121). As the number of computer users increase, it becomes very desirable to segment users into multiple groups. But to insure that any group can communicate with any other, a box called a "bridge" needs to be installed in the middle. (McConnell, Tr. at 121). In the bottom half of the CDX-150 there is a mechanism to segment groups of users into smaller groups to keep the number of collisions down, and at the same time still permit flow of communication. For example, if computer A wanted to communicate with computer B, that communication would flow normally. The bridge in the middle provides that functionality by listening to all

the traffic on this particular side. If the bridge sees the ultimate destination of the traffic is on the other side, it will forward the traffic through. If the bridge does not see the destination on the other side, it does not forward it. Therefore, it keeps traffic separated for the two parts of the network. (McConnell, Tr. at 122).

On CDX-150 there are two lines representing network A and network B, which are two completely independent networks, but they are joined in the middle by the bridge. The bridge, like a bridge in a city divided by a river, allows communication to go to either side, but only if the communication needs to be on the other side. If the communication does not need to be on the other side, the bridge keeps it local. (McConnell, Tr. at 124).

The '603 patent referred to a need for greater network efficiency by combining the function of network repeater management Ethernet MAC, and network bridging support function into a single device. (CX-2, col. 2, lns. 22-25).

3. 35 USC §112

Respondent, in its post hearing brief and with respect to the claimed "repeater management means" did not raise any section 112 defenses,[12] and also included a subsection at page 179 of its post hearing brief titled "The Repeater Management Means Corresponds to Structures That Comply With Clause 30 of IEEE Standard 802.3".[13, 14] In addition, in

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[12] The first paragraph of section 112 of Title 35 requires that the specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same.

[13] A sentence in that subsection at 180 reads "[c]lause 30 management requires compliance with a defined set of mandatory functions that must be performed to satisfy the IEEE definition of 'repeater management'." The sentence referenced footnote 99 which read:

respondent's "Proposed Conclusions Of Law," the only conclusion, with respect to invalidity of the asserted claims of the '603 patent, is that the asserted claims are invalid as anticipated under 35 U.S.C. §102.[15] Complainants understandably, in their reply brief, stated that respondent had abandoned its 112 defenses, including the written description, enablement, and best mode requirements, with respect to the claimed repeater management means, and that respondent admitted that the IEEE standards provide adequate structural support for said means. (CRBr at 41).

Respondent, in closing argument on May 25, 2001, after submission of its post hearing brief on May 9, and with respect to the claimed "repeater management means," agreed that it is "not" advancing 35 U.S.C. §112 defenses in the investigation. (Tr. at 4329, 4230).

> In the alternative, if the structure disclosed in the specification is not found in clause 30 of the IEEE 802.3 standard, then claims 1-10 are invalid under 35 U.S.C. §112, second paragraph, for failing to provide an adequate disclosure showing what is meant by the means-plus-function language in this clause of claim 1. See In re Donaldson, Co., 16 F.3d 1189, 1194 95 (Fed. Cir. 1994) (en banc).

The administrative law judge finds that footnote 99 did not raise a 35 U.S.C. §112 defense relating to the claimed "repeater management means" in respondent's post hearing brief. If respondent intended to maintain such a 35 U.S.C. §112 defense it should have so stated in its post hearing brief and further explained why any structure disclosed in the specification of the '603 patent is not found in clause 30, assuming arguendo that is a fact.

[14] Respondent, in their proposed findings, did include a subsection E related to the '603 patent and titled "Invalidity due to Indefiniteness" (RFF 2088 to RFF 2113). However those findings do not cure the failure of respondent to raise any 35 U.S.C. §112 defense relating to the claimed "repeater management means" in its post hearing brief. Moreover there is no reference of RFF 2088 to RFF 2113 in respondent's post hearing brief.

[15] It is assumed that respondent inadvertently omitted a conclusion of law as to invalidity with respect to other aspects of the '603 patent, e.g., "bridging support means" which were raised in respondent's post hearing brief. See infra.

However it argued that it did not admit that IEEE standards provide adequate structural support for the claimed "repeater management means". (Tr. at 4329). It then argued that "it's an open issue of law of whether one can rely upon a strictly functional description in a specification or incorporation by reference in order to satisfy the requirements of 112, paragraph 6" (Tr. at 4333); that "Altima contends that there is no structure disclosed in the IEEE specification" (Tr. at 4336-37); that the

> "proper interpretation of that heading [the subheading at page 179, supra, of respondent's post hearing brief] is that it would correspond to a structure that complied with Clause 30. There is no disclosure of any such structure in Clause 30 and there's no disclosure of any such structure in the '603 specification[;]"

and that the subheadings on page 181 of respondent's post hearing submission[16] reflect the "issue that the structures that are corresponding to the [repeater management] means are not identified in sufficient detail in the specification for one skilled in the art to produce, [i.e., practice the invention]" (Tr. at 4342).[17]

The administrative law judge finds respondent's argument on May 25 that it has not

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[16] Those subheadings read "(1) Structure Corresponding to the Means For Controlling and Monitoring Repeater Functions Related to the Retransmission of Data Packets" and (2) "Structure Corresponding to the Function of Providing Status and Control Over Repeater Functions Via an External Repeater Management Interface." The administrative law judge, in the text that follows those subheadings, does not find any basis for the argument that any structures that are corresponding to said means are not identified in sufficient detail in the specification.

[17] Respondent, in its post hearing brief, in contrast to the position it took with respect to the claimed "repeater management means," did argue that the "bridging support means" of claim 1 must be interpreted pursuant to 35 U.S.C. §112, ¶ 6 (1994); that the bridging support means lacks structure; and that the structure for bridging support in the '603 patent corresponds to a half bridge, rather than a complete IEEE 802.1d bridge (RBr at 188-191).

admitted that IEEE standards provide adequate structural support for the claimed "repeater management means" is inconsistent with its abandonment in its post hearing brief of an invalidity defense under 35 U.S.C. §112 as to said means. In view of the position respondent took in its post hearing brief, the administrative law judge further finds that the specification of the '603 patent, which incorporates by reference IEEE standards, is adequate under 35 U.S.C. §112 to permit one skilled in the art to practice the claimed subject matter with respect to the claimed "repeater management means."

Referring to the "claimed bridging support means," respondent has not objected to the facts that a bridge is defined by the IEEE 802.1 standard; that as an example, a bridge is something that connects multiple repeater domains; that by looking at the destination address it determines whether a packet that is coming into it should be forwarded (Feuerstraeter, Tr. at 312); and that the IEEE 802.1d standard (CX-1276) is the bridge standard. (Feuerstraeter, Tr. at 313). See RReCFF at 127, 128). The '603 patent incorporates all of IEEE 802. See Section IVA.2 supra. Respondent's expert Molle has admitted to the existence of an IEEE 802.1 bridge (Tr. at 3496). In addition Mick testified (Tr. at 2177-79):

> Q Now, looking back at CX-7, the patent in claim 1, do you have an opinion as to the meaning of the next element, the bridging element?
>
> A Yes, I do.
>
> Q And what is that?
>
> A The next slide, I think, but certainly we're talking here about a simple bridge, an IEEE 802.3, 802.1d bridge. And I'm sorry, as I mentioned earlier my definition of a bridge we're talking about the operation of selective transfer of frames between two repeaters based, collision domains, based on the use of MAC and

destination addresses.

* * *

Q Does 1276 contain the 802.1d standard to which you referred?

A Yes, it contains it.

Q Now, do you have an opinion as to whether the phrase "bridging support" had an ordinary technical meaning in the context of Ethernet repeaters in September 1995?

A Yes, I do.

Q And what's that?

A That it would have been, as I've described previously, the selective transfer of frames between two repeater-based collision domains, which is a common practice to control bandwidth and utilization.

Q And what kind of component would be used for such transfer?

A Typically, you would have one or more repeaters representing one collision domain. And in the act of partitioning, you would take some of those repeaters or users, and split them off into a separate collision domain and then you would use a bridge to move Ethernet frames between the two.

Q And do you have an opinion as to whether the term "bridge" had an ordinary technical meaning in the context of Ethernet in September of 1995?

A Yes, and that would have been an IEEE 802.3.1.d bridge. [Emphasis added]

In addition Molle testified (Tr. at 3477):

Q So you would agree that as of September 1995, IEEE 802.3u, clause 30, specified repeater management?

A Yes.

Q Now, and would you also agree that as of September 1995, IEEE 802.1d specified bridging?

A Yes.

Q And in fact, it is your belief that 802.1d defines everything one needed to know to build a bridge?

A At the functional level. To point out that I looked at the '603 patent this morning, at the document cited, and it cities a much earlier issue of the IEEE 802.3 standard and it doesn't cite 802.1d at all, if I recall correctly.

So page 2 of the '603, they have other publications, they list the 1990 version of the 802.3 standard. They list a 1990 supplement to the standard that describes 10BASE-T. They describe a September '89 - - that's not a standards document.

Q But would you agree that by the time the 802.1d standard had been published, everything one needed to know to build a bridge was available?

A Yes. And I've also testified that the design in the '603 doesn't meet those standards. It's incompatible. [Emphasis added]

While Molle testified, supra, that the design in the '603 patent does not meet IEEE standards, he also testified that the the '603 patent is an "architectectural patent" which discloses combinations of functions and further relates to the "definition of the boundary and the interfaces" that cross that boundary as opposed to the particular way those functions inside the boundary are implemented. (Molle, Tr. at 3341-42, 3473). Moreover, while the field of invention that is at issue in the '603 patent is Ethernet hardware, the level of abstraction used in the patent to describe the Ethernet hardware is a functional description similar to the kind of specifications that are in the relevant IEEE standards. (Molle, Tr. at 3205). A number of elements can be used in an Ethernet network system which includes repeaters, MACs and bridges and the subject of the '603 patent is to create a system that includes functions that are

related to an Ethernet bridge, a MAC, and the management of the repeater and bridge functions. (Molle, Tr. at 3205-6). A term of art for choosing to include some functions within one device and other functions in related devices would be "architecture." (Id.)

Molle also testified (Tr. at 3473):

> Q "Question: And based upon the information currently available to you, you believe it incorporates structures that you were earlier identified in your testimony as the structures of claim 1 of the '603 patent?"
>
> "Objection, no foundation, calls for a legal conclusion."
>
> "Answer: Honestly, I don't know how to answer that. I'm having difficulty seeing structures in the '603 patent. The existence of a board that does the functions which I see described in '603 implies a structure. Beyond that, I don't see a specific structure in '603."
>
> Did you give that testimony?
>
> A That sounds about right. I think that's consistent with what I was saying earlier today about the structure of '603 defining a boundary with an interface as opposed to the particular way that those functions inside the boundary are implemented. [Emphasis added.]

In addition, according to Molle, the state of the art in the time frame of the '603 invention included the kinds of equipment discussed in the '603 patent, including repeaters, management, bridges, MACs, and similar components and all of these were commercially available at the time, even combinations of certain components. (Tr. at 3214). Moreover, Molle testified that all of the high-level functions described in the '603 patent, repeaters, management, bridging, MAC are all well known, available in products, available in combinations in products, and are standard building blocks like Legos or bricks that one uses to build a building (Tr. at 3251-

3253), Molle further admitted that the IEEE standards talk about interfaces between functions, and sometimes they talk about interfaces which are logical in nature and help the implementer to provide structure. (Tr. at 3271).

There are two kinds of information in IEEE 802.3 clause 30 related to controlling and monitoring repeater functions. The first one defines what is called a managed object, which in terms of the '603 patent, would be either a register or a counter. A register is a memory location that holds specific information. A counter is incremented based on events. The 802.3 clause 30 defines what those managed objects are: naming them, saying what they are to contain, and supplying some of the implementation information concerning the issues that an implementer should be aware of in creating a particular object. (Mick, Tr. at 2180-81). One can take the information contained in the IEEE specifications and write a base Verilog description which would form the starting point for the rendering process that would move from base Verilog code down through the net list to synthesis. There is sufficient detail in the IEEE specifications so that an implementer can create an instantiation of the particular component. (Mick, Tr. at 2324-2326).

The IEEE standard 802.3 focuses on functionality. (Mick, Tr. at 2101). However, it also provides structure, giving information about tolerances, timing budgets, state machines, and information about transitions between states. (Id.) For example, the "short events" counter defined by IEEE 802.3u sub-clause 30.4.3.1.9, which is just one example of the many counters defined by IEEE 802.3u (CX-1067), specifies the following details: counter increment limitations ("a maximum increment rate of 75,000 counts per second at 10 megabits per second"); "tolerances," defined in terms of "bit times," based on the "propagation speed of

how quickly we can move a signal across the network;" and a "bit budget," which defines the total capacity of the network, i.e., the allowed size. (CX-1067 at 319; Mick, Tr. at 2150-2171).

Based on the foregoing, the administrative law judge finds that a person of ordinary skill in the art would consider the claimed "bridging support means" structural and, taken with the incorporated IEEE standards, be able to build an embodiment of the claimed invention with that means.[18] He further finds, assuming arguendo respondent had not waived the U.S.C. §112 defenses as to the "claimed repeater management means," that the specification of the '603 patent, combined with the incorporated IEEE standards and the level of skill in the art as of the date the application for the '603 patent was filed (September 1995) would have enabled one of ordinary skill in the art to understand the claims in issue and to build an embodiment of

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[18] In Budde v Harley-Davidson, Inc. 250 F.3d 1369, 1376, 1377 (Fed. Cir. 2001), the Court observed:

> For a court to hold that a claim containing a means-plus-function limitation lacks a disclosure of structure in the patent specification that performs the claimed function, necessarily means that the court finds the claim in question indefinite, and thus invalid. Because the claims of a patent are afforded a statutory presumption of validity, overcoming the presumption of validity requires that any facts supporting a holding of invalidity must be proved by clear and convincing evidence. Ultra-Tex Surfaces, Inc. v. Hill Bros. Chem. Co., 204 F.3d 1360, 1367, 53 U.S.P.Q.2d 1892, 1898 (Fed. Cir. 2000); Panduit Corp. v. Dennison Mfg. Co., 810 F.2d 1561, 1570, 1 U.S.P.Q.2d 1593, 1595 (Fed. Cir. 1987) (stating that the presumption mandated by § 282 is applicable to all of the many bases for challenging a patent's validity). Thus, a challenge to a claim containing a means-plus-function limitation as lacking structural support requires a finding, by clear and convincing evidence, that the specification lacks disclosure of structure sufficient to be understood by one skilled in the art as being adequate to perform the recited function. [Emphasis added.]

the claimed invention with said means without undue experimentation.[19]

The claimed media access control (MAC) element of claim 1 reads:

> media access controller, coupled to the repeater management means, for providing signal framing of the data packets and for controlling access to a repeater date interface [CX-2]

This language, as to the media access controller, does not use the word "means." While the clause does use the functional word "for," the clause would be understood as an IEEE 802.3 defined MAC used for bridging. (Mick, Tr. at 2179-80; CDX-181). To support bridging, the MAC would look at received frames or packets and make sure that they are valid by checking the CRC, and then it would get the destination address from inside the frame. (Id). If it received the frame from a bridging element, it would restore the timing and present that frame to the target network, and so essentially what it is doing is controlling the movement of the frames between the repeater and the bridge. (Id).

The phrase "media access control" had an ordinary technical meaning in the context of Ethernet bridging in September of 1995, viz., it would refer to a standard IEEE 802.3 MAC, and which are Ethernet MAC operations relative to support of bridging that are further discussed in IEEE 802.1d. (Mick, Tr. at 2185-86). The '603 patent specifically states that "[t]he definitions of an Ethernet MAC (Media Access Control) function are contained in the IEEE 802.3 specification, which is incorporated by reference." (CX-2, col. 1, lns. 45-51).

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[19] To invoke section 112, para. 6 of Title 35, patent claim drafters have used the words: "means for" followed by a recitation of the function performed. However merely because a named element of a patent claim is followed by the word "means," does not automatically make this element a "means-plus-function" element under said provision of section 112. Cole v. Kimberly-Clark Corp. 102 F.3d 524, 531 (Fed. Cir. 1996).

The IEEE 802.3 standard defines attributes which can be used by a management function within an IEEE 802.3 Ethernet repeater to monitor network behavior (Id.) Molle admitted that IEEE 802.3 specifies an Ethernet MAC. (Tr. at 3482). He also admitted that the IEEE 802.3 standard provides a sufficiently detailed description that a MAC could be built. (Tr. at 3310). The '603 patent states further that the MAC "allows transmitting of data packets from the MAC port on bridging support functions to the repeater data port and allows receiving of packets from the receiver data port to the MAC port." (CX-2, col. 2, lns. 46-50). The '603 patent (col. 3, lns. 48-55) under the subheading "Detailed Description Of The Preferred Embodiment," further states:

> The MAC provides preamble and cyclic redundancy check (CRC) generation and detection, deferral and collision handling, back-off algorithm and automatic retry. The MAC normally detects and rejects runts, oversized packets, and packets with CRC or alignment errors, but also offers alternate modes which allow capturing of errored packets.

Based on the foregoing the administrative law judge finds that respondent has not established, by clear and convincing evidence, that the specification of the '603 patent is inadequate.

4. The Claimed Subject Matter And Out-Of-Band IEEE Compliant Repeater Management.

The two ways to manage a network are through "in-band management" or "out-of-band management." The parties agree that "out-of-band management" means that none of the data packets or the data channel bandwidth are used for management (Feuerstraeter, Tr. at 445), and that "out-of-band management" is the gathering of statistics and the transmission of that information without using any of the bandwidth allocated for transferring network packets.

(Holland, Tr. at 610) (RReCFF at 131). With "in-band management," management data and instructions are sent to device being managed through the same channel that is being used to send the data, whereas with "out-of-band management" the management information is sent in a separate channel. The phrase "in-band management" also means that management messages are sent using the same channel that is used to move data through the network.[20] The phrase "out-of-band management" also means that all of the management signals between the manager and the managed object are sent using a separate channel. (Mick, Tr. at 2175-76). The phrase "in-band management" is used to refer to deriving statistics from or controlling of a module through the use of an Ethernet packet or Ethernet frame. (Harvey, Tr. at 2948-49). The use of control and monitoring packets that flow through the same data path as Ethernet data packets constitutes "in-band management" (Harvey, Tr. at 2949-50), while the phrase "out-of-band management" refers to status and control management information that is transmitted outside of the data path. (RX-732, Cabletron Spring 1993 Product Catalog at CS00015; Harvey, Tr. at 2950-51).

With "in-band management," a greater sophistication in implementation is required, as the managed device must distinguish between data and management information that is being sent to it through the same channel. Thus, the difference between "in-band management" and "out-of-band management" is critical. The "in-band management" requires special hardware and/or software inside the physical devices to generate and insert management packets into the

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[20] In "in-band management", the management messages actually compete with the data for bandwidth and access to the network resources. (Mick, Tr. at 2175-76).

data stream and identify and remove them from the data stream before it is provided to the physical interfaces. (Mick, Tr. at 22703-2272). Also, "in-band management" is considered more advanced than "out-of-band management." (Harvey, Tr. at 2923).

Respondent, in closing argument, argued that the '603 patent "doesn't emphasize in-band or out-of-band management, it enables both and it enables them over different ports" (Tr. at 4463). Although the term "out-of-band" is only used once in the '603 patent (CX-2 at col. 2 ln. 15)")[21], the administrative law judge finds that the '603 patent discloses that the "repeater management device" manages repeaters only through "out-of-band" communication and does not cover "in-band" communication for such management. Thus the '603 patent states, under "Background of the Invention":

> [a] secondary out-of-band port that is not part of the repeater domain is desirable for the management of traffic because it does not utilize any bandwidth from the repeater domain. To provide greater network efficiency, it is also desirable for the functions of network repeater management, Ethernet MAC, and network bridging to be combined into a single device.

(CX-2, col.2, lns. 14-21). (Emphasis added) The single device in which all of the desirable features were to be integrated was the invention disclosed in the '603 patent. See CX-2, col. 2, lns. 22-25. The use of "out-of-band management" of repeaters is also apparent from the separation of the repeater management interface, which is used to "control repeater functions as directed by commands received on the access port and to monitor repeater functions and supply the status of those functions in response to queries directed over the access port," (CX-2, col. 2, lns. 38-42), from the repeater data interface, from which "the MAC function 112

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[21] The phrase "in-band" never occurs in the '603 patent. (CX-2).

receives data packets from the inter-repeater backplane (also known as a repeater data interface)" (CX-2, col. 3, lns. 41-43). Even respondent's expert witness Molle admitted that the repeater management interface is separate and distinct from repeater data interface:

> Q Do you believe that there's a difference between the repeater management interface 114 and the repeater data interface 116?
>
> A Yes, I do.
>
> Q Could you explain the difference?
>
> A I just read a passage from I guess it was column 2 of the specification, that described the management of the repeaters by accepting commands through the access port and controlling the repeater functions through the repeater management interface.
>
> JUDGE LUCKERN: Can you pinpoint where you read that column through line so and so, or whatever you were referring to, for the record, Doctor?
>
> THE WITNESS: Yes. That was column 2, line 37 through 43.
>
> JUDGE LUCKERN: All right. Thank you. Go ahead. Let me see. Could you explain the difference and I just read a passage from I guess it was column 2, that described the management, et cetera. So you finished your answer, is that correct? In other words, you asked to explain the difference and you stand by that answer?
>
> THE WITNESS: Yes. I could search for a quote that describes the connection of the MAC, but it will be on the next page, but there is the one that part of the introduction. Yes, so column 3, line 40 through 43, states: "A MAC function 112 receives data packets for the interrepeater backplane 116 (also known as a repeater data interface)."
>
> So the description here is explaining how the MAC is connected to a repeater data interface from which it can send and receive Ethernet packets. And Ethernet packets are generally not the same thing as a management operation as described in this section of the patent. (Tr. 3233-34). [Emphasis added]

Separate and distinct channels for data on the one hand, and for management information on

the other hand, are consistent with finding that the '603 patent mandates a total "out-of-band" flow such that management information is not transmitted over the data path. (Mick, Tr. at 3865-66; CDX-175).

The finding that the repeater management interface is separate and distinct from repeater data interface is also born out by FIGS. 1 and 2 of the '603 patent. Thus Figure 1 clearly depicts the "repeater management interface" and the "repeater data interface" as being separate and unconnected. FIG. 2 depicts the two interfaces[22] as separate and, although there is a connection between repeater data interface and the "management address tracking 208" function, Molle admitted that such a connection "could be for snooping." (Molle, Tr. at 3519). The '603 patent in fact states that the connection is used by the address tracking function for snooping[23] in stating that a "repeater data interface 210 is used by the management and address tracking function 208 as well as with the MAC 212, DMA controller, and FIFOs 216 for snooping the inter-repeater bus." (CX-2, col. 4 lns 24-27).

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[22] The repeater management interface in FIG. 2 of the '603 patent is labeled as the "LXT914 Serial Interface 204" and the repeater data interface is labeled as "LXT914 Inter Repeater Bus (Data Interface) 210." The Serial Interface 204 is used for management, i.e., "rout[ing] information pertaining to port status and control," (CX-2 col. 4 ln. 22), and is depicted separate from the Inter Repeater Bus (Data Interface) 210. See also unobjected to CFF 281 and CFF 282 which read:

> CFF 281: In figure 1, there is a Repeater Management Interface, and in figure 2 it is called a Serial Interface. The management functions would be exerted over those interfaces. (Mick, Tr. at 2181-2183).
>
> CFF 282: In figure 3, Security & Serial Signals 312 are also separated from Inter-Repeater Backplane 308. (CX-2).

[23] The word "snooping," according to respondent, refers to monitoring data traffic, not adding management information to the data traffic. See RRCFF-288.

Respondent places great weight on Molle's testimony to support its contention that claim 7 of the '603 patent allows for "in-band management," viz., claim 7 requires delivery of in-band Ethernet traffic from the repeater data interface to the CPU, allowing "in-band management." (Tr. at 3328-29, CX-2 col. 8 lns. 17-21). Molle testified (Tr. at 3328-29):

Q Thank you, Dr. Molle. Could you please turn to claim 7.

A I have it.

Q Dr. Molle, do you have an understanding of whether claim 7 requires delivery of [in-] band Ethernet traffic from the repeater data interface to the CPU?

A Yes, I do.

Q What is your understanding?

A That the claim is stating exactly that fact, that this is similar to figure 4, which is already on the display. It is traffic originating on the Ethernet repeater domain and being delivered to the host rings, element 406 in figure 4.

Q Dr. Molle, are you familiar with the terminology "in-band versus out-of-band management"?

A Yes, I am.

Q Dr. Molle, would claim 7 relate to those concepts of in-band or out-of-band management?

A Yes, it would

Q How does it relate?

A It would enable in-band management. [Emphasis added]

However he also testified (Tr. at 3504-05):

Q So just focusing on the language of claim 7, "repeater management device of claim 1, further comprising a

media access control port for providing data packets received by the media access controller via the repeater data interface to memory," now, doesn't that just refer to taking packets through a MAC and putting them into memory?

A The port is CPU memory, and the specifications discusses the - - how this is used for Ethernet frames. There's discussion about the control blocks that go with data packets and so on.

This is clearly referring to the concept of receiving data packets from the Ethernet and placing them in the CPU memory where they could be read by the memory in a separate location from the bridging data structure.

Q But the '603 patent never says certainly anywhere in it, "in-band management," would you agree with that?

A I would have to go do a text search, but I don't recall any other location. However, one skilled in the art would recognize that if I have a network device, that has a read/write MAC, then that would be a good thing to do with it.

I certainly wouldn't set up a Web server on my repeater, I would use this for management. (Tr. at 3504-05) [Emphasis added.]

The administrative law judge finds that Molle, in the above testimony, did not testify, on the basis of claim 7 of the '603 patent, that the '603 patent practiced "in-band management" but only that claim 7 "enabled" such management or, with respect to claim 7, that "in-band management" would be a good thing. Molle further admitted that the '603 patent "strangely does not refer to in-band management." (Tr. at 3505). Thus the phrase "via an external repeater management interface" should be interpreted as "external interface" for "repeater management" rather than "management interface"

for "external repeater." (Mick, Tr. at 2176). Such an interface is external because it is for the "out-of-band management" of the repeaters. (Mick, Tr. at 2177; CDX-175).

Additionally, "out-of-band management" of the repeaters must be IEEE compliant. There is no dispute that the term "repeater management" as used in the '603 patent, is defined by clause 30 of the IEEE 802.3 standard. (See, e.g., RRBr at 179-80). The '603 patent states that

> [t]he definitions of an Ethernet Repeater and an Ethernet MAC (Media Access Control) function are contained in the IEEE 802.3 specification, which is herein incorporated by reference. This standard defines attributes which can be used by a management function within an IEEE 802.3 Ethernet Repeater to monitor network behavior.

(col. 1, lns. 45-50).

Therefore, "repeater management" as used in the '603 patent is governed by the IEEE 802.3 standard, and specifically by clause 30 of that standard which "provides the Layer Management specification for DTEs, repeaters, and MAUs based on the CMSA/CD access method" and "defines the facilities comprised of a set of statistics and actions needed to provide IEEE 802.3 Management services." (IEEE 802.3u, Cl. 30.1 (1995)). IEEE 802.3 repeater management requires compliance with a defined set of mandatory functions that must be performed to satisfy the IEEE definition of "repeater management." (CX-1067, IEEE Standard 802.3 at LOC029398-399). Those functions provide the means (1) to monitor and control the functions of a repeater and (2) to "gather[] statistics on packets that enter a repeater and maintain[] those statistics on a per-port basis." (CX-1067, IEEE Standard 802.3 at LOC029396). Hence a device practicing the '603 patent must have a "repeater management" function that is fully compliant with IEEE standard 802.3. Consistent with the administrative

law judge's earlier finding that the '603 patent mandates the use of "out-of-band management," such IEEE 802.3 compliant management functions must be implemented through an "out-of-band" channel.

5. Location Of The Repeaters That Are Managed In The Claimed Subject Matter In Issue

Each of complainants and the staff argued that any repeaters that are managed by the device of the asserted claims may be either internal or external to the claimed repeater management device, and that the asserted claims only require that the repeater management device exerts control over the repeaters. Respondent argued that repeaters that are managed by said device must be external to the claimed repeater management device. It is undisputed that the repeater management device of independent claim 1 is a single device. (CReCFF at 425).

The terms in the preamble of asserted independent claim 1, the only independent claim in issue and in the '603 patent, limit the claim. Thus the use of the plural term "repeaters" in said preamble indicates that the claimed repeaters management device must manage more than one repeater. However, the language of the preamble, while it specifies two specific functions for the claimed repeater management device," viz., "controlling and monitoring repeater functions" and "providing status of and control over repeater functions via an external repeater management interface," does not exclude other functions. Also looking at the plain language of the preamble, the language does not say one way or the other way where the repeaters that are to be managed are located relative to the claimed repeater management device. For example, the language does not state that the claimed repeater management device is separate from the repeaters it is controlling, or that the device is "controlling external repeaters." Rather all it states is that the repeater management device exerts control over the repeaters. In

addition, the word "comprising" in the preamble indicates that additional components, which could include repeaters, can be included in the claimed repeater management device. Hence the administrative law judge finds that the plain language of the preamble of claim 1 indicates that the repeaters could be, but do not have to be, separate from the claimed repeater management device.

The specification of the '603 patent explains the combination of known components, viz., repeater management, bridging support and MACs, into a single device. Thus as stated in the Summary Of The Invention "[t]o overcome the limitations in the prior art described above, and to overcome other limitations that will become apparent upon reading and understanding the present specification, the present invention discloses a system which combines the functions of repeater management, Ethernet MAC, and network bridging support into a single device." (CX-2, col. 2, lns. 28-33). While the specification refers to repeaters, there is no language in the specification that states that the referenced "repeaters" must be external to the repeater management device. While the specification does use the word "external" (col. 2, ln. 13, col. 3, ln. 60, col. 6, ln. 24, col. 6, ln. 48, col. 6, ln 54) it is not in reference to "external repeaters" or "external management devices."

FIG. 3 of the '603 patent is a block diagram of a RMD in accordance with the present invention." (col. 3, lns. 4-5). Significantly while FIG. 3 shows a connection to "remote" repeaters 310, (col. 4, lns. 45-46), it also shows three repeaters 318 which are not said to be "remote." In addition there is no language in the specification which states that repeaters 318 must be "external" to the device containing the claimed management functionality.

FIG. 1 of the '603 patent "is a functional block diagram illustrating the relationship

between the management functions, the bridging support functions and the MAC functions in accordance with the present invention." (col. 2, lns. 64-67). There is no language in the '603's patent's discussion of FIG. 1 which specifies that the depicted Repeater Management Interface 114 and Repeater Data Interface 116 must be connected to repeaters that are "external" to the claimed device. The '603 patent only states that "[a] repeater management function 108 uses a repeater management interface 113 to control and monitor repeater functions." (col. 3, lns. 29-31). The location of the repeater is not specified. Moreover, FIG. 1 does not characterize interfaces 114 and 116 as "external."

FIG. 2 of the '603 patent is "a system block diagram showing a repeater management device (RMD) in accordance with the present invention." (col. 3, ln. 1-3). There is no language in the '603's patent's discussion of FIG. 2 (col. 4, lns. 19-38) that specifies that the depicted LXT914 Serial Interface 204 and LXT914 Inter Repeater Bus (Data Interface) 210 must be connected to repeaters that are "external to" the claimed device. Thus the '603 patent states that "RMD 200 uses a serial interface 204 connecting with the repeaters to route information pertaining to port status and control 206." (col. 4, lns. 20-23). There is also no language that the repeaters must be "external" repeaters. In addition, although "LXT914s" were commercially available repeater chips sold by Level One at the time the application for the '603 patent was filed, nothing would preclude an LXT914 from being incorporated into the claimed device. Thus, an LXT914 chip could be built onto a single circuit board that practiced the claimed invention, or the logic of an LXT914 could even be combined into a single chip that practiced the claimed invention. (Mick, Tr. at 2308-11).

Respondent, responding to complainants' argument that there is nothing in the

specification of the '603 patent that states that the repeaters must be external with respect to any disclosed Figures, argued that in FIG 3 "there are double-headed arrows, for instance at 322, twisted pair ports, are clearly connected to an external device." (Tr. at 4515). However, FIG. 2 of the '603 patent, which is devoted exclusively to a repeater management device, "in accordance with the present invention" (col. 2, lns. 19-21), shows double-headed arrows connecting components that are not external from each other.

In addition, with respect to the language of the repeater management element of claim 1, respondent's expert Molle admitted that the language of the repeater management element is divided into the following two parts: (1) "controlling and monitoring repeater functions related to the retransmission of the data packets" and (2) "providing status of and control over repeater functions via an external repeater management interface." He testified that the part (1) "refers to controlling repeaters," while the part (2) "refers to reporting through software running on a CPU." (Tr. at 3458-59). Thus, the disputed claimed language "external repeater management interface" appears in the part of the claim involving communications with the CPU rather than the part of the claim involving communications with the repeaters. Hence, the administrative law judge finds that the claimed phrase "external repeater management interface" refers to the CPU interface, rather than Repeater Management Interface 114 shown in FIG. 1. Moreover, the word "external" in "external repeater management interface" refers to the '603 patent's use of out-of-band communication for repeater management. See Section IV A 4. supra.

Respondent argued that language added to original claim 1 in the prosecution of the '603 patent to distinguish over a citation U.S. Patent No. 5,414,694 to Crayford et al (the '694 patent) established that the claimed repeater management device of independent claim 1 can be

used only with external repeaters. (RFF 765-66).[24] The added language was "and for providing status of an control over repeater functions via an external repeater management interface" and the addition of the media access controller (MAC) element which required signal framing of the data packets and control access to a repeater data interface. (FF 35 to 49).

As originally filed, claim 1 of the 603 patent was not limited to a "repeater management means" for "providing status of and control over repeater functions via an external repeater management interface." (FF 35, 36). The Examiner, in his first office action, rejected all the original thirteen claims as anticipated by the '694 patent. In that Office Action the Examiner stated that the '694 patent discloses an address tracking function over repeater based networks comprising a repeater management means for monitoring and controlling repeater functions related to the routing of the data packets (10 of FIG. 3); bridging support means for receiving the data packets on the receiving port and for routing the data packets to the destination port (12 of FIG. 3); a media access controller for providing signal framing of the data packets and for controlling access to the ports (FIG. 8); and means for maintaining attributes relating to the repeater functions. (FF 38).

The '694 patent teaches using a management device, the HIMIB, to control and monitor a separate repeater, the IMR+ which is shown in FIG. 3 of the '603 patent. The separation of management and repeater into two devices is also discussed at column 5 of the '694 patent:

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[24] As indicated, supra, independent claim 1 does not recite a repeater and the plain language of the claims and specification supports a finding that the repeater can be either internal or external to the claimed device.

> Referring now to FIG. 3, the present invention comprises two devices in a preferred embodiment. One is entitled The Hardware Implemented Management Information Base (HIMIB) Device 10 and the other is an Integrated Multiport Repeater (IMR) device 12. The IMR device provides the basic repeater function, performing signal amplitude and timing restoration, incorporating 8 individual 10BASE-T ports, and one Attachment Unit Interface (AUI) port. The AUI port allows connection of the 10BASE-T ports to an existing coaxial wired Ethernet/Cheapernet network. The IMR device also provides an inter-module expansion bus, which allows multiple IMR devices to be cascaded together, and still be treated as a single repeater. In addition, the IMR device also has a management port, to allow configuration and monitoring of the operational state of the repeater, and a simple reporting function to provide an external indication of which port is receiving at any time.
>
> The HIMIB device is a companion device to the IMR circuit, and provides monitoring for all network activity detected by the IMR device. The HIMIB collects statistics based on the type of network activity, and stores this information internally as registers which can be accessed by an external host device, such as a microprocessor. The host typically uses the data collected and stored by the HIMIB device to provide network management information, in order to more easily administer the operation and/or fault diagnosis of the network.
>
> These two devices 10 and 12 cooperate to provide the advantages above described. [RX-646, col. 5 lns. 8-39; FF 47 to 49] [Emphasis added.]

According to respondent's expert Molle, the '694 patent refers to MACs and at column 8, starting at line 51, there is a description of a function where an Ethernet MAC takes source addresses from different ports on the repeater and makes comparisons of those source addresses. The MAC and the address table are used for security purposes. In this context, "security means that if the wrong person is found attached to the network, the system can either disable a port or perhaps scramble the data if it is supposed to be blocked". (Molle, Tr. at 3463-65). Thus the '694 patent teaches using MACs to track source and destination addresses for security purposes. (RX-646, col. 3, lns. 21 to col. 4, lns. 10). For example packets can be blocked based on address if, for example, an eavesdropper is detected (col. 3,

lns. 42-54). Molle admitted that at col. 5, lns. 8-13, the '694 patent refers to the HIMIB and the IMR as separate devices. (Tr. at 3457). Bridging is not mentioned in the '694 patent. (RX-646).

In contrast to what is disclosed in the '694 patent, applicants, responding to the first office action, stated in a September 16, 1997 response (FF 41):

> The applicants respectfully traverse the rejection. Crayford et al. teach an integrated multiport repeater device having a hardware implemented management information base device (HIMIB). The repeater/HIMIB provides monitoring for network activities detected by the repeater. The repeater/HIMIB stores statistics based on the network activity, which can then be accessed by an external host advice that typically provides network management information. The repeater/HIMIB compares source address and destination address fields to provide authentication and security features. However, Crayford et al. do not teach a media access controller for providing signal framing of data packets and for controlling access to repeater via a repeater data interface. Further, Crayford et al. do not teach bridging functions included with a repeater manager for controlling and monitoring repeater functions related to the retransmission of the data packets and for providing status of and control over repeater functions via an external repeater management interface and the media access controller.
>
> In contrast to Crayford et al., the Applicant's invention is a repeater manager for controlling and monitoring repeaters and for providing status of and control over repeater functions via and external repeater management interface bridging support means for receiving the data packets on the receiving port and for forwarding the received data packets to the destination port in accordance with a destination address, and a media access controller for providing signal framing of the data packets and for controlling access to a repeater data interface. Applicants' invention therefore provides upper-layer services for repeaters, including management, security, full MAC functionality and bridging.

> Note that the Applicants' invention is an external management device for a repeater via the repeater data interface, e.g., a inter-repeater backplane, rather than a repeater having some additional management functionality added thereon. Applicant's invention also provides additional advantages including a processor interface for providing direct memory access and semaphoring capability to facilitate MAC and bridging functions with low CPU overhead.
>
> Accordingly, Applicants submit that claims 1-2, 4-6 and 14-18 recite novel features not shown by the cited reference. [Emphasis added]

Thereafter the Examiner issued a notice of allowance. (FF 42).

The administrative law judge finds, as seen from the September 16, 1997 response, that the '694 patent (which shows separation of management and repeater into two devices) was distinguished from the claimed subject matter on the basis that the '694 patent does not teach either "a media access controller for providing signal framing of data packets and for controlling access to repeater via a repeater data interface" or "bridging functions included with a repeater manager for controlling and monitoring repeater functions related to the retransmission of the data packets and for providing status of and control over repeater functions via an external repeater management interface and the media access controller." There is no reference in the remarks of September 16, 1997 to an "external repeater management interface."

Respondent relies on the following language in the remarks: "external management device for a repeater via the repeater data interface, e.g., a inter-repeater backplane," which is found in the paragraph supra, that starts with "[n]ote that . . . ." Molle, however, has admitted that a person of ordinary skill in the art, looking at the phrase " via the repeater data interface, e.g., a inter-repeater backplane." would conclude that the phrase refers to the

repeater data interface 116 of FIG. 1 or the LXT914 inter-repeater bus, the data interface 210 of FIG. 2 or the inter-repeater backbone 308 of FIG. 3 which are not repeater management interfaces. (Tr. at 3289-90, 3460-61).[25]

Respondent argued that complainants' representation in the paragraph that commences with "[n]ote that . . . ." in the September 6, 1997 response to the Examiner, supra, that the invention claimed in the '603 patent was not "a repeater having some additional management

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[25] Molle's testimony was in response to specific questioning of this administrative law judge (Tr. at 3289-90; 3460-61):

> JUDGE LUCKERN: Would a person of ordinary skill in the art, then looking again at this language that we see on page 7 of this response, namely "via the repeater data interface, for example an inter-repeater backplane," would he look at this language and then looking at the packet, would he conclude that that is referring to the repeater data interface 116 of figure 1 or the LXT914 inter-repeater bus, the data interface 210 of figure 2 or the inter-repeater backplane 308 of figure 3?
>
> THE WITNESS: Yes, they would.
>
> JUDGE LUCKERN: Well, are those repeater management interfaces? I understand that the repeater management interface is 114 of figure 1 or it's 204 of figure 2 or 312 of serial signals 312 of figure 3. The man, person would conclude that they're not the repeater management interface, they're not the same as a repeater management interface, are they?
>
> THE WITNESS: No, they're not.
>
> * * *
>
> Q Now, going back to the passage that you were discussing with Mr. Jarvis on page 7 of RX-102, I believe that you agreed with the Judge's question on direct that the repeater data interface referred to here is not a repeater management interface; is that right?
>
> A Yes. [Emphasis added.]

functionality thereon," is evidence that the claimed device is limited to managing only external repeaters. (RBr at 186). The administrative law judge rejects respondent's argument. The administrative law judge finds that complainants' representation is not inconsistent with the administrative law judge's finding that the subject matter of the '603 patent may be used in conjunction with internal repeaters, since when so used, the resultant combination is something more than a "repeater with some additional management functionality." Thus, the '603 claimed device with an internal repeater would still be capable of managing more than one repeater and there is nothing to indicate that a "repeater with some additional management functionality" would be able to manage a second repeater Also, the '603 claimed device still has full IEEE compliant repeater management capability. There is nothing to indicate that a "repeater with some additional management functionality" would have full IEEE compliant repeater management capability. In addition, the '603 claimed device still has a MAC function. There is nothing to indicate that a "repeater with some additional management functionality" would have MAC capability. Moreover, the '603 claimed device still has bridging support. There is nothing to indicate that a "repeater with some additional management functionality" would have bridging support as specified in the '603 patent.

Based on the foregoing the administrative law judge finds that any repeaters that are managed by the device of the asserted claims may be either external or internal to the claimed device.

B. The '410 Patent

The '410 patent, entitled "Perimeter Matrix Ball Grid Array Circuit Package With A Populated Center," issued on April 13, 1999. (CX-3). The named inventor, Michael Barrow,

assigned the patent to Intel. (CX-3). Said patent is based on application Ser. No. 08/959,546 filed October 24, 1997 which in turn is a continuation of Ser. No. 08/623.355 filed March 28, 1996. The '410 patent contains twenty-nine claims.

The invention of the '410 patent relates to an integrated circuit package. (CX-3, col. 1, lns. 10-11). Integrated circuits are typically mounted to a package, which is then soldered to a printed circuit board. One such type of integrated circuit package is a ball grid array (BGA) package. BGA packages have a plurality of solder balls located on a bottom external surface of a package substrate. The solder balls are reflowed to attach the package to the printed circuit board. The integrated circuit is mounted to a top surface of the package substrate, and electrically coupled to the solder balls by internal routing within the package. (CX-3, col. 1, lns. 13-22).[26]

In issue are independent claims 1, 7. 14, 17 and 28 and dependent claims 3, 8, 13, 15, 16, 18, 19, 23, 24, 25, 26, 27 and 29. They read (CX-3):

> 1. A ball grid array package, comprising:
> a substrate which has a top surface and an exposed external bottom surface, said external bottom surface consisting only of an outer array of contact pads each separated from each other by a first distance, and a center array of contact pads each separated from each other by a second distance, said center array of contact pads being separated from said outer array of contact pads by a third distance which is larger than the first and second distances; and,

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[26] All parties agree that in a ball grid array (BGA) package, the substrate is used to electrically connect the integrated circuit to the solder balls at the bottom of the package. (RReCFF at 728). Moreover, all parties agree that the BGA package in the asserted claim can be referred to as a "bull's-eye BGA." (RReCFF at 1221).

a plurality of solder balls attached to said contact pads of said substrate.

3. The package as recited in claim 2, wherein said top surface of said substrate has a ground bus that is connected to said center array of contact pads by a plurality of vias that extend through said substrate.

7. A ball grid array integrated circuit package, comprising:
a substrate which has a top surface and an exposed external bottom surface, said top surface having a plurality of bond pads, said external bottom surface consisting only of an outer array of contact pads each separated from each other by a first distance, and a center array of contact pads each separated from each other by a second distance, said center array of contact pads being separated from said outer array of contact pads by a third distance which is larger than the first and second distances;
a plurality of solder balls attached to said contact pads of said substrate; and,
an integrated circuit that is mounted to said substrate and coupled to said bond pads.

8. The package as recited in claim 7, wherein said top surface of said substrate has a ground bus that is coupled to said integrated circuit and connected to said center array of contact pads by a plurality of vias that extend through said substrate.

13. The package as recited in claim 7, wherein said outer array of contact pads is located outside as outer dimensional profile of said integrated circuit.

14. A method for assembling a ball grid array integrated circuit package, comprising the steps of:

a) providing a substrate which has a top surface and an exposed external bottom surface, said external bottom surface consisting only of an outer array of contact pads each separated from each other by a first distance, and a center array of contact pads separated from each other by a second distance, said center array of contact

pads being separated from said outer array of contact pads by a third distance which is larger than the first and second distances;

b) mounting an integrated circuit to said top surface of said substrate; and,

c) attaching a plurality of said solder balls to said contact pads.

15. The method as recited in claim 14, further comprising the step of escapsulating said integrated circuit.

16. The method as recited in claim 15, further comprising the step of coupling said integrated circuit to said substrate with a plurality of bond wires.

17. An integrated circuit package for an integrated circuit which has a dimensional profile, comprising:

a substrate which has a top surface and an exposed external bottom surface, said external bottom surface consisting only of an outer array of contact pads located outside the dimensional profile of the integrated circuit and a center array of contact pads located within the dimensional profile of the integrated circuit, wherein said outer array is separated from said center array by a distance that is greater than a distance which separates said contact pads from each other.

18. The package as recited in claim 17, wherein said top surface of said substrate has a plurality of bond pads.

19. The package as recited in claim 18, wherein said top surface of said substrate has a ground bus that is connected to said center array of contact pads by a plurality of vias that extend through said substrate.

23. The package as recited in claim 1, wherein the first distance is the same as the second distance.

24. The package as recited in claim 7, wherein the first distance is the same as the second distance.

25. The package as recited in claim 17, further comprising a plurality of solder balls that are attached to said contact pads.

26. A ball grid array package, comprising:

a substrate which, has a top surface and an opposite exposed external bottom surface; and,

a plurality of solder balls attached to said external bottom surface of said substrate, said solder balls consisting only of an outer array of solder balls each separated from each other by a first distance, and a center array of solder balls each separated from each other by a second distance, said center array of solder balls being separated from said other array of solder balls by a third distance which is larger than the first and second distances.

27. The package as recited in claim 26, wherein the first distance is equal to the second distance.

28. An integrated circuit package for an integrated circuit which has a dimensional profile, comprising:

a substrate which has a top surface and an exposed external bottom surface;
a plurality of solder balls that are attached to said external bottom surface, said solder balls consisting only of an outer array of solder balls located outside the dimensional profile of the integrated circuit and a center array of solder balls located within the dimensional profile of the integrated circuit, wherein said outer array is separated from said center array by a distance that is greater than a distance which separates said solder balls from each other.

29. The package as recited in claim 28, wherein the first distance is equal to the second distance.

The asserted claims provide two choices for relative size of the indicated first and second distances. Those distances can either be the same, as with asserted dependent claims 23, 24, 27 and 29, or they can be different which asserted claims 1, 3, 7-8, 13-19, 25-26 and 28

read on. (CX-3). All of the asserted claims require that both the first and second distances be smaller than the third distance, i.e., the distance which separates the inner and outer arrays. With the exception of claims 23, 24, 27 and 29, the asserted claims are not limited to any particular relationship between the first and second distances. (CX-3).

In issue is whether a solder mask can or cannot be considered part of the claimed "substrate." Also in issue is the claimed phrase "a center array of contact pads" which is found only in claims 1-3, 7, 8, 13-19 and 23-25 of the asserted claims.

1. Solder Mask

Each of complainants and the staff argued that solder masks may be considered part of the "substrate," as that term is used in the asserted claims. Respondent argued that solder masks cannot be part of said substrate.

The term "substrate" appears in each of the asserted independent claims and several asserted dependent claims. While the '410 patent does not specifically define the term "substrate," the administrative law judge finds that specific language in the claims, and the specification of the '410 patent as well as FIGS 3, 4, and 5 of the '410 patent,[27] define certain characteristics of the "substrate" and does so in broad terms.

Referring to the language of the asserted claims, the "exposed external bottom surface" language of the claims serves to distinguish the top of the substrate from its bottom, and to

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[27] While FIGS. 1 and 2 of the '410 patent relate to the prior art, FIG. 3 is a side cross sectional view of a BGA package of the invention of the '410 patent. FIG. 4 is a bottom view of the FIG. 3 package and FIG. 5 is a bottom view of an alternate BGA package of the invention of the '410 patent. (CX-3, col. 2, lns. 15-20). FIGS. 3, 4 and 5 show the substrate to be of generally flat shaped. They also show equal first and second distances between the solder balls and contact pads in the inner array and those in the outer array.

define where the "contact pads" of the substrate are in relation to the rest of the components defined by the claims. For instance, claim 1 requires that the "substrate" have an "external bottom surface [with] only an outer array of contact pads . . .and a center array of contact pads." Claim 1 also requires that there be "solder balls attached to [the] contact pads of [the] substrate." Unasserted claim 2 further defines "substrate" by adding the requirement that it have a plurality of "bond pads" as part of its "top surface". Claim 7 requires "an integrated circuit . . . mounted to [the] substrate."

With respect to the specification, under the subheading "Summary Of The Invention," the '410 patent specifically teaches that the invention is a ball grid array integrated circuit package which has an outer two-dimensional array of solder balls and a center two-dimensional array of solder balls located on the bottom surface of a package substrate. (CX-3, col. 1, lns. 55-59).[28] The specification discloses that the claimed "substrate" can encompass a wide range of materials and can be made through a wide range of processes. Thus, under the subheading "Detailed Description Of The Invention," and referring to FIGS. 3 and 4 and the integrated circuit (package 10) "of the present invention," it is disclosed (CX-3, col. 2, lines 26-50):

> [t]he package 10 includes a substrate 12 that has a top surface 14 and an opposite bottom surface 16. Mounted to the top surface 14 of the substrate 12 is an integrated circuit 18. The integrated circuit 18 is typically a microprocesor. Although a microprocessor is described, it is to be understood that the package 10 may contain any electrical device(s).

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[28] In contrast to the claimed invention in issue, the prior art FIG. 1 shows a solder ball array of a BGA package where the solder balls are arranged in a two-dimensional pattern across the entire bottom surface of the package. (CX-3, col. 1, lns 23-26). In the prior art FIG. 2 solder ball array of a BGA package the bottom surface of the package has only an outer two dimensional array of solder balls which are located away from the package area that is beneath the integrated circuit. (CX-3, col. 1, lns. 34-38).

> The top surface 15 of the substrate 12 has a plurality of bond pads 20 and a ground bus 22. The substrate 12 may also have a separate power bus 23 concentrically located about the integrated circuit 18 and ground pad 22. The integrated circuit 18 is coupled to the bond pads 29 and busses 22 and 23 by bond wires 24. The integrated circuit 16 is typically enclosed by an encapsulant 26. Although bond wires 24 are shown and described, the integrated circuit 18 can be mounted and coupled to the substrate with solder balls located on the bottom surface of the circuit die in a package and process commonly referred to as "C4" or "flip chip" packaging.
>
> The bottom surface 16 of the substrate 12 has a plurality of contact pads 28. The contact pads 28 are coupled to the bond pads 20 and busses 22 and 23 by vias 30 and internal routing 32 within the substrate 12. The substrate can be constructed with conventional printed circuit board, or co-fired ceramic, packaging processes known in the art.
>
> A plurality of solder balls 34 are attached to the contact pads 28 with known ball grid array processes . . . . [Emphasis added.]

Thus the specification teaches, for example, that bond pads, a ground bus, a power bus, and contact pads are part of the substrate and not merely mounted to the substrate, and that the solder balls are attached to the contact pads, which are part of the substrate. Moreover, all parties agree that the term "substrate," as used in the '410 patent and as understood in the packaging industry, is a broad term that encompasses a wide range of materials and processes. (RReCFF at 728). Accordingly the administrative law judge finds that the claimed substrate may consist of multiple materials, including dielectrics and conductors.

As seen, supra, the '410 patent discloses that the "substrate can be constructed with conventional printed circuit board, or co-fired ceramic, packaging processes known in the art." All parties agree that co-fired ceramic packaging processes are distinct from the printed circuit board processes used to make plastic BGA substrates and that ceramic BGA substrates do not include solder masks. (RReCFF at 734). However, it was well known in the art that a BGA

substrate made from "conventional, printed circuit board" may include a solder mask. See (FF 80, 86-87, 90-97, 99, 217, 224). For example, Ivor Barber of LSI Logic, who has been designing BGA packages since 1991 (JX-68 at 36), has testified that{

} (JX-68 at 36-37).

Respondent has argued that the language of dependent claim 3 in issue requiring "a plurality of vias that extend through said substrate" serves to limit the word "substrate" in the claimed subject matter in issue to a substrate without a solder mask. Claim 3, however, does not require that the vias extend all the way though the substrate but rather merely requires vias that extend "through the substrate." Vias may extend "through" a substrate without extending all the way through the substrate. Thus respondent's expert Pecht testified (Tr. at 2455-56):

> Q. Dr. Pecht, have you ever heard of a term called "blind vias'?
>
> A. Yes. I have.
>
> Q. Okay. And that is a via that goes through a substrate but is totally contained within the substrate; is that right?
>
> A. Yes, that's true. [Emphasis added]

FIG. 3 of the '410 patent, which is a side cross-sectional view of a ball grid array package of the invention of the '410 patent (CX-3, col. 2, lns. 15-16), shows vias that do not actually extend all the way to the surface of the substrate and therefore are not as long as the substrate is thick.[29] In addition, while the word "through" can mean in one side and out of the opposite or

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[29] The via shown on the far right of FIG. 3 of the '410 patent stops when it reaches, and does not go through, the very narrow rectangle representing a conductive layer near the top of the substrate which would include bond pads or the very narrow rectangle representing a

other side (American Heritage College Dictionary, 3rd Edition at 1413), it can also mean "[a]mong or between," "here and therein" (American Heritage College Dictionary, 2d Edition at 1266) and can be "used as a function word to indicate penetration or passage within . . . an object, substance or space" and "to indicate movement within a specified environment," as in the phrase "through the air." (Webster's Third New International Dictionary, Unabridged at 2384).

Respondent argued that FIG. 3 of the '410 patent shows the vias terminating at the contact pads, thus preventing their extension through any solder mask that may be applied to the otherwise exposed bottom surface of the substrate. However FIG. 3 shows vias coming into contact with a very narrow rectangular area representing a conductive layer near the bottom surface of the substrate. (CX-3, FIG. 3; Prince, Tr. at 3043).[30]

Respondent argued that the asserted claims were narrowed during prosecution to overcome rejections based on prior art by limiting the bottom surface to an "exposed external" bottom surface and that the scope of the substrate was further restricted by changing the term "having" to the term "consisting only of," thereby excluding packages in which the bottom surface has structures other than contact pads/solder balls. (RBr at 10-15)

In the first office action, the Examiner rejected all sixteen original claims as anticipated over U.S. Patent No. 5,490,324 to Newman (Newman) and rejected certain claims as obvious over Newman in view of two other patents. (FF 50 to 64). The relevant portion of the original

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conductive layer near the bottom of the substrate which would include the contact pads, both of which are part of the substrate. (FIG. 3).

[30] See also preceeding footnote.

claims read (FF 51):

> a substrate which has a top surface and an opposite bottom surface, said bottom surface having an outer array of contact pads . . . and a center array of contact pads . . . .

In rejecting the claims over Newman, the Examiner interpreted Figure 5 of Newman, specifically the bond pads which are denoted as 512 and the contact pads denoted as 516, as disclosing an outer array of contact pads and a center array of contact pads that met the distance limitations articulated in the original claims. (FF 50 to 64). Figure 6 of Newman, which is a side view or a cross-section of what is depicted in Figure 5, shows that the bond pads denoted as 512 are internal to the package. (Prince, Tr. at 3161).

In an attempt to overcome the rejection, in a May 19, 1997 response, the relevant portion of the claims was amended to read (FF 50 to 64):

> a substrate which has a top surface and an exposed external bottom surface, said external bottom surface having an outer array of contact pads . . . and a center array of contact pads . . . .

The remarks accompanying the May 19,1997 amendment read in part (FF 50 to 64):

> The applicant submits that the prior art does not disclose, teach or suggest an integrated circuit package which has a center array of contact pads and an outer array of contact pads as disclosed and claimed in the present invention. The center and outer array of contact pads are located on an exposed external bottom surface of the package. This is to be distinguished from the Newman reference which discloses a plurality of bond pads that are internal to the package. The applicant would like to direct the Examiner's attention to Fig. 6 of the Newman reference which clearly shows that bond pads 514 and 516 are located internal to the package. These features are not on the exposed external bottom surface of the package with the other solder balls 510 of the Newman package None of the secondary references cited by the Examiner disclose, teach or suggest the present claimed invention. For these reasons the applicant submits that the claims are neither anticipated nor rendered obvious by the prior art. [Emphasis added.]

Thus the administrative law judge finds that the purpose of the amendment was not to limit the bottom surface of the substrate to contact pads/solder balls. Rather he finds that the amendment, as is clear from its language, served as a positional reference point to specify where the "contact pads" of the claims are located in relation to the other elements of the claims, viz., that the "contact pads" of the claims are on the outer surface of the package and not internal to the package, as are the "pads" in Newman.

Based on the language of the claims, the specification and prosecution history of the '410 patent the administrative law judge finds that a solder mask may be considered part of the claimed substrate.

Respondent argued that the words "consisting only of" in the claimed language "said external bottom surface [of the substrate] consisting only of an outer array of contact pads . . . and a center array of contact pads" means that the bottom of the package can only contain contact pads/solder balls. (RRBr at 20). The administrative law judge finds that argument inconsistent with the plain language of the claimed subject matter and the specification of the '410 patent. Thus, as the claims are written, "consisting only of" refers to and modifies "outer array" and "center array." Moreover, FIG. 3 of the '410 patent expressly discloses contact pads and metal traces on the bottom of the package. (Blanchard, Tr. at 4C30-32). In addition he finds nothing in the prosecution history (FF 50 to 64) which excludes packages in which the bottom surface has structures in addition to contact pads/solder balls.

2. The Claimed Phrase "A Center Array Of Contact Pads"

Respondent argued that the language "a center array of contact pads" in claims 1-3, 7, 8, 13-19 and 23-25 means an array of metal structures, each separated from another, located in the

center of the package. (RBr at 31-32). Complainants argued that "contact pads," including a "center array of contact pads," as used in the claims of the '410 patent, is "a set of exposed conductive pads, each designed to receive a solder ball," i.e. areas on the bottom of a BGA package that interface with or provide contact points to the solder balls on the bottom of the package. (CBr at 97).

The administrative law judge finds that the language of the claims should not be read as requiring that each "contact pad" be physically separated from another contact pad as respondent argued. As is made clear from the specification, including FIGS. 3-5, a "contact pad," as it is used in the claims of the '410 patent, is the conductive area to which a solder ball is attached. Thus, FIG. 3 shows a cross-section of a plastic ball grid array (PBGA) package and identifies the contact pads 28 of the package. (FIG. 3, col. 2, lns. 44 45). The area identified as a contact pad in FIG. 3 is the area under a solder ball. FIGS 4 and 5 (the bottom views of the package that illustrate the outer array of contact pads 36 and the inner array of contact pads 38) confirm that the area under the solder ball is a contact pad. (FIGS. 4-5, col. 2, lns. 55-60, col. 3, lns. 29-37). In addition FIG. 3 shows solder balls attached to contact pads in a cross-sectional view. (Blanchard, Tr. at 4030-32). The figure also shows metal regions, or metal traces, on the bottom of the package that are not part of the "contact pads." (Blanchard, Tr. at 4030-32). Moreover, FIG. 3 shows that in certain instances more than one contact pad depicted in the figure is illustrated as existing on a single piece of metal. (See FIG. 3 depicting four solder balls on the center of the package which rest on a single region of metal). In addition in the description of the preferred embodiment, the solder balls in the center array are described as being "coupled to the ground bus 20 and power bus 23," while "[t]he

vias 30 couple the busses 22 and 23 to the contact pads 38." (col. 3, lns. 7-11). Since more than one solder ball in the center array of the preferred embodiment is coupled to a single potential (either ground or power), this supports a finding that they can rest on different contact pads on the same metal region as illustrated in FIG. 3.

C. The '341 Patent

The '341 patent, entitled "Electrical Circuit For Setting Internal Chip Functions Without Dedicated Configuration Pins" issued on March 4, 1997. (CX-1). The named inventor, Ralph E. Andersson, assigned the patent to Level One. (CX-1). Said patent is based on Ser. No. 437,621 filed May 9, 1995. (CX-1). The '341 patent contains twenty claims.

The invention of the '341 patent relates to a circuit for setting internal chip functions, and more particularly, to a circuit which can determine the mode of operation without dedicated configuration pins. (CX-1, col. 1, lns. 7-11).

In issue are independent claims 1 and 13 and dependent claims 3, 10, 11, 15, 16 and 19. They read (CX-1):

> 1. A device for selectively controlling internal functions of an integrated circuit comprising means for sensing an application indication by means of a potential detected at a pin, and circuit means for internally adjusting the potential of the pin in response to the detected potential, the sensing means being operative following a reset to provide a control signal for determining an application associated with the application indication selected by a user.
>
> 3. A device as claimed in claim 1 wherein the sensing means comprises means for comparing the potential of the pin with a threshold voltage.
>
> 10. A device as claimed in claim 1 further comprising external resistor means for adjusting the potential of the pin.

11. A device as claimed in claim 3 further comprising, for at least one pin, at least one of a pull up resistor for selecting a logic high or a pull down resistor for selecting a logic low.

12. A device as claimed in claim 3 further comprising a floating pin or an input to an external logic device for selecting a logic low.

13. A device for selectively controlling internal functions of an integrated circuit comprising:

N application sense pins on an integrated circuit for selecting one of N^2 applications, the pins having an application sense function and a respective function unrelated to sensing;

circuit means, coupled to the N application sense pins, for internally adjusting a potential of the pins;

logic means, coupled to the N application sense, pins, for comparing the potential at the pins with a reference voltage; and

application select means, coupled to the logic means, for selecting one of the N^2 applications for the circuit in response to the comparison, the application being determined by a binary logic level at the N application select pins.

15. A device as claimed in claim 13 further comprising, for at least one pin, at least one of a pull up resistor for selecting a logic high or a pull down resistor for selecting a logic low.

16. A device, as claimed in claim 13 further comprising a floating pin or an input to an external logic device for selecting a logic low.

19. A device as claimed in claim 13 wherein the circuit means further comprises external resistor means for adjusting the potential of the N pins.

In issue is whether the asserted claims are limited in scope to LED or other visual

displays[31], the "circuit means" limitations of claims 1 and 13, and the "N Application Sense Pins" and "N^2" recitations of claim 13.

1. What Independent Claims 1 and 13 Are Directed To

Each of complainants and the staff argued that the claimed subject matter in issue should relate only to a device for selecting different chip function LED or other visual display patterns. (CBr at 77, 85; SBr at 20). Respondent argued that the claimed subject matter should not be limited to only LED or other visual displays. (RPost at 87).

a) Language Of The Claims

All parties are in agreement that the first portion of independent claim 1, viz., "means for sensing an application indication by means of a potential detected at a pin" is a "means plus function" element, and should be construed in accordance with 35 U.S.C. §112, para. 6. As the plain language of that portion of independent claim 1 indicates, the means plus function element is a "means for sensing" and is not directed at a particular use to which the circuit is put. An "application" itself is not even mentioned in said portion, only an "application indication."[32] Moreover, the application indication is not part of the means plus function

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[31] Complainants, in their complaint as filed in 337-TA-435, alleged that the asserted claims were broad enough to cover all of respondent's reset configurable devices and a number of Level One's device. However the vast majority of those devices did not contain any reset configurable pins that could be used to select LED display patterns. (Ward, Tr. at 3583). While complainants have restricted the devices of respondent that are "now" alleged to infringe the asserted claims of the '341 patent, in comparison to what initially was alleged to be infringed in the complaint as filed, claim construction should be independent of what is being alleged to infringe. See Chisum, supra.

[32] The phrase "application indication" appears only in claim 1. Nowhere else is this phrase found in the '341 patent.

element. Rather the administrative law judge finds that the "application indication" is the thing to which the function relates. Thus, claim 1 reads in part "means for sensing an application indication by means of a potential detected at a pin." (Emphasis added). That the "application indication" is the thing to which the function relates to is further shown by subsequent dependent claims, such that in dependent claim 2 the "means for sensing" is defined as "digital means having a high switching threshold" and in dependent claim 3 the "means for sensing" is defined as "means for comparing the potential of the pin with a threshold voltage."[33] Neither of dependent claims 2 and 3 are dependent on the nature of the application or the presence of LEDs. In contrast, dependent claim 6, which is dependent on dependent claim 4, refers to "LED applications," which indicates that those applications are not part of the "means for sensing" element."[34] Thus, the administrative law judge finds that the plain language of

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[33] The examination of other claims in a patent may provide guidance and context for interpreting a disputed means-plus-function limitation, especially if they recite additional functions. Wenger Manufacturing v. Coating Machinery Systems 239 F.3d 1225, 1233, 34 (Fed. Cir. 2001). Complainants admit at least that claim differentiation provides guidance in claim interpretation (CBr at 88).

[34] Complainants have not put in issue claims 2, 4 and 6 which read (CX-1):

> 2. A device as claimed in claim 1 where the means for sensing is digital means having a high switching threshold.
>
> 4. A device as claimed in claim 1 wherein the application is determined by a binary logic level at an application select pin, and having two applications select pins for selecting four applications.
>
> 6. A device as claimed in claim 4 further comprising means for having the four applications being selectively one of three LED applications and a LED default application.

As seen by the language of each of claims 4 and 6, the only thing that differentiates claim 6

independent claim 1 does not restrict independent claim 1 to a particular type of application ultimately chosen with the "means for sensing." Rather, the administrative law judge finds that the plain language of independent claim 1 indicates that the nature of the application is irrelevant to the function of sensing the application indication, and that the plain language of claim 1 indicates that the claim is directed to circuitry for recognizing a signal from the user as to which application is to be involved. He finds nothing in the plain language of independent claim 1 which limits the claimed systems to those dedicated only to choosing LED or other visual display or to choosing any specific application.

Claim 13, the only other independent claim in issue, does not have the means plus function element recited in independent claim 1. Rather, instead of a "sensing means" found in claim 1, independent claim 13 refers to "application sense pins." Claim 13 in its final clause does have the language "application select means ... for selecting one of the N^2 applications for the circuit in response to the comparison, the application being determined by a binary logic level at the N application select pins." However, independent claim 13 does not contain the word "indication" found in independent claim 1. Moreover like independent claim 1, there is a dependent claim related to claim 13 that specifically refers to the applications as LED

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from claim 4, on which claim 5 depends, is the additional limitation that the "four applications" of claim 4 be "three LED applications and a LED default application."

Dependent claims 6 and 20, which latter claim is dependent on independent claim 13 in issue, are the only claims of the '341 patent that require LED applications. Claim 20, which complainants have not put in issue, reads (CX-1):

> 20. A device as claimed in claim 13 wherein the N^2 applications comprise one of three LED applications and a LED default application.

applications. Thus, unasserted dependent claim 20 adds only the additional limitation that the N^2 applications "comprise one of three LED applications and a LED default application." As with independent claim 1, the administrative law judge finds that the ordinary language of claim 13 is broad and encompasses non-visual display applications.

b) Specification

The abstract of the '341 patent[35] informs a person of ordinary skill in the art that the '341 patent is for a

> "circuit for selecting different applications based upon the manner in which external elements are attached. The selection of the applications is controlled based on the potential detected at a pin immediately following reset.. . . The pin used to sense the application is used as a sense immediately after reset has occurred. After this it can function as either an output or an input. . . . The application sense may be used to select an LED display scheme or another application function." (CX-1) [Emphasis added].

Significantly it informs the reader that the application sense may be used to select an LED display scheme or another application function.

The claimed phrase "application indication", which is found nowhere in the '341 patent other than in independent claim 1, according to the specification, appears to refer to a signal that defines what "application' or "configuration" is being chosen. For example, the specification under the subheading Summary Of The Invention, states:

> Means is provided for sensing an application by means of a potential detected At a pin immediately following reset thereby to provide a signal for determining which application is desired by the user. [col. 2, lns. 13-16] [Emphasis added.]

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[35] The abstract is frequently looked to for determining the scope of a claimed invention. Hill-Rom Company, Inc. v. Kinetic Concepts Inc. 209 F.3d 1337, 1341, n. 1, 54 U.S.P.Q.2d 1437, 1440 n. 1 (Fed. Cir. 2000).

In the Summary Of The Invention of the '341 patent, this "signal for determining which application is desired" is a binary signal, or one of two voltages defined as a logic 1 or logic 0:

> When a first binary code is sensed, a first application is implemented. When a second binary code is existent, a second application is implemented and so on. [col. 2, lns. 42-45.]

Also, the '341 patent affirmatively discloses that the claimed invention can be used in a wide range of circumstances with different sorts of applications. While, in a preferred embodiment, "the application sense pin is used to select indication patterns for driving LEDs." (col. 5, lns. 48-50), other sections of the '341 patent indicate that the patent covers far more general territory. For example, the specification, in the section titled Detailed Description Of The Invention discloses:

> The end result of these operations is a logical determination of the intended application of the device. This is provided to the appropriate blocks where the appropriate action is taken. This action is limitless in scope. The application select can be used to change handshaking implementation for communications with other logic, to redefine the outputs or inputs of specific pins, or to change timing. The entire functional definition of the chip can vary to suit the needs of the consumer allowing him to differentiate his product from his competition or to accomplish a specific need. The end result is that integrated circuit manufacturers are allowed to meet the needs of a broader customer base without having to sacrifice pins of a device for configuration purposes. [Emphasis added.]

(col. 5 lns. 30-43). Moreover, in another section of the patent titled Summary which section follows A Preferred Embodiment Of The Invention section, it states (col. 7, lns. 47-59):

> According to the invention, an integrated circuit may logically determine the intended application of the device. The application select can be used to change handshaking implementation for communications with other logic, to redefine the outputs or inputs of specific pins, or to change timing. The entire functional definition of the chip can vary to suit the needs of the consumer allowing him to differentiate his product from his competition or to accomplish a specific need. The end result is that we are allowed to meet the needs of a broader customer

base. [Emphasis added.]

Likewise, the specification further contradicts any effort to limit the scope of the patent to visual display applications, stating in the Summary Of The Invention section that "[t]his method of sensing an application, however, could be used in any number of ways other than selecting an LED display scheme." (col. 2, lns. 50-53). The specification in the Detailed Description Of The Invention portion, specifically mentions an Ethernet device capable of being configured as either an AUI or MAU device. (col. 3, lns. 45-50).

Complainants, to support their argument that independent claims 1 and 13 should relate only to a device for selecting different chip function LED or other visual display patterns, in their post hearing brief, placed great weight on the word "indication" found in claim 1, but not found in claim 13. Thus, complainants argued that the word "indication" itself is sufficient to connote a visual display configuration. However, complainants ignore the fact that claim 1 uses the general generic term "application indication" and not merely the word "indication" and further ignores the fact that the claimed word "application" throughout the '341 patent describes an LED configuration among other applications.

Complainants, more than four years after the '341 patent issued on March 4, 1997, believes it is "enlightening" to replace only the term "indication" with the parties proposed constructions. (CBr at 85). The inventor, however, when he filed for the '341 patent on May 9, 1995, could have used any claimed language he desired. It is not the role of attorneys, more than four years after a patent has issued and when that patent is in a hotly contested litigation, to replace, or rewrite, the specific language of the claimed subject matter with limiting language.

Complainants argued that patents are not construed according to what the specification

states "might be related to the invention." (CRBr at 47). However, nowhere in the specification of the '341 patent has the inventor qualified his definitive statements, supra, relating to non-visual display applications with any indication that the claimed subject matter "might" relate to non-LED applications or that those definitive statements are merely based on speculation. A person of ordinary skill in the art should be able to accept statements made in the specification of a patent as factual. Neither complainants nor the staff have cited cases to the contrary.

The staff argued that the phrase "means for sensing an application indication by means of a potential detected at a pin" refers to "application function to select indication patterns for driving LEDs or LED behavior request", citing col. 5, lines 48-61 of the '341 patent.[36] The staff then concluded that the phrase "sensing an application indication" in claim 1 is a word play on the phrase "indication patterns for driving LEDs" in the specification. (SBr at 27). It is not clear to the administrative law judge what the staff intended in its use of the phrase "word play." However, it is clear that said col. 5, lines 48-61, relied on by the staff, is under the subheading "A Preferred Embodiment Of The Invention." (col. 5, lines 45-46).

Complainants argued that the word "indication" in independent claim 1 should be construed to mean visual displays such as LED configurations; that the '341 patent when it refers to a preferred embodiment states that the application sense pin is used to "select indication patterns;" and that U.S. Patent No. 5,66,129 (CX-1285) ('129 patent), incorporated

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[36] The administrative law judge is unable to find in the '341 patent the exact phrase "quoted" by the staff for col. 5, lines 48-61. (SBr at 27).

by reference in the '341 patent in its referral to application Ser. No. 08/271,111 filed July 6, 1994 (col. 5, lines 50-51), explicitly defines "indications" as five LED conditions listed in the '129 patent. (CBr at 81-83).[37] Independent claim 1 of the '341 patent however does not use the phrase "indication patterns." Rather, it uses the combined term "application indication." Moreover, the specification of the '341 patent has used variations of the word "indication," such as "indicate,"[38] to illustrate the user's choice of applications, not the application itself. Thus, with reference to a preferred embodiment, the '341 patent states (col. 6, lns. 48-52):

> The output from the flip flop latch 412 is directed to indicate the application along line 416. Thus, in the manner to be described more fully below, the signal along line 416 indicates an LED configuration selected by the user [Emphasis added.]

Hence the administrative law judge finds that the common usage of the English language supports his finding that the word "indication" in the claimed phrase - - application indication -

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[37] The '129 patent states that:

> For example, using red and green LEDs for the twisted pair ports 23, each TP port LED driver provides the following indications:
>
> 1. steady green wherein link integrity pulses are received;
> 2. blinking green when data is transmitted;
> 3. steady red when reverse polarity is detected;
> 4. blinking red when data is received; and
> 5. alternating red and green when the port is auto partitioned out.

(CX-1285, col. 5, lns. 16-25). This language does not specifically equate "indication" with "LED condition." Rather it refers to the LED driver providing the "indication" and not that any LED display patterns are the "indications" since it is the LED driver which delivers the voltage pattern, i.e. the "indication," to the LEDs to cause them to display one of the available "conditions."

[38] The word "indication" has been defined as "1. The art of indicating. 2. Something that serves to indicate." The American Heritage College Dictionary at 691 (3rd ed. 1997).

- is used to mean something that indicates.

Complainants are correct that the '341 patent does incorporate by reference the '129 patent. However, the incorporation by reference relates only to a preferred embodiment of the '341 patent. Thus the '341 patent states (col. 5, lines 45-53):

> A PREFERRED EMBODIMENT OF THE INVENTION
>
> In a preferred embodiment, the application sense pin is used to select indication patterns for driving LEDs. FIGS. 6(a)-6(c) illustrate a circuit, which references ideas detailed in application Ser. No. 08/271,111, filed Jul. 6, 1994 [the '129 patent], incorporated by reference herein, for operating a pair of electrical display elements 210 and '211 [Emphasis added]

Respondent argued that any attempt to limit the scope of claim 1 by reading in limitations from a preferred embodiment is improper and that it is fundamental patent law that features of a preferred embodiment will not be converted into claim limitations, citing Interactive Gift Express, Inc. v. Compuserve Inc., 231 F.3d 859, 874, 56 U.S.P.Q. 2d 1647 (Fed. Cir. 2000) and Intel Corp. v. United States Int'l Trade Comm'n, 946 F.2d 821, 836 (Fed. Cir. 1991). (RBr at 98, 100).[39]

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[39] Complainants have argued that their claim construction goes beyond the preferred embodiment and that they have acknowledged repeatedly that an "application indication" can involve an LED display configuration or equivalent condition configuration. Respondent however argued that this shows only that complainants are willing to concede that the claims "might" have a slightly broader scope as long as the additional subject matter is not "encompassed by Intel's own significant body of prior art," and that while complainants rely on a portion of the specification that provides, "[i]n other situations instead of LED display elements, other suitable displays can be used," complainants ignore other portions of the specification extolling the breadth of the application select technology, such as "[t]his method of sensing an application, however, could be used in any manner of ways other than selecting an LED display scheme." (col. 2, lns, 50-53).

Complainants argued that it is irrelevant that their construction is limited to a preferred embodiment, if the claims require that construction, and that claims are "commonly" construed to cover only the preferred embodiment, citing Wang Labs., Inc. v. America Online 197 F.3d 1377, 1383, 53 U.S.P.Q.2d 1161, 1165 (Fed. Cir. 1999) (Wang); DeMarini Sports, Inc. v. Worth, Inc. 239 F.3d 1314, 1326, (Fed. Cir. 2001) (DeMarini); Modine Mfg. Co. v USITC 75F.3d 1545, 1551, 37 U.S.P.Q.2d 1609, 1612 (Fed. Cir. 1996) (Modine); SciMed Life Systems, Inc. v. Advanced Cardiovascular Systems, Inc., 242 F.3d 1337, 1343. (CBr at 91, 92) (SciMed).

The administrative law judge finds that the cases cited by complainants are distinguishable on their facts. Thus, in Wang the Federal Circuit found that references to "bit-mapped protocols" were merely acknowledgments of the state of the art, and not an enlargement of the invention described in the patent Wang, 197 F.3d at 1382. In DeMarini, the Court found that the patent does not "suggest" anything more than the preferred embodiment DeMarini, 239 F.3d at 1325. In Modine, in the prosecution of the patent in issue the patentee limited the claimed subject matter to the "hydraulic diameters" of the preferred embodiment. Modine, 75 F.3d at 1551. In SciMed, the Court found that the abstract of the patent in issue, the manner in which the patentee distinguished the prior art, the Summary Of The Invention section of the patent and the reference in the specification that the "intermediate sleeve structure defined above is the basic sleeve structure for all embodiments of the present invention contemplated and disclosed herein" limited the claimed invention to the preferred embodiment. SciMed, 242 F.3d at 1342, 1343. It is well established, however, that a preferred embodiment does not limit broader claims that are supported by the written description. Toro Co. V. White Consol.

Indus., Inc., 199 F.3d 1295, 1301, 53 U.S.P.Q.2d 1065, 1069 (Fed. Cir. 1999). As seen supra, the abstract of the '341 patent, the '341 patent's Summary Of The Invention section, and affirmative passages of the '341 patent in Detailed Description Of The Invention and Summary sections clearly establish that the claimed invention is not limited to only LED or other visual display configurations but rather encompasses non-LED applications, as is confirmed by the finding of the administrative law judge that the asserted claims{

} See Section V(C)(1), infra.

Based on the plain language of independent claims 1 and 13 and the specification of the '341 patent, the administrative law judge finds that the claimed subject matter in issue encompasses devices used to choose between applications using a signal from the user as to which application is to be invoked and is not limited to devices used only to sense a choice of available displays.

2. The "Circuit Means" Limitation Of Claims 1 And 13

Regarding the "circuit means" limitation of claims 1 and 13,[40] respondent, inter alia, argued that the selection of a particular application or configuration using the multifunction pin disclosed in the '341 patent required the performance of two functions: 1) the application sense logic portion of the device would detect a voltage on the pin following reset and then compare the detected voltage to a threshold voltage to determine whether the detected voltage was a logic low or logic high, and 2) "[a]nother portion of the device performs the function of adjusting the

[40] The parties agree that the "circuit means" limitation in claim 13 refers to the same structure as referred to in the "circuit means" limitation of claim 1. (CRBr at 51-52; SBr at 36; RBr at 108-09).

voltage on the pin while it is being sensed. Specifically, a pull down current 114, 124, or 134 is enabled during reset and disabled after reset, as shown in Figure 9 [of the '341 patent]. (col. 7. lns. 9-14)." (RBr at 87-88).

Respondent further argued that the circuit means limitation is not satisfied by only the presence of an internal pull up or pull down resistor connected to the multifunction pin, because such a circuit would "not act 'in response to the detected potential'" simply because it was electrically connected to the pin. (RRBr at 78 (quoting claim 1 of '341 patent)). Respondent further argued that this was borne out by the prosecution history of the '341 patent in which the Examiner rejected both of the original dependent claims as being anticipated by U.S. Patent No. 5,051,622 to Pleva (the '622 patent), which, in turn, disclosed a device with "output buffer 131, which is a circuit that is electrically connected to pin 130 and is also able to internally adjust the pin potential after reset." (RRBr at 78 (Emphasis in original omitted)).[41] In support, respondent argued that, since the '622 patent disclosed an output buffer that could be enabled only after the reset signal was no longer asserted and whereas the '341 patent disclosed an internal resistor that was to be only enabled while the reset signal was being asserted, that the addition of the language "in response to the detected potential" in the prosecution of the '341 patent[42] was meant to preserve this distinction, so that the invention disclosed in the '341 patent

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[41] The driver 131 is disabled by the reset signal, ('622 patent, col. 3. lns. 15-17, 47-49), and is then only enabled after "RESET is withdrawn." ('622 patent, col. 3, lns. 54-60). Therefore, since the driver 131 would be disabled by the reset signal and not enabled until the withdrawal of that signal, Altima fails to make clear how that driver changes the "detected potential" during reset.

[42] See FF 73.

required the use of an internal resistor that was disabled once reset is withdrawn. (RRBr at 79).

Complainants argued that the "in response to" portion of claim 1 of the '341 patent did not "create some kind of complex connection between the 'the detection of the potential and the subsequent adjusting of the potential,'" but rather that, since no structure capable of implementing such an complex relationship was disclosed in the '341 patent, such a structure, and such a relationship was not required by the '341 patent's "circuit means" language. (CRBr 49-50). Complainants, relying on Texas Instruments v. ITC, 871 F.2d 1054, 1065 (Fed. Cir. 1989) and Yamamoto v. Dictaphone, 740 F.2d 1569, 1571 (Fed. Cir. 1984), further argued that this was especially true since a construction that results in a finding of inadequate disclosure is disfavored, especially when such a construction would not cover the only embodiment of the invention. (CRBr at 50).

Complainants argued also that the "in response to the detected potential" language relied upon by respondent did not indicate the existence of any complex relationship between the detected potential and the adjustment mechanism, but rather "merely states the well known principle of physics that where two nodes are electrically tied together, potential will flow from a point of greater potential to a point of lower potential." (CRBr at 51). Complainants also argued that this "well known principle" was illustrated by the testimony of respondent's expert Ward, as it related to exhibit CDX-221. (CRBr at 51). According to complainants, Ward demonstrated, with respect to the pull up in respondent's AC 101, that the pull up would raise the potential of the pin, if the pin was in a low potential state prior to reset, and would not affect the potential of the pin, if the pin was at a high potential state prior to reset. (CRBr at 51). Complainants, in addition, argued that this interpretation of the phrase "in response to the

detected potential" is borne out by Ward's opinion that one of ordinary skill in the art would construe the circuit means of element of claim 1 in the same way as the circuit means element of claim 13 of the '341 patent, even though claim 13 does not contain the clause "in response to the detected potential." (CRBr at 51).

The staff argued that the circuit means limitation in claim 1 "calls for circuitry for adjusting the voltage on the pin in response to the voltage initially detected on that pin" and that the '341 patent explicitly teaches the use of an internal pull down or an internal pull up circuit. (SBr at 28).

Blanchard testified (Tr. at 1577):

> JUDGE LUCKERN: Is there different structures in the specification of the patent illustrative of claim 1 and another structure or circuitry illustrative of claim 13 or is it the same circuitry described in the specification in the figures that would relate to each of claim 1 and claim 13, even though claim 13 does not have this phrase "in response to the detected potential"?
>
> THE WITNESS: It's the same circuit, Your Honor.

Ward testified (Tr. at 3606-07):

> QDr. Ward, would a person of ordinary skill in the art reading the circuit means limitations in claim 1 and 13, how would they construe them?
>
> AWell, by extension, an economical construal of the circuit means of claim 13 is to construe it to cover - - in the same way that the circuit means in claim is construed. And that is my preference, my preferred construal, . . . That is the - - my first choice as a way to construe these circuit means in claim 13 and I believe it would be the construal of a person of ordinary skill in the art.
>
> That having been said, it is true that claim 13 lacks some words and consequently, lacks - - potentially lacks a constraint that is implied by the, in response to phrase in claim 1.
>
> So I think that there are plausible alternative interpretations of the circuit means in claim 13 that are not plausible with respect to claim 1. [Emphasis added.]

In light of the testimony of Ward and Blanchard, supra, the administrative law judge finds that the "circuit means" limitations of claims 1 and 13 require identical circuitry.

The '341 patent contains numerous descriptions of the circuitry required to satisfy the circuit means limitations of claims 1 and 13, e.g.:

> For application sense functions according to the invention, an [sic] weak pull down will sink current of approximately 40 uA on an application sense pin during the portion of time when reset is being implemented on the chip. If the application sense pin functions as an output during non-sense periods, the output driver is tristated (disabled) during the portion of the time when the external configuration is being sensed. If used as in an input, no changes are made to the internal input function during the portion of time when the external configuration is being sensed. Thus, an application sense pin may be used to sense whether a primary application or a secondary/alternate application is desired. Further, the application sense pin may be used to change the application for a pin from an unassociated function to a function selected by external components.
>
> * * *
>
> When the output pin 112 is left unconnected, the internal pull down 114 is sufficient to result in a low logic level during the application sense period. The pull down is enabled during reset and output is disabled. The pull down size is sufficient to pull the application sense pin down to 0 volts and a logic 0 is sensed by the application select logic 116. (CX-1, col. 3, lns. 58 to col. 4, ln. 5; col 4, lns. 11-18) [Emphasis added].
>
> * * *

Therefore the administrative law judge finds that the cited portions, supra, of the '341 patent disclose an internal pull down which is enabled after reset and is sufficient to result in a low logic level during the application sense period.

The '341 patent further describes the circuit means as follows:

> [W]hen reset 414 is high, the internal pull down 426 is enabled. Thus, the output driver is placed in a high impedance mode and an internal pull down current is applied to 404. . . .
>
> * * *

. . . . After the reset goes low the weak pull down 426 is disabled as indicated in this bottom timing diagram of FIG. 9. (CX-1, col. 2, lns. 2-14) [Emphasis added].

The administrative law judge finds that this language of the '341 patent shows that the pull up and pull down resistors that constitute the circuit means are disabled after reset. He further finds that this is the written description of the "circuit means" contained in the '341 patent.

3. The "N Application Sense Pins" Recitation In Claim 13

Respondent argued that the use of the word "pins" in the "N application sense pins" recitation of claim 13 indicates that the number of pins required by the clause must be at least two. (RBr at 106). Complainants argued that respondent provides little support for its argument other than the fact that the word "pins" is used in claim 13, rather than "pin." (CRBr at 54). The staff argued that just one pin can satisfy claim 13. (SBr at 34).

Respondent's argument that claim 13 requires at least two pins is rejected. The variable N represents "an indefinite number; esp : a constant integer or a variable taking on integral values." (Webster's Ninth New Collegiate Dictionary, 1984 at 785). (Emphasis in original). An integer is defined as "any of the natural numbers, the negatives of those numbers, or zero." (Id. at 628). A natural number is defined in turn as "the number 1 or any number (as 3, 12, 432) obtained by adding 1 to this number one or more times." (Id. at 785). Therefore "N" may be "1". Moreover, other claims of the '341 patent make it clear that "N . . . pins" refers to one or more pins. For example unasserted claim 14, which depends on claim 13 requires a

"[choice] between a primary and a secondary/alternative application."[43] Asserted claim 15, which is also dependent on claim 14, makes explicit reference to "one pin." Asserted claim 16, which like dependent claim 14 and 15, are dependent on claim 13, only makes reference to " a floating pin." Respondent argued that the prosecution history shows that the applicant amended "the claim" to remove the language "at least one-pin" and to substitute "N . . . pins" (RBr at 106). There is nothing, however, in the prosecution history (FF 65 to 76) which would estop the patentee from including the concept of a single pin in the claimed subject matter.

4. The "N^2" Recitation Of Claim 13

Respondent argued that claim 13 expressly intends for the N pins to be used to choose one of N^2 pins, not one of 2^N pins. (RBr at 107). Each of complainants and the staff argued that the transposition of "N^2" and "2^N" was an obvious error that one of ordinary skill would recognize as an obvious mistake.

It is a fact that the term "2^N" appears twice in the specification of the '341 patent and "N^2" does not even appear in the specification. (CX-1 Abstract, col, 2, lns. 40-45). In addition there are multiple uses of "2^N" in the prosecution history. (FF 65 to 76). Moreover "N^2" is not consistent with the binary selection processes described in the '341 patent, whereas "2^N" is consistent with said processes. (col. 2, lns. 40-45).

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[43] Unasserted claim 14 reads:

> 14. A device as claimed in claim 13 wherein the application select means chooses between a primary application and a secondary/alternative application [CX-1].

In Biotec Biologische v. Biocorp, Inc. 249 F.3d 1341 (Fed. Cir. 2001), the defendants argued that language in the prosecution history of a patent in issue limited the claimed subject matter. The Court found otherwise stating (249 F.3d at 1348):

> An error in the prosecution record must be viewed as are errors in documents in general; that is, would it have been apparent to the interested reader that an error was made, such that it would be unfair to enforce the error. The defendants do not argue that this statement led them to believe that it clearly limited the invention that was claimed. A person of reasonable intelligence would not be misled into relying on the erroneous statement, for it is contrary not only to the plain language of the claims and the specification, but also to other statements in the same prosecution document. In Intervet America, Inc. v. Kee-Vet Labs., Inc., 887 F.2d 1050, 1054, 12 U.S.P.Q.2d 1474, 1477 (Fed. Cir. 1989) the court dealt with an erroneous statement during prosecution and held: "When it comes to the question of what should control, an erroneous remark by an attorney in the course of prosecution of an application or the claims of the patent as finally worded and issued by the Patent and Trademark Office as an official grant, we think the law allows for no choice. The claims themselves control." We sustain the district court's construction of the claims as not limited to the use of starch from which water was removed by pre-dying before processing. [Emphasis added.]

While the "N^2" is found in claim 13, the administrative law judge finds that it would have been apparent to the interested reader that an error was made in view of language in the '341 patent and in its prosecution history. Respondent has not argued that it was misled. Indeed respondent's expert Ward admitted that one of ordinary skill in the art would recognize that "N^2" is an obvious error and should be "2^N". (Tr. at 3722).

V. Validity

Under 35 U.S.C. §102 a patent may be found invalid by anticipation. However, a claim is invalid as anticipated only if a single prior art reference expressly or inherently discloses each and every element of the claimed invention. See In re Robertson, 169 F.3d 743,

745; 49 U.S.P.Q.2d 1949, 1950 (Fed. Cir. 1999). If a reference fails to disclose even a single claimed element, a finding of anticipation is improper. See Atlas Powder Co. v. E.I. DuPont de Nemours & Co., 750 F.2d 1569, 1574; 224 USPQ 409, 411 (Fed. Cir. 1984). Thus, a party asserting that a patent claim is anticipated must show identity of invention. See Minnesota Mining & Mfg. Co. v. Johnson & Johnson Orthopaedics, Inc., 976 F.2d 1559, 1565; 24 U.S.P.Q.2d 1321, 1326 (Fed. Cir. 1992) (Minnesota Mining).

An anticipatory reference must also enable a person of ordinary skill in the art to make the claimed subject matter at the time of the invention without undue experimentation. See PPG Indus., Inc. v. Guardian Indus. Corp., 75 F.3d 1558, 1566; 37 U.S.P.Q.2d 1618, 1624 (Fed. Cir. 1996); Minnesota Mining, 976 F.2d at 1572; 24 U.S.P.Q.2d at 1332. In order for a description to be sufficient it must be in clear and exact terms, and describe the invention with enough specificity to enable a person skilled in the relevant field to practice the invention. Canron, Inc. v. Plasser Am. Corp., 474 F. Supp. 1010, 1013; 203 USPQ 440, 444 (E.D. Va. 1978), aff'd, 609 F.2d 1075 (4th Cir. 1979), cert denied, 446 U.S. 965 (1980). Therefore, a prior art reference does not anticipate if it would require a person skilled in the art to engage in undue experimentation to practice the claimed invention. See Minnesota Mining, 976 F.2d at 1572; 24 U.S.P.Q.2d at 1332.

In addition, a reference that discloses a genus or generic group but does not disclose a species or specific member of that group does not anticipate a claim to the species. See Corning Glass Works v. Sumitomo Elec. U.S.A., Inc., 868 F.2d 1251, 1262; 9 U.S.P.Q.2d 1962, 1970 (Fed. Cir. 1989). Even if the claimed invention is subsumed in a reference's generalized disclosure, if there is no literal identity of invention, that reference does not

anticipate the claimed invention. See Minnesota Mining, 976 F.2d at 1572; 24 U.S.P.Q.2d at 1332.

A patent is invalid under 35 U.S.C. §103 if:

> the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

Id. The test for obviousness requires four factual determinations, viz., (1) the scope and content of the prior art; (2) the differences between the prior art and the claims at issue; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness, such as commercial success, copying, or long-felt need. Graham v. John Deere Co., 383 U.S. 1, 17, (1966) (Graham).

In analyzing invalidity under 35 U.S.C. §103, "the changes from the prior art . . . must be evaluated in terms of the whole invention, including whether the prior art provides any teaching or suggestion to one of ordinary skill in the art to make the changes that would have produced the patentee's . . . device." Northern Telecom Inc. v. Datapoint Corp., 908 F.2d 931, 935 (Fed. Cir.), cert. denied, 498 U.S. 920 (1990). The burden of establishing the invalidity of patent claims "is especially difficult when the prior art was before the PTO examiner during prosecution of the application." Hewlett-Packard Co. v. Bausch & Lomb, Inc., 15 U.S.P.Q.2d 1525 1527 (Fed. Cir. 1990), citing American Hoist & Derrick Co. v. Sowa & Sons, Inc., 725 F.2d 1350, 1359 (Fed. Cir.), cert. denied, 469 U.S. 821 (1984).

A. The '603 Patent

Respondent argued that the claimed subject matter in issue is anticipated by each of the Cabletron MMAC Hub with an EMME card, National Semiconductor Application Note 782 and Picazo U.S. Patent No. 5,432,907 ('907 patent).

1. Cabletron MMAC Hub With An EMME Card

Respondent argued that the Cabletron Multi-Media Access Center with Flexible Network Bus (MMAC Hub) with an Ethernet Managment Module with Ethernet (EMME card) anticipated the '603 patent. Respondent represented that the MMAC hub, which was introduced in as{ }is a chassis with multiple backplanes that can be used to connect up to eight cards that are capable of performing various networking functions. (RBr at 207-09). These cards were known as Media Interface Modules (MIMs) and one of the types of MIMs was the EMME card, which was introduced in 1991. (RBr at 207-08).

The EMME card includes a repeater and respondent argued that the EMME card could manage that repeater as well as any other repeaters located on the other MIM cards in the MMAC chassis and that the EMME contained SONIC chips which provided bridging between up to four different repeater collision domains and that the SONIC chips also media access controllers (MACs) that provided the signal framing so as to allow the EMME card's CPU to send and receive Ethernet packets. (RBr at 208).

Respondent argued that the EMME card, consistent with the preamble of claim 1 of the '603 patent, was "'a repeater management device for communication networks,'" and, also consistent with the preamble of claim 1, comprised four SONIC chips to perform bridging and MAC functions, a CPU,{

}and was capable of managing the managed repeater ASIC located on

the EMME board as well as any RIC repeaters located on any TPRIMIM cards located in the MMAC hub. (RBr at 211-12). Respondent further argued that the EMME card embodied the repeater management standards, and also incorporated repeater management, bridging, and MAC functions in one device, and could manage the external RIC chips over an external repeater management interface. (RBr at 212).

Respondent conceded that the EMME does not implement all of the IEEE 802.3 repeater management functions that were adopted in 1995, but argued instead that the EMME board was still an anticipatory reference because "[i]t is settled law that a reference anticipates a claim if the reference discloses the claimed invention such that a skilled artisan could take its teaching in combination with his own knowledge of the particular art and be in possession of the invention," RBr at 214 (citing In re Graves, 69, F.3d 1147, 1152 (Fed. Cir. 1995), and that "a skilled artisan in possession of the IEEE 802.3u standards and the EMME card would have been in possession of the repeater management feature of the claims of the '603 patent." (RBr at 214).

Respondent further argued that the EMME card, like the '603 device, was capable of both "in-band" and "out-of-band" management; that the EMME card could be used to monitor and manage RIC repeater chips located on TPRIMIMs through out-of-band management; that the EMME conducts such out-of-band management{

}hat this backplane connector corresponds to the "external repeater management interface" of the claims of the

'603 patent; that the EMME also incorporates managed IEEE 802.1 bridging so as to allow it to bridge the three repeater channels that operate across the MMAC chassis's backplane; and that the EMME's Sonic Chips are MACs that provide signal framing or data packets and control access to the four Ethernet collision domain consistent with the MAC element of the '603 patent. (RBr at 215-20).

Respondent also argued that the EMME

> meets each and every limitation of claim 1 of the '603 patent. A prior art reference renders a claim invalid when it discloses every feature of the claimed invention. Dr. Mick's arguments that the MMAC hub and EMME card were marketed towards large companies and that the MMAC was modular system whereas the '603 disclosure could be a single board, is irrelevant because one skilled in the art would have recognized that smaller scale implementations of the EMME functions could be implemented without undue experimentation. Prior art references are not limited to the particular invention described or to the problems with which it is concerned. Instead, a reference must be evaluated for all that it fairly suggests to one of the ordinary skill in the art.

(RBr at 221-22).

Respondent additionally argued that the limitation of an access port in claim 2 is satisfied by the connection of the EMME's CPU{

}(RBr 222-23) (Emphasis added).

Respondent also argued that claim 3 was embodied by the use of the EMME's CPU to interpret management commands,{ }and configure the SONIC bridge chips and argued that the limitation in claim 4 was anticipated by the

EMME's use of{

} (RBr at 223).

Respondent conceded that while the EMME's SONIC chips{

}Respondent argued that such error correction is not supported by the Ethernet MACs, and that, if the limitation in claim 5 is interpreted to only require error detection codes, the EMME with its SONIC chips then anticipates claim 5; that if claim 5 is interpreted to require the ability to correct errors, as well as to detect errors, then claim 5 is not enabled; that the EMME implemented the limitation of claim 6, i.e., registers for "storing attributes relating to repeater functions," through the{ } management statistics collected by the EMME and aggregates the status information gathered by the SONIC chips; that the EMME supports in-band management over the SONIC MACs to inter-RIC repeater bus, thus implementing the limitation of claim 7 of the '603 patent; that the EMME supports in-band management of the SONIC MACs to inter-repeater bus, and, as such, implements the in-band management functions of claim 9 of the '603 patent; and that the EMME supports semaphoring for DMA transfers and, as such, anticipates claim 10 of the '603 patent. (RBr at 224-5).

Complainants argued that the MMAC and the EMME did not anticipate the '603 patent, because the '603 patent was for a single device, whereas the MMAC was a chassis capable of using various modules including the EMME, and that the EMME and MMAC were sold separately, and that the EMME, without the MMAC, was incapable of managing multiple repeaters, as required by the '603 patent. (CRBr at 29). Therefore, according to complainants, two devices, the MMAC chassis and the EMME, were required to manage

multiple repeaters, instead of the single device required by the '603 patent. (CRBr at 30).

Complainants also argued that respondent failed to prove that the MMAC chassis with the EMME module could manage multiple repeaters entirely through out-of-band management, showing only that some of the management information could be transferred through out-of-band management, while other management information had to be transferred in-band, contrary to the teaching of the '603 patent. (CRBr at 30). Complainants base their argument on the following assertions: in order to allow the EMME to manage more than one repeater a TPRMIM module or modules must be used in conjunction with the EMME and MMAC; the TPRMIM contains a National Semi-Conductor RIC repeater chip; and that the RIC chips always communicate some management information in-band, as they are incapable of transferring all of the management information required by IEEE 802.1 out-of-band, as required by the '603 patent. (CRBr at 30-34).

Complainants further argued that the EMME module does not anticipate claims 4 and 6 of the '603 patent because the registers and counters specified by those limitations are not located on the EMME module or even on the MMAC chassis, but on the RIC chips located on the TPRMIM modules, and therefore all the elements required by claims 4 and 6 are located on three devices – a TRPMIM module, a EMME module and the MMAC chassis – instead of a single device. (CRBr at 35). Complainants also argued that even if the EMME copies the management information{ }as respondent argued, the TRPMIM module must still gather the management information or to the counters and registers located on the TRPMIM's RIC chip before this information can be transferred{ }by the EMME; and that the EMME, even with the MMAC, cannot manage repeaters across an inter-

repeater backplane, out-of band, as required by claim 9 of the '603 patent, as no additional repeaters can be attached to the MMAC's channel A's backplane, and as such this backplane is not an inter-repeater back-plane, and the only additional repeaters that can be attached to the MMAC's channels B's and C's backplane are the RIC chips located on the TRPMIM modules and which, according to complainants do not practice full out of band management. (CRBr at 35).

The record shows that the MMAC hub is a chassis which can be used to connect up to eight cards known media interface modules (MIMs), which are capable of performing various networking functions. (Harvey, Tr. at 3007-3008). The MMAC hub possesses 3 backplanes (A, B, and C) each comprising a separate channel (A, B, or C), and each comprising a separate repeater domain. (Harvey, Tr. at 2882-83, 3009).

Types of MIMs include the TPMIM, which is a module which plugs into channel A of the MMAC hub and does not possess a repeater. (Harvey, Tr. at 3004-05). TPRMIMs are another type of MIM and which contain National Semiconductor RIC repeater chips. (Harvey, Tr. at 3005-07). The EMME card, a type of MIM, when used in channel A of the MMAC hub is capable of performing the repeating function of channel A as well as performing bridging functions in relation to the remaining two channels. (Harvey, Tr. at 2882-83).

One of the main selling points of the MMAC/MIM system was its flexibility – customers could pick and choose which of the various MIMs to use with their MMAC hub. (Harvey, Tr. at 3008-09). Accordingly, the various MIMs, and the MMAC hub itself, were available to be purchased separately. Various examples are shown in RX-737 at pages CS127

{ }

{ } The MIMs, however, could not be used without the MMAC hub. (Harvey, Tr. at 3015).

The MMAC hub itself, without any cards, does not have repeater management, repeater, bridging or media access control functions. (Harvey, Tr. at 3009). The EMME contains an ASIC that serves as the repeater for channel A{

} (Harvey, Tr. at 3009-10).

The EMME is a bridged repeater that can perform the repeating of channel A and bridge the three channels on the MMAC hub together. (Harvey, Tr. at 2882-83). The EMME also contains four media access controllers in the form of National Semiconductor SONIC chips. (Harvey, Tr. at 2884; Molle, Tr. at 3356). As the EMME contains only one repeater on its card, for it to manage more than one repeater as required by the '603 patent, TRPMIM cards, with RIC chips, must be used in conjunction with EMME and the MMAC chassis. No more repeaters can be added onto the EMME module itself. (Harvey, Tr at 3010). The repeaters for channels B and C exist on the TPRMIM RIC modules, Exhibits RPX-1-X and Y. (Harvey, Tr. at 3010). The management of the external repeaters by the EMME cards involves two pathways: 1) a path through the managed repeater located on the EMME card itself and over the{ }and 2) a path to the{

}(RX-731D; Molle, Tr. at 3358-62); (Molle, Tr. at 3356). The first path, through which information is collected through the ASIC chip and the{ }is out-of-band; whereas the second path, through which information is collected through the SONIC

bridge chips, is in-band. (RX-731D; Molle, Tr. at 3356-62). The second pathway is in-band because the RIC repeater chips on the TPRMIMs append{ } of management status information to the end of the data packets that they transmit to the EMMI.[44] (Harvey, Tr. at 3012). Even respondent's expert Molle agreed that in the case of sending repeater packets across the bridge,{

} (Molle, Tr. at 3517). The SONIC chips located on the EMME chips remove those seven bytes of status information from the data packets and the status information { } (RX-731D; Molle, Tr. at 3356-62). If appropriate, the data packet then can be forwarded across the bridge,{

}(Harvey, Tr. at 3012).[45]

---

[44] RX-734 at CS49 states, in describing the Cabletron TPRMIM RIC repeater modules, that

{

[45] RX-731C at page CS30 describes the EMME module accordingly:

{

}

In the out-of-band pathway, the EMME's CPU can read and write onto registers located on the RICs on the TPRMIM cards{ } (Harvey, Tr. at 3011-3012). {

} (Harvey, Tr. at 3010-11).

The packets that are transmitted from the RIC chip on the TPRMIM{

} (RX-734 at CS57).{

}

Additionally, RX 1052, the National Semiconductor Application Note 782, describes the following interaction between the RIC and SONIC chips:

{

}

RX-1052, National Semiconductor Application Note 782 at NSC 2729.

Additionally, RX-1052 further states that

{

{ }

}

Id. at NSC 2732.

Although RX 1052 does not relate directly to Cabletron's MMAC EMME device, it does relate to the interaction between the RIC and SONIC chips. As Molle testified in relation to the Cabletron MMAC/EMME: "That particular style of, with the{ } it's a property of the RIC/SONIC chipset. {

} (Molle, Tr. at 3519-20). See also Molle, Tr. at 3523:

> Q. Now, Dr. Molle, this document [RX-1052] you testified or direct describes the RIC/SONIC connection that we were discussing in connection with Cabletron?
>
> A. Yes, it does.

In light of RX-1052, the administrative law judge finds that even if one could prevent the Cabletron RICs from{ }this would prevent the system from practicing full IEEE repeater management, contrary to the '603 patent.

(Mick, Tr. at 3877-78).

Therefore, because of the use of in-band communication of repeater management information required for full IEEE repeater management, by the RIC and SONIC chips, the administrative law judge finds that the Cabletron MMAC/EMME device is not an anticipatory reference to the '603 patent.

2. National Semiconductor Application Note 782

Respondent argued that National Semiconductor Application Note 782 was an anticipatory reference to the '603 patent, and that figure 2 of National Semiconductor's Application Note 782, which depicted the implementation of SONIC and RIC chips, is

"'architecturally identical to Fig. 3 of the '603 patent.'" (RBr at 225) (quoting Molle, Tr. at 3390-91). Respondent argued that the SONIC chip provides "status and configuration registers" as in the '603 patent; that the interface between the SONIC and RIC chip is an "external repeater management interface," that the SONIC chips provide{ }called for in the '603 patent; and that the RIC chips are{ } (RBr at 226).

Respondent further argued that figure 3 of National Semiconductor's Application Note 783, showing a depiction of the implementation of a SONIC chip and RIC chip device, was architecturally indistinguishable from figure 2 of the '603 patent as figure 3 of the Application Note depicted{ } (RBr at 228). According to respondent the{ }of the Application Note was "the same purpose and similar structure to the Inter-Repeater Backplane of figure 3 of the '603 patent." (RBr at 228) (footnote omitted). Also, according to respondent, figure 2 of the Application Note also depicts a structure "corresponding" to the "repeater management device" depicted in figure 2 of the '603 patent. (RBr at 229). Furthermore, respondent contended { } (RBr at 229).

Complainants argued that the RIC/SONIC chip device disclosed in Application Note 783 does not practice full out-of-band management of the RIC chips, but instead the RIC chip always transfers at least a portion of the{ } to the SONIC

chip. (CRBr at 36). Complainants further argued that the Application Note failed to reveal the chips implemented in a single device, as required by the '603 patent, but instead disclosed

{

(CRBr at 36).

Complainants also argued that "[e]ven if there were a single device that combined RICs and SONICs , it still would not practice the '603 patent (setting aside the in-band management issue) because a SONIC is primarily just a MAC chip" which "may facilitate repeater management . . . but it does not itself provide full repeater management." (CRBr at 37).

On the basis of the above findings relating to the Cabletron device, the administrative law judge finds that the system described in National Semiconductor Application Note 782 is not an anticipatory reference. National Semiconductor Application Note 782 shows a system of managing repeaters by using RIC repeater chips and SONIC chips. As discussed supra, RIC/SONIC chipsets make use of in-band management with respect to some of the management information, and as such National Semiconductor Application Note 782 which incorporates such a chipset cannot constitute an anticipatory reference to the '603 patent.

3. The Picazo '907 Patent

Respondent argued that U.S. Patent No. 5,432,907 (the '907 patent) to Picazo "anticipates and makes obvious claims 1-10 in the '603 patent." (RBr at 30). In support of this argument, respondent argued that the '907 patent disclosed an inter-repeater bus similar to that disclosed in the '603 patent, a MAC, a repeater, a bridge, in-band management, SNMP in-band management, and out-of-band management; that the '907 disclosed a repeater management device for communication networks, the ability to control repeaters and rout data

packets between a receiving port and a destination port, the ability to control and monitor repeater functions related to retransmitting of data packets and providing the status of and control over repeater functions via an external repeater management interface, the ability to receive data packets on a receiving port and to forward the received data packets to a destination port in response to a destination address, and a MAC that provides signal framing of the data packets and controls access to a repeater data interface. (RBr at 230-31).

Complainants countered respondent's reliance on the '907 patent by arguing that the device disclosed in the '907 patent cannot manage out-of-band, multiple repeaters, but instead featured in-band management of National Semiconductor's RIC chips. Thus complainants contended that while the first stacked repeater could be managed out-of-band, this repeater then converts any management information destined for other repeaters that it received out-of-band into in-band management information, which the first repeater would then relay to the other repeaters. (CRBr at 37-38). Complainants also argued that the 907 patent does not disclose stacking of repeaters with an inter-repeater bus, but rather shows stacking using daisy-chained repeaters or AUI ports, and that an inter-repeater bus connects devices more tightly than are devices daisy chained together or connected through AUI ports. (CRBr at 38).

The '907 patent discloses a "hub circuit with an integrated bridge circuit carried out in software including a switch for bypassing the bridge process." (Abstract). The '907 patent also discloses

> [a]n in-band management process in software . . . which receives and executes network management commands received as data packets from the LANs coupled to the integrated hub/bridge . . . . An out-of-band to in-band management process receives network management commands and executes them or forwards them in-band to whatever device to which they are addressed.

(Id.)

> The '907 patent practices both out-of-band and in-band management features.
>
> [A] console command process executing in background in software receives out-of-band management commands from the network manager via a modem or a terminal connected to the integrated hub/bridge. The console command process executes any management messages addressed to the integrated hub/bridge by interacting appropriately with the hub, bridge process, etc.

(col. 6, lns. 20-27). However,

> [a]ny management messages addressed to other hubs bridges, routers, etc. on any of the networks coupled together are written as data packets into the transmit buffer of the appropriate network which must be traversed to get to the destination machine.

(col. 6,, lns. 27-32).

Similarly, while "[o]ut-of-band management is carried out by the background console command process 282 in some embodiments,"

> [t]he function of the console command process 282 is to receive these commands and status inquiries and to interact appropriately with the repeaters, bridge process or configuration/status database to carry out the desired function. This interaction is carried out via data paths 306, 308 and 310 In the case where the management command is not addressed to the hub/bridge to which the network manager is directly connected, the console command process places the command in a data packet and places it in the transmit queue of the appropriate network controller so that it will eventually reach the destination component to be managed."

(col. 24, lns 9-15).

Accordingly, the administrative law judge finds that the '907 patent discloses a device that, while allowing for the out-of-band transmission of management information between a network user and the hub/bridge that the user is directly connected, transmission to any other hub/bridge occurs in-band. Insofar as the '603 patent requires out-of-band transmission of

management information, the administrative law judge finds that the '907 patent is not an anticipatory reference to the '603 patent.

4. Commercialization

Respondent argued that the asserted claims are invalid due to prior commercialization. It was argued that from a period starting as early as 1990, Level One employees commercially exploited the repeater management device claimed in the '603 patent prior to its critical date of September 14, 1994, and that Level One took substantial steps in marketing and selling an external management device prior to September 14, 1994 as shown, inter alia, by an "Engineering Specification for an External Management Device." (RBr at 241-246).

Complainants argued that respondent failed to prove, by clear and convincing evidence, that the pre-LXT930 EMD designs even practice the '603 patent and that those designs were publicly disclosed or embodied in a product that was offered for sale. It was also argued that respondent has failed to rebut the evidence presented by Level One that the first offer to sell the LXT930 occurred in 1995, less than a year before the '603 patent was fled in September 1995. (CRBr at 39-40).

The staff argued that respondent failed to establish by clear and convincing evidence that the invention of the '603 patent was offered for sale by Level One as an External Management Device (EMD) prior to the critical date of September 14 1994.

Level One's{

} (Tr. at 2565-66). The administrative law judge finds nothing in the record that conflicts with McConnel's testimony. Moreover, he fails to find anything in the record that establishes, by clear and convincing evidence, that any pre-LXT930 EMD embodied the claimed invention in issue.

With respect to any offer to sell, while respondent's Marketing Vice President Steve Kubes (formerly of Level One) testified that he engaged in "pricing discussions" with customers before the critical date, he did not testify that there was an actual offer to sell the LXT930 before the critical date. (Tr. at 2567, 2641). In addition, as to any formal price quotations to customers, Level One's{ }responsibility for the issuance of said quotations. (Perry, Tr. at 543). CX-1137, dated January 5, 1995, is Level One's first EMD price quote, either budgetary or firm for the EMI/LXT930. (Perry, Tr. at 546, 555-556). Level One's{ }confirmed that CX-1137 was Level One's first price quote by reviewing all of Level One's price quote records. (Tr. at 546). The parties do not dispute that it was Level One's policy that any sales quotes offered to customers had to be issued through Level One's Customer Service Department headed by{ } (RReCFF at 968).

Respondent has the burden to establish, by clear and convincing evidence, that there was a firm offer to sell the device embodied in the asserted claims before the critical date. See Buildex Inc. v. Kason Indus., Inc., 849 F.2d 1461, 1464 (Fed. Cir. 1988); RCA Corp. v. Data

General Corp., 887 F.2d 1056, 1059, 1062 (Fed. Cir. 1989). The administrative law judge finds that respondent has not met its burden.

B. The '410 Patent

Respondent argued that the asserted claims of the '410 patent are not valid under section 102 of Title 35 over each of LSI Logic 503 EPBGA package, the LSI Logic's (LSI) Package Selector Guide 1994-1995 (RX-928), Texas Instrument's (TI) Semiconductor Group Package Outlines Reference Guide 1995(TI 1-386) (RX-343), a article by Freyman et al "Surface Mount Process Technology for Ball Grid Array Packaging" (1993) (Amkor prior art) (RX-901), Motorola's Electric Design article, "Plastic Ball-Grid Arrays Continue To Evolve" by J. Houghten (CX-776), Intel's U.S. Patent No. 5,506,756 to Haley, dated April 9, 1996 (RX-775), and IBM's U.S. Patent No. 5,367,435 to Andros et al., dated November 22, 1994 (RX-157). (RFF 216).

Respondent also argued that "LSI Logic 503 EPBGA Package, LSI Logic Package Selector Guide, The Texas Instruments Package Outlines, The Amkor Article, The Motorola Article, The IBM Reference And Intel's Own Reference," singly or in combination, render the asserted claims obvious under 35 U.S.C. §103. (RBr at 71).

Complainants argued that respondent has not sustained its burden in establishing that the asserted claims are not valid over the cited prior art.

The staff argued that the LSI Logic 503 EPBGA package satisfies each element of asserted claims 1, 3, 7-8, 13-19 and 25-26 and 28 and that respondent has provided clear and convincing evidence that the "503-pin EPBGA" was offered for sale more than one year before the critical date of the '410 patent, viz, prior to March 28, 1995. (SBr at 79). However, it

argued that the package does not satisfy the claimed recitation "wherein the first distance is the same as the second distance" of asserted claims 23, 24, 27 and 29, and hence that those claims are not anticipated by that reference. (SBr at 79-81). The staff also concluded that there is no clear and convincing evidence that the missing elements of claims 23, 24, 27 and 29 are inherently present in any of the cited prior art. (SBr at 83).

The staff further argued that respondent has failed to demonstrate, by clear and convincing evidence, that either the TI Package Outline or the LSI 1994/1995 Selector Guide (the Guide) is prior art; that the Guide fails to satisfy certain elements of the asserted claims; and that any testimony relating to the TI Package Outlines is "irrelevant and should be disregarded." (SBr at 85-86). The staff further asserted that respondent has not sustained its burden in establishing that the asserted claims are not valid over any of the other cited art. (SBr at 86 to 93).

1. Claims 1, 3, 7-8, 13-19, 25-26 and 28 (Group I claims)

a) LSI Package

Respondent argued that the LSI Logic 503 EPBGA package includes all the limitations of the Group I claims. It was also argued that respondent has provided clear and convincing evidence that the "503-pin EPBGA was offered for sale more than one year before the critical date." (RBr 39-59).

Complainants argued that respondent has not proven, by clear and convincing evidence, an "on sale" bar under section 102(b). It was argued that respondent did not even attempt to show that the LSI package was "ready for patenting," citing, Pfaff v. Wells Elecs., Inc. 525 U.S. 367-68 (Pfaff), when a May 26, 1994 offer for sale of the LSI package was made and that

the evidence overwhelmingly indicates that said package could not be produced using LSI's specifications during the relevant time period. (CRBr at 102-11).

The administrative law judge finds that the LSI Logic 503 EPBGA package contains all the limitations of claims 1, 3, 7-8, 13-19, 25-26 and 28. See FF 124, 128, 129, 132, 144, 145. Complainants moreover have admitted this finding. (Tr. at 4303-04).

The administrative law judge finds that LSI Logic (FF 100), through{

} (FF 121, 122, 136, 137, 138, 142).

On{

} (FF 139, 140, 142, 156).[46] This transaction was verified by a separate { }LSI Logic internal document. (FF 141). Moreover, the transaction was stored in LSI Logic's{ } a database system that LSI Logic relied on and used to track and manage the business. (FF 154). Hence the administrative law judge finds that the 503 EPBGA Package was the subject of a commercial offer for sale and actual sale between LSI Logic{ } and thus meets the first part of the two-part test set out in Pfaff for an on-sale bar. See Intel Corp. v. United States Int'l Trade Comm'n, 946 F.2d 823, 830 (Fed. Cir. 1991). (Intel Corp.).

Referring to complainants' argument that the LSI package was not "ready for

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[46] Complainants do not dispute that there was a "May 26, 1994, offer to sell." See CRBr at 109.

packaging," the second part of the two-part test in Pfaff for an on-sale bar, LSI's{ } shows a footprint of the 503 EPBGA package having an outer array of contact pads/solder balls and an inner array of contact pads/solder balls. (FF 158 to 161). The drawing is essentially identical to figures 4 and 5 of the '410 patent. (FF 162). In addition,{ } drawing shows the cross-section of the 503 EPBGA package that is essentially identical to figure 3 of the '410 patent. (FF 163). Drawings or other descriptions are "proof that an invention is complete, and hence ready for patenting." See Robotic Vision Sys., Inc. v. View Eng'g, Inc. 249, F.3d 1307, 58 U.S.P.Q.2d 1723, (Fed. Cir. 2001) where the Court noted that in Pfaff, the Supreme Court based on the facts of that case, referred to "drawings or other descriptions" as proof that an invention is complete and hence ready for patenting.

Complainants argued that LSI Logic{ } (CBr at 187). However, "a signed purchase agreement before the critical date establishes an offer for sale sufficient to invoke an on-sale bar" regardless of whether the delivery of the products occur after the critical date. See Weatherchem Corp. J.L.Clark, Inc., 163 F.3d 1326, 1333 (Fed. Cir 1998). Moreover, whether or not the 503 EPBGA package{ }is completely irrelevant to the issue of an "on-sale bar" against the asserted claims. See STX,LLC v. Brine, Inc. 211 F.3d 588, 591 (Fed. Cir. 2000) ("[A]ny 'fine tuning' . . after the sale does not undermine the conclusion that the invention was ready for patenting."); see also FF 155, 157, 166, 167, 168. Complainants further argued that the 503 EPBGA package was{ }(CBr at 187). However, a qualified package at LSI Logic only

meant that a package had been tested so that it was suitable for a customer's use, application, reliability and lifetime perspective. (FF 150). In addition, a package can be available before it has been qualified if a customer orders a prototype package with a working, functioning semiconductor integrated circuit in that package so that the entire product may be evaluated. (FF 151, 153). See Intel Corp., 946 F.2d at 830.

Based on the foregoing the administrative law judge finds that respondent has established, by clear and convincing evidence, that the Group I claims, viz., claims 1, 3, 7-8, 13-19, 25-26 and 28 of the '410 patent, are not valid under section 102(b) of Title 35 in view of the offer for sale of the LSI Package before the critical date.

b) LSI Logic Package Selector Guide

Respondent argued that the LSI Guide (1) is a printed publication under 35 U.S.C. §102(a) and (b), and (2) anticipates, either explicitly or inherently, all of the claimed limitations in issue. (RBr at 48 to 52). Each of complainants and the staff argued that respondent has not established, by clear and convincing evidence, either (1) or (2).

Regarding whether the Guide is prior art because it was published more than one year before the critical date of March 28, 1996 LSI Logic's {

} (RX-561; Barber JX-67 at 36-39). The document was for giving new LSI Logic engineers information about LSI Logic packaging. (Id.) There is reference in the document to the existence of the Guide produced by marketing and which was intended to be given to customers of LSI to show them the outlines of the packages produced by LSI. (Id.) RX-561 states that it is the current issue of the Guide,{ }

{

}

{ } if not the editor of the Guide, because he received inputs from the various engineers and then compiled and published the Guide. (Barber, JX-67 at 36-39). Weihe, at the hearing, testified that he and his group were directly responsible for compiling the Guide (FF 103, 104, 108); that the purpose of the Guide was to document the package offerings that LSI was making available for sale to LSI customers in support of their custom integrated circuits (FF 111); that after the LSI Guide was printed in { } it was immediately distributed to the LSI sales and design centers throughout the world, so that the Guide could be given to customers freely and without restrictions. (FF 110, 112-121). Based on the testimony of Weihe and Barber and contemporaneous documentation (RX-928, RX-561, RX 608), coupled with the offer for sale of the package, supra, the administrative law judge finds that the Guide was published and made available to the public at least before the{ } date. See In re Hall, 781 F.2d 897, 898 99 (Fed. Cir. 1986).

With respect to the limitations of Group I claims, respondent argued (RBr at 49) that, in a figure shown in the LSI Guide, the center and outer arrays of solder balls are separated by a distance that is greater than the spacing between the balls in either of the two arrays (citing RX-928, LSI Logic 1994-95 Package Selector Guide, at 8-27; RX-928-B. RX-928-C; RX-

556;[47] 503 PBGA Program Kick-Off Meeting, at LSI000474, LSI000489, LSI000504; Prince, Tr. at 3084, 3108; Pecht Tr. at 2360-2361; Weihe, Tr. at 1742), and that the LSI Package Selector Guide also shows a portion of the{

} (citing RX-928 at 8-17 and 8-28 (for dimensions) and at 8-29 to 8-31 (for interconnects), LSI Package Selector Guide).

Respondent also argued (RBr at 50) that the interconnect table shows a{

} (citing RX-928 at 8-29 to 8-31; RX-556 at LSI000473, LSI000475, LSI000482, LSI000490, LSI000497, LSI000505; Prince, Tr at 3100-01, 3107; Pecht, Tr. at 2406-07; Weihe, Tr. at 1749-50); that thus, the LSI Package Selector Guide discloses a{

} (citing RX-928 at 8-27; RX-556 at LSI000473, LSI000475, LSI000490, LSI000505; RX-556-A, marked up page LSI000475 of RX-556; Prince, Tr. at 3088, 3107; Pecht, Tr. at 2467-68; Weihe, Tr. at 1751-72 1755, 1774-75); and that the 503 EPBGA Package also explicitly discloses encapsulation of an integrated circuit in a height of { } mm (citing RX-928 at 8-27 and 8-28).

Respondent further argued (RBr at 50-51) that, because the Guide explicitly discloses two arrays of solder balls, it also inherently discloses a plurality of contact pads to which the solder balls are attached, (citing RX-928 at 8-7; RX-928-C; RX-556 at LSI000473-5, LSI000489-90, LSI000504-5; Prince, Tr. at 3084, 3108; Pecht, Tr. at 2356, 2359; Weihe, Tr. at 1742), and that therefore the Guide discloses a substrate with a bottom surface, consisting

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[47] RX-556 is titled "503 PBGA Program Kick-Off Meeting." Respondent admitted that the "Kick-Off Meeting" for the 503 EPBGA was an internal meeting. (RReC FF at 1159).

solely of bottom surface materials and outer and center arrays (citing RX 928 at 8-27; RX-928-C, marked up page of 8-27 by Prince; RX-556 at LSI000473-5, LSI000489-90, LSI000504-05; Prince, Tr. at 3082-83; Pecht, Tr. at 2358-59; Weihe, Tr. at 1735, 1813). Respondent then argued (RBr at 51) that the pads within each array are separated by first and second distances, and the arrays are themselves separated by a third distance longer than the first and second distances, (citing RX-928 at 8-27; RX-928-B; RX-928-C; RX-556 at LSI000474, LSI000489, LSI000504; Prince, Tr. at 3084, 3108; Pecht, Tr. at 2360-64; Weihe, Tr at 1742); that because a semiconductor package is used to house an integrated circuit, the 503-lead EPBGA package described in the Guide also inherently discloses a plurality of bond pads on the top surface of the substrate so as to electrically connect an integrated circuit to the package, (citing RX-928 at 8-29-31; RX-556 at LSI000473, LSI000475, LSI000481, LSI000490, LSI000496, LSI000505; Prince, Tr. at 3088, 3100; Pecht, Tr. at 2406; Weihe, Tr. at 1742-43, 1748, 1751); that the integrated circuit is coupled to the bond pads with a plurality of bond wires, (citing Prince, Tr. at 3110 and 3115-16; Pecht, Tr. at 2420); and that a ground bus would be connected to the center array by vias through the substrate, (citing RX-928 at 8-29 to 8-31; RX-556 at LSI000473, LSI000475, LSI000482, LSI000490, LSI000497, LSI000505; Prince, Tr. at 3100-01, 3107; Pecht, Tr. at 2406-07; Weihe, Tr. at 1749-50; RX-928 at 8-27; RX-556 at LSI000473, LSI000475, LSI000480, LSI000505; RX-556-A, marked up page LSI000475 of RX-556; Prince, Tr. at 3088, 3107; Pecht Tr. at 2467-68; Weihe, Tr. at 1751-72, 1755, 1774-75).

For a piece of a prior art reference to anticipate a claim under section 102 of Title 35, the reference must clearly be shown to contain or disclose each and every limitation of the

claim. See, e.g., Motorola, Inc. v. Interdigital Tech. Corp., 121 F.3d 1461, 1473 (Fed. Cir. 1997); In re Bond, 910 F.2d 831, 832 (Fed. Cir. 1990). A reference that is silent about a certain element may still be an anticipatory reference if that element is "inherently" disclosed by the reference. See Finnigan Corp. v. Int'l Trade Comm'n, 189 F.3d 354, 1356 (Fed. Cir. 1999) (Finnigan); Continental Can Co. USA, Inc. v. Monsanto Co., 948 F.2d 1264, 1268 (Fed. Cir. 1991) (Continental), Inherency can only be established through extrinsic evidence that makes it clear that the missing element "is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill." Finnigan, 180 F.3d at 1365-66; Continental, 948 F.2d at 1268. It cannot be established by mere probabilities or possibilities and the mere fact that something may exist is not sufficient to establish inherency. Scaltech Inc. v. Retec/Tetra, L.L.C., 178 F.3d 1378, 1384 (Fed. Cir. 1999); Finnigan, 180 F.3d at 136566; Continental, 948 F.2d at 1269. Expert testimony can be helpful in combining references. In Motorola, Inc. v. Interdigital, Technology Corp., 121 F.3d 1461, 1472 (Fed. Cir. 1997) Motorola's experts testified in detail about the teachings of each reference and the motivations that one skilled in the art might have to combine the various references.

As seen from the foregoing, respondent and its experts, in an attempt to establish inherency and the conclusion that the Guide anticipates all of the Group I claims of the '410 patent, have used the teachings of the LSI 503 EPBGA Program Kick-Off Meeting document (RX-556) in their analysis of what is disclosed by the LSI Guide. The Kick-Off Meeting document has not been shown to be a public document. To the contrary, it is labeled "LSI Logic Corp. Proprietary," and has been labeled "Highly Confidential." (RX-556 at LSI000475).

Any extrinsic evidence used to fill a "gap" in a reference by inherency must make it clear that persons of ordinary skill would recognize the missing item as present. Continental, 948 F.2d at 1268. A confidential, internal LSI document describing the 503-lead EPBGA package would not have been accessible to a non-LSI employee of ordinary skill during the relevant time frame. Thus, it has no bearing on what one skilled in the art would believe is taught by the Guide between 1993-1996. Accordingly the administrative law judge finds that respondent has not established by clear and convincing evidence that the Guide anticipates or makes obvious the Group I claims, prior to the critical date.

c) Andros et al Patent

Respondent argued that IBM's U.S. Patent No. 5,367,435 to Andros et al anticipates the Group I claims or renders them obvious. The Andros et al patent is titled "Electronic Package Structure and Method of Making Same. (FF 170). The package however described in the IBM Andros et al patent consists of a first substrate and a second substrate with solder balls sandwiched between the two substrates. (FF 171). Hence, the administrative law judge finds that the surfaces of the substrates that contact the solder balls are not "external" as required by the asserted claims. Moreover, the IBM patent never mentions or shows arrays of solder balls. (FF 172). The administrative law judge can find nothing in Andros et al that shows or discusses the arrangement of solder balls or contact pads on the bottom of a substrate. Moreover the patent does not show contact pads in arrays. (FF 173). The few solder balls in Figures 1 and 2 of the IBM patent are separated by many distances and appear to be drawn at random on the bottom of the second substrate. (FF 174). The administrative law judge finds that respondent has not satisfied its burden in establishing that the asserted

Group I claims are not valid in view of Andros et al under either sections 102 or 103 of Title 35.

d) Amkor Article

Respondent argued that an Amkor article (Surface Mount article) anticipates the Group I claims or renders them obvious. (FF 177). The Amkor article contains a total of three pages of text. (RX-901). The article is directed to BGAs, and in particular to a 225-pin full array BGA. (RX-901 at 81). The article reads in part:

> Johnson et al, of Compaq have shown that first temperature cycle induced solder joint failures occur in the solder joints . . . . These findings suggest that for applications requiring very large die or especially stringent temperature cycle performance it may be necessary to de-populate the solder balls at the edge of the die. It should be noted, however, that BGAs are currently shipping in mass production in desk top computing and handheld telecom applications with no reported filed failures after more than four years.

Nothing however in the above quote nor in the Amkor article discusses any arrays of contact pads. See also FF 178 to 185. In addition, the indication to "de-populate the solder balls at the edge of the die" does not state that all the solder balls under and around the entire periphery of the die should be removed from the package. Rather it could suggest to one of ordinary skill in the art to depopulate solder balls from underneath the corners of the die. (Blanchard, Tr. at 4010-14; CDX-225). The administrative law judge finds that respondent has not established by clear and convincing evidence that the asserted Group I claims are not valid under Title 35 in view of the Amkor article.

e) Haley Patent

Respondent argued that U.S. Patent No. 5,506,756 to Haley makes the Group I claims not valid under Title 35. The Haley patent is titled "Tape BGA Package Die-Up/Die Down"

(FF 186). Haley, as shown by its Figure 1 and 3, sets forth an embodiment that consists of a flexible circuit board(15) that bears a single array of solder balls (38) and an integrated circuit (12) with solder balls (38) directly attached to the integrated circuit. The integrated circuit is positioned in an opening or hole (42) in the circuit board package (RX-775). The Haley patent does not describe or disclose a package with two arrays of solder balls or a substrate as required by the Group I claims. See also FF 187 to 211. The administrative law judge finds that respondent has not established by clear and convincing evidence that the Group I claims are not valid under sections 102 or 103 of Title 35 in view of the Haley patent.

f) Texas Instruments Package Outlines

Respondent argued that the Texas Instruments Package Outlines (RX-343) (the Outlines) anticipates the Group I claims or renders them obvious. (RBr at 59). Complainants argued that respondent has not proved by clear and convincing evidence that the Outlines was "published" prior to March 28, 1995. It was also argued that respondent has failed to show that each limitation of the Group I claims is either expressly or inherently disclosed by the Outlines. (CBr at 188). The staff argued that respondent has failed to demonstrate by clear and convincing evidence that the Outlines qualifies as a prior art reference and therefore any argument presented by respondent on validity is irrelevant and should be disregarded. (SBr at 86). It is admitted by the parties that the Outlines is a reference guide for packages used by Texas Instrument's semiconductor group in the manufacture of integrated circuits. (CReCFF at 94).

Referring to the prior art status of the Outlines, respondent argued that complainants, having admitted the Outlines is prior art in the prosecution of the '410 patent, are precluded

from arguing that the Outlines is not prior art, citing In re Nomiya, 509 F.2d 566 (CCPA 1975) (Nomiya). (RRBr at 48). The prosecution history of the '410 patent does show that after issuance of a Notice of Allowability, on October 23, 1997, the applicant filed a continuation application with items which included an Information Disclosure Statement and a declaration of the applicant. (FF 63, 64). The Court however said in Nomiya that it is necessary to consider "everything" appellants have said about what is prior art to determine the exact scope of their admission. Nomiya, 509 F.2d at 571. Neither the Information Disclosure Statement nor the declaration states that the Outlines is prior art. Hence the administrative law judge rejects respondent's argument that complainants have admitted that the Outlines is prior art.

RX-309 is a collection of separate documents which are marked TI-1509 to TI-1565. The administrative law judge is unable to determine from those documents the publication date of the Outlines, nor when the Outlines was distributed outside of Texas Instruments. Accordingly, the administrative law judge finds that respondent has not established, by clear and convincing evidence, that the Outlines is a prior art reference.

Referring to whether the Outlines discloses the limitations of the Group I claims, respondent admits that the Outlines only inherently discloses an integrated circuit die attached to the top surface of a substrate (RR CFF-1837D); that the Outlines only inherently discloses an integrated circuit die with an edge profile lying in between the outer and center arrays of solder balls (RRCFF-1839H); that the Outlines only inherently disclose a ground bus attached to therma vias extending through the substrate to the center array of solder balls (RRCFF-1842G); that the Outlines inherently only discloses an integrated circuit die attached to the top

surface of the substrate (RRCFF-1,934M), and that the Outlines only inherently discloses wire bonds connecting the integrated circuit die to bond pads, (RRCFF1,935B). Moreover, respondent, for each of the asserted inherent disclosures,[48] relies on, for confirmation, testing reported by Edwards in an article published at the "1995 Proceedings 45th Electronic components and Technology Conference May 21-24, 1995" (RX-216, 219) which is after the critical date of March 28, 1995. As with the LSI Guide, any extrinsic evidence used to add to a reference by inherency must make it clear that a person of ordinary skill would recognize the inherency in a reference before the critical date. The fact that a confirmation test published after the critical date is relied upon supports a contrary finding. Hence, the administrative law judge finds that respondent has not established, by clear and convincing evidence, that the Outlines makes the Group I claims not valid.

g) Electric Design Article

Respondent argued that Motorola's Electric Design article titled "Plastic Ball-Grid Arrays Continue To Evolve" by J. Houghten (CX-776) makes the Group I claims not valid under Title 35. All parties agree that the Electric Design article contains figures of full array BGAs, drawings of perimeter array BGAs, and contains discussion about full array BGAs and about perimeter array BGAs. (RReCFF at 1223).

Figure 3 of the Electric Design article shows a perimeter array BGA (CX-776). The

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[48] Respondent also stated that the package in the Outlines "inherently" discloses a plurality of bond pads on the top surface of the substrate so as to electrically connect an integrated circuit to the package, because a semiconductor package is used to house an integrated circuit. (RRCFF-1,934K).

article further states:

> All of the perimeter arrays are likely to have a version that includes a small matrix of solder balls in the center for applications requiring improved thermal dissipation. This is typically implemented in full-array BGAs by means of ground bumps located directly beneath the die. Thermal vias (copper-plated through holes) provide direct heat transfer from the die attach to these ground/thermal bmps. When these bumps are connected to one or more ground planes on the printed circuit board, BGA heat dissipation can exceed that of standard QFPs.

(RX-776 at 142). (Emphasis added]

Respondent argued that the "small matrix of solder balls in the center" in the language, supra, refers to the '410 BGA configuration of the asserted claims. However, the plain language, supra, merely contemplates placing solder balls in the center of the package for thermal and/or ground purposes. The administrative law judge finds nothing in the language, in the absence of hindsight, that suggests the spatial relationship between the solder balls in the central area and those on the perimeter of the package as found in the Group I claims. See also FF 228, 212-216.

Robert Munroe has worked in the engineering field for over thirty years. During that time, he has had responsibilities in the area of semiconductor packaging for both IBM and Motorola. (FF 217). Monroe has been employed by Motorola since 1991 as a Design Group Manger and Section Manager with responsibility for packaging power PC products. (FF 218). According to Munroe, research and development efforts at Motorola before at least 1996 were focused on full-array BGAs, since that was perceived to be the target market. (FF 219). Monroe was not aware of any bull's-eye BGA work done at Motorola prior to 1996. (FF 220). Munroe could not recall the first time he saw a product with a bull's-eye BGA prior to

1997. (FF 221). Munroe has no knowledge of testing performed at Motorola prior to 1996 that involved either Motorola bull's-eye BGA designs or competitors' designs. (FF 222). Motorola's proposed solutions to a better BGA specifically excluded designing a bull's-eye BGA package. (FF 226).

The administrative law judge finds that respondent has not established, by clear and convincing evidence, that the Electric Design article makes the Group I claims not valid under Title 35.

2. Claims 23, 24, 27 and 29 (Group II Claims)

Respondent has argued that the same art, supra, with reference to the Group I claims, makes the Group II claims not valid under Title 35. Each of complainants and the staff has argued that respondent has not sustained its burden, in establishing by clear and convincing evidence, that the Group II claims are not valid.

Claims 23, 24, 27 and 29 depend from claims 1, 7, 26 and 28, respectively. They define a two-array BGA package with solder balls or contact pads arranged in the form of a bull's-eye and separated by equal distances. The pertinent portion of those claims generally reads:

> wherein the first distance [distance separating the solder balls or contact pads of the outer array] is the same as or equal to the second distance [distance separating the solder balls or contact pads of the center array].

(CX-3 claims 23, 24, 27, and 29).

None of the cited prior art discloses or shows BGA circuit packages wherein the "first distance" is the same as or equal to the "second distance". Thus, in the only relevant prior art, i.e., the LSI Package, the solder balls or contact pads of the center array of the LSI package

are separated from each other by a distance of 2.54mm, and the solder balls or contact pads of the outer array are separated from each other by a distance of 1.27mm. (RX-556 at LSI000474; CFF 1860-62). Moreover, LSI Logic only put in{

} (CFF 133). Hence, the solder balls or contact pads of the center array of the LSI package are expressly separated from each other at twice the distance as the solder balls or contact pads of the outer array. Respondent has admitted that said package does not possess solder balls or contact pads arranged in a manner that meets the limitations of claims 23, 24, 27 and 29. However, it argued that the LSI package "inherently" discloses solder balls or contact pads of the center and outer arrays spaced apart at the same distance. (RBr at 44).

There is testimony from LSI's{

} (JX-67 at 102). There were reasons in the LSI Package for only placing the solder balls in the center as needed, viz. to minimize cost and maximize heat disruption. (See Pecht, Tr. at 2408-2409).[49] Pertinent to this point is the testimony of complainant's expert Blanchard (Tr. at 3987-90):

> Q And well, what, if anything, would{
> } [RX-556] on page LSI 474 teach to one of ordinary skill in the art in the 1993 through '95 time frame?

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[49] All parties agree that adding extra solder balls to a package increases its cost and when adding solder balls to the bottom of a BGA package, one reaches a point of diminishing returns in terms of improving thermal performance. (RReCFF at 1127).

A One of ordinary skill looking at the two drawings on page LSI 000474, would understand that there's an optimum number of solder balls to extract the heat from this package, and these solder balls would be placed evenly across the bottom of the package below the pad that the integrated circuit will be attached to.

In terms of the optimization process, there are really two issues here. One, the inner set of solder balls are designed to perform two functions. They provide in this case electrical continuity to the die that's in the package but they also are the path from heat, that heat uses to flow from the integrated circuit into the underlying PC board the package will be assembled to.

So the requirements of the solder balls in the inner array are primarily thermal. The requirements for the solder balls in the outer array had to do with the number of inputs/outputs and such as that is really driven by another concern, which is how many signals do we want to get into the package and how much signals do we want to get out of the package.

In terms of the optimization, we've heard testimony that as we add more solder balls, there are cost issues and there are also manufacturing issues, the handling of these solder balls add one more solder ball and an additional expense.

So there's an optimum point in terms of thermal performance and cost with regards to the number of solder balls that will be placed in the inner array. And the spacing between the solder balls will be chosen from this optimum point.

Q Well, what, if anything, does that suggest to one of ordinary skill in the art about whether to make the spacing of the inner array the same as the -- or different than the spacing in the outer array?

A Well, since the considerations are different, we're constrained in the outer array with a given number of signals. In the inner array, we're concerned about the thermal performance. They aren't related.

Well, look at the amount of the -- well, take the die area that's used, the number of balls that will spread uniformly across the region of the package below the die area. There is, in fact a point of diminishing returns, as we add more solder balls, the

cost of each incremental solder ball adds more cost to the package, but the thermal performance has a diminishing return in terms of the added performance of the package as we add more and more solder balls.

Q And . . . .

How, if at all, does Mr. Barrow's approach [in the '410 patent] bear on this analysis?

A Well, Mr. Barrow chose to use solder balls that are placed in the inner array, that are spaced apart by the same distance as those in the outer array.

This has the disadvantage that you sacrifice thermal performance because the size of the array that was chosen is relatively small, so that if we have a die that is larger than this array, we can restrain the heat flow.

It does have an advantage, however, that for the same size package, we can allow a greater variation in die size or die sizes to be used in the package of the '410 patent, while with the package of the LSI, shown here in this LSI Logic document, we have a lot less variability in die size.

So it's a trade-off between being able to have a range of die sizes fit in a package or having optimized for a specific thermal performance for a limited range of die sizes. [Emphasis added]

Respondent argued that Blanchard admitted "that the difference in separation between the contact pads/solder balls in the center and outer arrays is a matter of design choice that packaging engineers would make everyday in 1995 timeframe." (RBr at 44). Blanchard, however, testified (Tr. at 4105-06):

Q Okay. Now, I believe you - let me understand your testimony. Since you indicated a distinction was the same distance was not shown in the LSI package, I'd like to understand your opinion. Is it your opinion that a packaging engineer who looked at the LSI package with a bull's-eye pattern and a different distance in the center as opposed to the outer array, would require more than

ordinary skill to come up with a package where the balls in the center array had the same distance as the balls in the outer array?

A I believe that the LSI Logic teaches that you use the center array for thermal purposes and you use the outer array for signal purposes. And given that, in the cost of adding additional solder balls regardless of where they are, you would optimize the center for the thermal and financial aspects of it, while dealing with the number of inputs and outputs of the outer perimeter.

Q Okay. But perhaps my question wasn't clear. Are you saying that it would have required more than ordinary skill for a packaging engineer in 1995 to have made that choice, to have gone from a bull's-eye pattern in which the center array had different spacing than an outer array, to a bull's-eye pattern in which the center array and the outer array had exactly the same spacing?

A I'm saying that the LSI Logic teaches a way [sic laway] from having a bull's-eye array, such that the center has equal to same spacing as the outer spacing because of the requirements, both thermal and economic for the center array, with a different set of conditions affecting the number of solder balls in the outer array.

Q Well, weren't there a known advantage to increasing the number of solder balls in the center?

A There was a thermal advantage, there was a financial disadvantage and that's the optimization that one skilled in the art would have performed in that time frame, as we see LSI Logic performed. [Emphasis added.]

Moreover Blanchard's design choice testimony was not about the difference in separation between the contact pads/solder balls in the center and outer arrays of the LSI package. Rather Blanchard answered a general question regarding choices engineers make between efficiency and cost (Tr. at 4108):

Q Aren't trade-offs of cost versus diminishing returns of number of I/O pins and thermal performance precisely the type of design choices that packaging engineers would make every day in the 1995 time frame?

A I believe so.

Based on the foregoing, the administrative law judge finds that respondent has not established by clear and convincing evidence that claims 23, 24, 27 and 29 of the '410 patent are not valid under Title 35.

3. Objective Evidence Of Nonobviousness

Barrow, the inventor on the '410 patent, testified that once the idea for BGA package with a perimeter array and a separate center thermal array of solder balls as described in the '410 patent, was in the marketplace{ } (Tr. at 964-965). Respondent characterized the Barrow testimony as irrelevant and unreliable because uncorroborated oral testimony of the named inventor of the '410 patent. (RReCFF at 721). It is a fact, however, that respondent's accused Plastic Ball Grid Array (PBGA) packages equate the "first distance" with the "second distance." See Section VI B infra. Moreover, Motorola's proposed solutions to a die edge problem specifically excluded designing a bull's-eye PBGA. (FF 225, 226).

C. The '341 Patent

Respondent argued that a number of references constitute invalidating prior art, viz., Intel Pentium P54C Microprocessor, Benchmarq's bq2010 Device, U.S. Patent No. 5,477,166, Chips and Technologies 65510 Flat Panel VGA Controller (65510), Chips and Technologies' 82C230 Controller, Motorola's MC6801 Processor and Intel's 82077SL CHMOS Floppy Disk Controller.

1. Intel Pentium P54C Microprocessors

Respondent has argued that the Pentium 75/90/100 MHz microprocessors (also known as the{ }practiced all of the limitations of the asserted claims of the '341 patent. The{ }were available to the public prior to '341 patent's critical date.

The P54C series (P45C) includes the multifunction pins BE0-BE3 (RX-516, Pentium Data Sheet, at 2-91, 2-102, Table 5; Ward, Tr. at 3701). BE0-BE3 pins are used to provide APIC ID configuration inputs during reset and are sampled on RESET. (RX-516, Pentium Data Sheet, at 2-91; Ward, Tr. at 3700). The designation "APIC" refers to the Advanced Programmable Interrupt Controller. (RX-516, Pentium Data Sheet, at 2-91).

{

} Therefore, "BE0#-BE3# pins in the Pentium P54C are Byte Enable pins that are used as APIC Identification inputs and are sampled at RESET. (RX-516, Pentium Data Sheet, at 2-91) {

}

The DPEN#/PICD0 and APICEN/PICD1 pins are also multifunction pins that read certain information during reset and have different functions during normal operation. (RX-516, Pentium Data Sheet, at 2-91 and 2-93).

The DPEN# pin is an output of the Dual processor and an input of the Primary processor. (RX-516, RX-516, Pentium Data Sheet, at 2-91, 2-93). The Dual processor drives the pin low to the Primary processor at RESET to indicate that the Primary processor should enable dual processor mode. (RX-516, Pentium Data Sheet, at 2-91, 2-93). DPEN# shares a pin with PICD0. (RX-516, Pentium Data Sheet at 2-91, 2-93). The APICEN pin

enables and disables the on-chip APIC interrupt controller. (RX-516, Pentium Data Sheet at 2-91, 2-93). If sampled high at the falling edge of RESET, the APIC is enabled. APICEN shares a pin with PICD1. (RX-516, Pentium Data Sheet at 2-91, 2-93).

{

} (Ward, Tr. at 3701; RX-516, Pentium Data Sheet at 2-102, Table 5). {

} Those pins are multifunction pins, on which the voltage is sampled during reset, thus satisfying the sensing means and application sense means limitations of claim 1. (Ward, Tr. at 3700; RX-516, Pentium Data Sheet at 2-91). The voltage on those pins is adjusted during reset by internal pull down resistors that are active only during reset, thus satisfying the circuit means limitation of claim 1. (Ward, Tr. at 3702-03; RX-516, Pentium Data Sheet at 2-91). {

} After an initialization process the P54C provides a control signal indicating that the processor is required to operate in a particular mode, thus satisfying the control signal limitation of claim 1. (RX-516, Pentium Data Sheet at 2-91). Therefore all the elements of

{ } The logic means limitations of claims 3 and 13 are necessarily present, as they are present in every digital device (Ward, Tr. at 3648-49), and as such those claims are anticipated.

} Accordingly, the administrative law judge finds that those claims are anticipated. Finally, one of the pins may be left floating, as required by claims 12 and 16, (RX 516, Pentium Data Sheet at 2-102), and therefore those claims are anticipated. Hence, the administrative law judge finds that the{ } includes all of the elements of the asserted claims of the '341 patent and, as such, is an anticipatory reference to those claims.

Complainants, in their reply brief, do not even attempt to argue that the{ } does not have the aforementioned features. Instead they argued that references which had been disclosed to, or referenced by, the patent examiner, specifically U.S. Patent No. 5,051,622 to Pleva ('622 or Pleva patent) (RX-544) and U.S. Patent No. 5,237,218 to Josephson et al. (the '218 patent) (CX-421)[50] had the aforementioned features, yet the Examiner allowed the '341 patent anyway, and therefore such features could not be anticipatory. (CRBr at 62-63). Complainants' arguments are inapposite. The application for the '341 patent was originally

[50] The Examiner in his Office action of Feb. 13, 1996 merely cited the '218 patent of interest. He made no rejection of the claimed subject matter on the '218 patent. (FF 68, 69, 70). Thus it appears that while the '218 patent teaches multiplexing of input pins for in-system programming of an integrated circuit (FF 70), the Examiner considered the '218 patent otherwise irrelevant to the claimed subject matter.

rejected, in part, because the Examiner had found it to have been anticipated and/or rendered obvious by the '622 patent, causing the patentee to amend the claims by, inter alia, adding the "circuit means" limitation to claims 1 and 13, i.e., limiting those claims to devices with internal pull up and pull down resistors which the device disclosed in the '622 patent lacked. (Ward, Tr. at 3709; RX-924) (FF 65 to 70). Moreover, while the '218 patent may have revealed a device with a "mode-select pin with an internal pull up circuit (or "resistor") used to set the pin at a default voltage", (CRBr at 62), the administrative law judge finds no disclosure of a device having the application sense circuitry disclosed in the '341 patent. (CX-421).

The staff argued that the '341 patent does not disclose or describe any structure or material for implementing any application other than an LED application. (SBr at 77-78), apparently taking the position that unless the prior art specifically discloses the structure shown in a patent's preferred embodiment, irrespective of what the patent in issue claims and irrespective of what the specification of the patent in issue teaches, the prior art is irrelevant. The administrative law judge rejects that argument. {

} s prior art to the claims of the 341 patent. The circuit of the{ }is for selecting an application based upon the manner in which the external elements are attached. (See Abstract of the '341 patent (CX-2)). As disclosed in the abstract, and as seen in the{ }(1) the selection of the application is controlled based on the potential detected at a pin immediately following reset, (2) the detected voltage is compared with a reference voltage, (3) the pin used to sense the application is used as a sense pin immediately after reset has occurred, (4) after this it can function as either an output or input

pin, (5) a flip flop is connected such that the output of the application sense pin and the condition reset is directed appropriately to the flip flop, (6) when the condition of not-in-reset is sensed, the flip flop latches to a first condition or second condition based on the potential at the application sense pin, (7) a binary select allows 2^N different applications to be selected where N is the number of pins used to select the applications, (8) when a first binary code is sensed, a first application is implemented, and (9) when a second binary code is sensed, a second application is implemented. (See Abstract of the '341 patent. (CX-2)). As the specification discloses, and with respect to the{ } the end result of the operations of the Pentium "is a logical determination of the intended application of the device" and shows that the claimed subject matter is "limitless in scope." (CX-2, col.5, lns. 30-35). Moreover, the integrated circuit of the{ }may "logically determine the intended application of the device." (CX-2, col. 7, lns. 50-52).

2. Benchmarq's bq2010 Device

Respondent argued that the bq2010 "anticipates the asserted claims of the '341 patent under any suggested interpretation of the claims." (RBr at 128). Respondent conceded that the bq2010 uses more complex circuitry than the '341 device, but argued that this was because the bq2010, and the related device disclosed in U.S. Patent No. 5,477,166, infra, "include circuitry that permits additional functions to be performed, namely, the use of a single multifunction pin to choose between three rather than two, applications." (RBr at 133).

The bq2010 is an integrated circuit. (Ward, Tr. at 3658), which uses an LED display to represent the remaining charge of a rechargeable battery. (Ward, Tr. at 3659). {

} (RX-79, bq2010 data sheet at 1,

Ward, Tr. at 3659). {

} to indicate graphically the available battery charge. (RX-79 at 1). The bq2010 can display the available battery charge in one of two ways: absolute or relative. (RX-79). In relative display mode, the battery charge is represented as a percentage of the last measured discharge. (RX-79, bq2010 data sheet, at 14). Each LED segment represents 20% of the last measured discharge, the sixth segment,{ }is not used. (RX-79, bq2010 data sheet, at 14). In absolute display mode, each segment represents a fixed amount of battery charge, based on the initial programmed full count. In absolute display mode, each segment represents 20% of the programmed full count, with{ } representing "overfull." (RX-79, bq2010 data sheet, at 14). Therefore, in relative mode, only five LEDs are used, while in absolute mode, six LEDs are used. (RX-79, bq2010 data sheet, at 14).

There{ }

(RX-79, bq2010 data sheet at 1; Ward, Tr. at 3660). {

} (RX-79, bq2010 data sheet at 1; Ward, Tr. at 3660).

Unlike what is disclosed in the '34 patent, the bq2010 uses a{ } to determine the presence of an internal pull down or pull up, instead of simple circuitry. To determine the presence of a pull up or pull down,{ }in the bq2010 performs two analyses to determine the presence of an internal pull down or internal pull up. (RX-79). In se using the potential placed on a multifunction pin,{ }conducts two separate interrogations: one to determine

{ }(Ward, Tr. at 3795).

The results of each interrogation are placed in{

} (Ward, Tr. at 3795; RX-79). {

} (Ward, Tr. at 3795-3798).

The bq2010, also unlike the device disclosed in the '341 patent, does not{

} The results of each analysis to determine whether there is{

} (RX-79). {

} (Ward, Tr. at 3676; Blanchard, 4051-4052)

The administrative law judge finds that the bq2010 is not an anticipatory reference because it, like the device disclosed in U.S. Patent No. 5,477,166, infra, uses { } to determine{ }(Blanchard, Tr. at 4047-4048; Ward, Tr. at 3802), and also{ }to read the information read during reset.

3. U.S. Patent No. 5,477,166

Respondent argued that U.S. Patent No. 5,477,166 (the '166 patent) to Wallace Matthews and assigned to Benchmarq Microelectronics (RX-577), which disclosed the identical circuitry found in the bq2010, also "contains all the elements of the asserted claims of the '341 patent," including the circuit means, the sensing means, a means of comparing the detected potentials, a way to add an external resistor, and logic means. (RBr at 121).

The reset signal in the '166 patent, inter alia, resets the CPU, which causes the CPU to execute a reset sequence of instructions, including sampling the pull ups and pull downs. (Ward, Tr. at 3801-02). The CPU in the '166 device first interrogates the circuit for pull downs, places those values in a register, and then conducts a second interrogation and places those values in a register. (Ward, Tr. at 3802). In contrast, the "sensing means of the '341 patent does not require a CPU or most of a CPU's associated supporting circuitry, but instead employs basic threshold sensing logic and a D flip-flop to accomplish the configuration selection." (Blanchard, Tr. at 4051 - 4053). Even Altima's expert witness, Ward, admitted that the "'166 patent discloses a design that is based on CPU control." (Ward, Tr. at 3802).

Also the '166 patent does not disclose a device that uses a D flip flop, as with the '341 patent, but rather discloses a device that uses at least two registers to determine whether a multi-function pin is pulled low or high by an internal pull down or pull up. (Blanchard, Tr. at 4046, 4051). A register is a collection of bi-stable storage devices capable of holding more than one bit of information. (Ward, Tr. at 3802). The difference between a register and a flip flop is that a register can be viewed as basically a group of storage elements and it is a multi-bit storage device that may in fact be constructed from a set of flip-flops that perhaps share some circuitry. (Ward, Tr. at 3676). Registers, unlike a D flip flops, are capable of holding multiple bits of information, whereas D flip flops can usually hold only one bit of information. (Blanchard, Tr. at 4051-52).[51]

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[51] Although respondent has suggested that registers may be constructed by putting together a set of flip flops, (Ward, Tr. at 3675), even a register constructed from a set of D flip flops

{ }the administrative law judge finds that the '166 patent is not an anticipatory reference to the '341 patent, because in the device disclosed in the '166 patent the CPU makes an inquiry to determine the presence of pull downs or pull ups on a particular multifunction pin, (Blanchard, Tr. at 4047-48; Ward, Tr. at 3802) unlike the '341 patent which uses non-CPU circuitry to accomplish these tasks. (Blanchard, Tr. at 4051-53).

4. Chips And Technologies 65510 Flat Panel VGA Controller

Respondent argued that the Chips and Technologies 65510 Flat Panel VGA Controller (65510) "contains all of the elements of the '341 patent claims," if the '341 patent is construed to apply to the use of multifunction pins to configure video displays, and the "circuit means" is construed to require the pull up or pull down circuit, then all of the limitations of the asserted claims are found in the 65510. (RBr at 113, 115). Otherwise, respondent argued the "use of a multifunction pin to select LED display conditions is rendered obvious by the 65510." (RBr at 115).

The administrative law judge rejects both of respondent's arguments that the 65510 is an anticipatory reference to, or renders obvious, the '341 patent Treating the latter argument

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would be more complex than just a D-flip flop, because

> While it may be theoretically possible to create a register by combining multiple flip-flops, practically, a memory cell such as a register does not work the same way as a flip-flop. Moreover, there are many different types of memory cells, which may operate differently. For example, DRAMs store bits of charge on a capacitor. SRAMs use a cross-coupled four or six transistor cell. These are very different from a flip-flop.

(Blanchard, Tr. at 4134-4135).

first, respondent has not, other than making a single sentence assertion that the 65510 renders the '341 patent obvious, argued this position in its post hearing brief, and has not given a basis both factual and legal for this assertion. Therefore, this argument is rejected.

Referring to respondent's argument that the 65510 anticipates the claimed subject matter in issue, the 65510 is a controller for flat panel display. (Ward, Tr. at 3962). The 65510 device has a set of multifunction pins, designated MA0 through MA7, that during reset provide configuration information during reset. (Ward, Tr. at 691, 692; RX-515, 65510 Data Sheet, at 12). The multifunction pins are sampled to provide configuration information. (Ward, Tr. at 3692; RX-515, 65510 Data Sheet, at 12). The 66510 detects a voltage value on a pin and makes a determination of whether the detected voltage is a logic 0 or a logic 1. (RX-515, 65510 Data Sheet at ALT32525?). There are eight bits in the configuration register XR01, and those bits latch the MA0-MA7 pins on the falling edge of RESET. (RX-515, 65510 Data Sheet, at 75). Bits 0 and 1 represent the CPU Bus Types; bit 2 is reserved; bit 3 represents transceiver control; bit 4 is for clock doubler control; and bits 5-7 are configuration bits. (RX-515, 65510 Data Sheet, at 75). MA5-MA7 are latched on the falling edge of RESET and include internal pull-ups that are enabled only at RESET, but have no hardware function. (RX-515, 65510 Data Sheet, at 75). The values read on the multifunction pins during reset are latched in a register. (JX-60C, Chandavarkar dep. at 21). Based on the values of the pins that are read during reset, certain features of the chip are configured. (Ward, Tr. at 3693; RX-515, 65510 Data Sheet, at 12, 75).

Pins MA0-MA7 are used on reset to configure for EISA/ISA bus, MC bus, PI bus, or 386SX CPU interface. (RX-515, 65510 Data Sheet, at 12). The configuration register of the

65510 contains eight bits that are read from those multifunction pins during reset. (Ward, Tr. at 3693; RX-515, 65510 Data Sheet, at 75). The values of pins MA0 and MA1 are used to choose between four different CPU bus types. (Ward, Tr. at 3693; RX-515, 65510 Data Sheet, at 12 and 75). The value of the MA4 pin determines whether the clock doubling feature will be enabled. (Ward, Tr. at 3695-96; RX-515, 65510 Data at 12 and 75).

The 65510 has pull-ups on pins MA0-MA7 which are enabled during the reset active period. (RX-515, 65510 Data Sheet, at 12). The pull ups are internal, p channel transistors. (JX-60C, Chandavarkar dep., at 24).

The administrative law judge finds that the 65510 does not constitute an anticipatory reference to the '341 patent because of the presence and use of registers rather than D-flip flops. As stated in the section supra, in reference to the '166 patent, a register is a more complicated structure than the D flip flop.

5. Chips And Technologies 82C230 Controller

Respondent argued that '341 patent was allowed over Pleva, because of the addition of the limitation of "circuit means for internally adjusting in response to the detected potential" to claim 1, i.e, the additional requirement that the device have an internal pull up or pull down resistor, and that while the Pleva patent does not disclose any such internal pull up or pull down resistor (Ward, Tr. at 3709; RX-924), the 82C230 which although embodying some of the claimed features in the Pleva patent (RX-787C, Disclosure Statement regarding Ser. No. 07/433,476), also possessed features not revealed in the Pleva patent, including internal pull up resistors. Respondent's sole support for claiming that the 82C230 possessed such internal resistors is the following statement by Pleva himself:

> I believe . . . [the configuration resulting in a logic high] would be accomplished, although I would need to confirm this with reference to circuit diagrams, but I believe it would be accomplished through the facility of an on chip pull up resistor in the I/O cell connected to pin 30. [Emphasis added.]

(JX 63, Pleva dep. at 189-190). In light of such equivocal evidence, the administrative law judge finds that respondent has not shouldered its burden of proof of clear and convincing evidence regarding the 82C230, and finds it not to be an anticipatory reference to the '341 patent because of its lack of internal pull ups or pull downs.

6. Intel's i960JX Embedded Microprocessor

{

}

(RX-924). {

}

(RX-924).

The administrative law judge rejects respondent's contention that the i960 practices any asserted claim of the '341 patent. Specifically, there is nothing to indicate that this device stores information read during reset in a D flip flop as required by the asserted claims of the '341 patent.

7. Motorola's MC6801 Processor

Respondent argued that the MC6801 "meets all the limitations of the asserted claims, and did so fifteen years before the filing of the application that issued as the '341 patent." (RBr at 126).

The reference manual for the MC6801, RX-211 at page MOT00049 bears a "First Edition" date of 1980. As described in RX-211, the MC6801 includes three operational modes — { }—which are controlled by the levels present at pins{ } (RX-211 at 2-20). The reference manual for the MC6901 describes how to "program[] the mode" and instructs an user how to apply external circuitry to several pins in order to specify what mode the processor selects during reset. (Ward, Tr. at 3714; RX-211 at 2-20). According to RX-211, the MC6801 includes pins{ }are used to select from three operational modes. (RX-211 at 2-20).

The MC6801 reference manual states that "the [MC6801] operating mode{ } (RX-211 at 3-8; see also Ward, Tr. at 3717). The schematic for the MC6801 discloses several bits of port, two of which shows the multifunction pins that are used to select the mode. (Ward, Tr. at 3718; RX-211 at 3-20). The top-most left diagram discloses the{ }(Ward,

Tr. at 3718; RX-211 at 3-20). The output of{ }which is an { } (Ward, Tr. at 3718; RX-211 at 3-20). Prior to the inverter the output may go off to mode control logic. This shows the{ }(Ward, Tr. at 3718; RX-211 at 3-20).

The schematic provided in the MC6801 Reference Manual shows that the device uses a passive pull-down resistor to adjust the potential on the pin. (Ward, Tr. at 3717-18; RX-211, MC6801 Reference Manual at 3-20). As with all digital logic devices, the MC6801 compares the voltage detected on the multifunction pins to a threshold voltage, satisfying the limitations of claim 3 and the logic means of claim 13 is present.' (Ward, Tr. 3648-49; RX-211, MC6801 Reference Manual at Fig. 3-5). External resistors may be connected to pins on the MC6801. (RX-211 at 3-8).

The administrative law judge finds no indication in the MC6801 that this device stores information read during{ }Hence, the administrative law judge rejects the argument that the MC6801 anticipates the claimed subject matter in issue

8. Intel's 82077SL CHMOS Floppy Disk Controller

Respondent argued that the 82077SL "anticipates, or at least renders obvious, the claims of the '341 patent." Respondent failed to provide any argument, beyond the bare assertion, or any factual or legal support for the contention that the 82077SL rendered the '341 patent obvious. Therefore, the administrative law judge rejects this contention.

The 82077SL was on sale more than one year prior to the filing date of the application that issued as the '341 patent. With respect to respondent's anticipation argument, the

82077SL has two multifunction pins, the IDENT pin, (RX-942 at 5), and the MFM pin. (RX-942 at 6). { } and 6). During{ } information for{

}

---

[52] {

}

{

}

The administrative law judge finds that respondent has not established, by clear and convincing evidence, that the 82077SL constitutes an anticipatory reference to the asserted claims of the '341 patent. Although the 82077SL has many features in common with the { } which has been found to be an invalidating reference, see supra, respondent has not shown that it has a sensing means that "provide[s] a control signal for determining an application associated with the application indication selected by a user" as required claim 1 and claims 3, 10, 11, and 12 which are dependent on claim 1. {

}

VI. Infringement

Complainants have the burden of proving, by a preponderance of the evidence, that the claims in issue are infringed by the accused products. See e.g., Conroy v Reebok International, Ltd., 14 F.3d 1570, 1573 (Fed. Cir. 1994); Braun Inc. v. Dynamics Corp., 975 F.2d 815 (Fed. Cir. 1992); Chisum, § 18.06(1). To find infringement, an accused system must

meet each claim limitation, either literally or under the doctrine of equivalents. Charles Greiner & Co. v. Mari-med Mfg. Inc., 962 F.2d 1031, 1034 (Fed. Cir. 1992). Literal infringement requires that every limitation of the claim be found in the accused device, exactly. Southwall Techs., Inc. v. Cardinal IG Co., 54 F.3d 1570, 1575 (Fed. Cir.), cert. denied, 116 S. Ct. 515 (1995). For a means-plus-function limitation under 35 U.S.C. § 112, para. 6, to read literally on an accused device, the accused device must (1) employ means identical to or the equivalent of the structures, material, or acts described in the patent specification and (2) also perform the identical function as specified in the claims. Valmount, 983 F.2d at 1042; Johnston v IVAV Corp., 885 F.2d 1574, 1580 (Fed. Cir. 1989). To be an equivalent of the disclosed means under section 112, para 6 a structure must perform the express functions. Sage Prods., Inv. v. Devon Indus., Inc., 126 F.3d 1420, 1428 (Fed. Cir. 1997).

A device that does not literally infringe a claim can infringe under the doctrine equivalents. The "doctrine of equivalents" prevents an accused patent infringer from avoiding liability for infringement by changing only minor or insubstantial details of a claimed invention while retaining the invention's essential identity. Festo Corp. v. Shoketsu Kinzoku Kogyo Mabashihi Co., 234 F.3d 558. (Fed. Cir. 2000), cert. granted, 2001 WL 378251 (June 18, 2001).

A. The '603 Patent

Complainants alleged that respondent's AC105R and AC108R series of integrated repeaters infringe claims 1-9 of the '603 patent.[53] Claim 1 of the '603 patent discloses: (1) a

[53] Complainants originally asserted claims 1-10 of the '603 patent, but have withdrawn their assertions concerning claim 10 "because the claim does not appear important to distinguish

repeater management device (2) that is capable of managing multiple repeaters, either internal or external to the device (3) solely using out-of-band communications to implement the repeater management function, to the exclusion of in-band management and (4) in accordance to IEEE 802.3 (5) and has a media access controller coupled to the repeater management means for providing signal framing of the data packets and for controlling access to the repeater data interface, as well as, (6) bridging support means coupled to the repeater management means, for receiving the data packets on the receiving port and forwarding the received data packets to the destination port in accordance with a destination address. See, Section IV(A).

Claims 2-9 of the '603 patent add the following limitations to the device claimed in claim 1: an access port for providing access to the attributes relating to the repeater functions (claim 2); wherein the bridging support means are controlled by the repeater management means (claim 3); wherein the management means has additionally a plurality of counters for traffic control (claim 4); wherein the MAC has the means to generate preambles and correcting codes, to detect error correcting codes, handling deferrals and collisions, controlling and handling back off conditions, and means for retrying data transmissions (claim 5); wherein the repeater management means has registers for storing attributes relating to repeater functions (claim 6); a media access port for providing data packets received by the media access controller via the repeater data interface to memory (claim 7); wherein the media access controller determines whether a data packet is to be sent to the bridge for forwarding to

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prior art and because time constraints prevented [complainants] from offering evidence about claim 10 at the trial." (CRBr at 15-16).

destination address or whether the data packet is to be retransmitted via the repeater data interface (claim 8); and wherein the repeater data interface comprises an inter-repeater backplane (claim 9).

1. Claim 1:

a) A repeater management device.

The AC108R series includes the AC108RM, AC108RU, and AC108RN. (Chang, Tr. at 1192). Similarly, Altima's AC105R series consists of the AC105RM, AC105RM and AC105RN. (Kubes, Tr. at 2532). For the purposes of infringement analysis,{

} (Molle, Tr. at 3337).

{

} (Chang, Tr. at 1290).

Respondent argued, based on the representations made in CX-62 and the testimony of its expert Molle, that the AC105RU, AC105RN, AC108RU and AC108RN were unmanaged repeaters and therefore outside of the investigation. (RBr at 198-99). Devices designated with the RU suffix were represented in AC108R datasheet (CX-62) as being unmanaged and nonstackable repeaters while devices with the RN suffix were represented in CX-62 as being unmanaged and stackable repeaters and the devices designated with the RM suffix were represented in CX-62 as being managed and stackable repeaters.

All of respondent's{

} (Chang, Tr. at 1238). Respondent labeled some of the{

} (Chang, Tr. at 1239). For the 108RUs and 108RNs that

respondent{

}

(Chang, Tr. at 1241).

Respondent's AC108RM, AC108RU, and AC108RN products contain{

} (Kubes, Tr. at 2532; 2534; 2614). Similarly, respondent's AC105RM, AC105RU, and AC105RN products contain{

} (Kubes, Tr. at 2532; 2534; 2614). The repeater management functionality{ } (Kubes, Tr. at 2652).

In producing respondent's AC108RM, AC108RU, and AC108RN products,{

} (Kubes, Tr. at 2614). {

}[54]

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[54] Kubes testified accordingly:

Q When the Altima 108R and 105R series of repeaters were first produced,{
}

A {

(Kubes, Tr. at 2532),{

(Kubes, Tr. at 2614); Chang, Tr. at 1242, 1245). Since, the 108RM, 108RU and 108RN, and the 105RM, 105RU, and 105RN{ }

(Kubes Dep. at 474).

Molle's testimony to the contrary -- that the AC105RU, AC105RN, AC108RU and

---

}

A I'm not sure I heard the question.

JUDGE LUCKERN: Rephrase the question. You didn't hear it or you didn't understand it?

THE WITNESS: I think I missed a part?

JUDGE LUCKERN: Let me read the question to you.{

}

THE WITNESS: {

}

BY MR. WILSON:

Q {

}

A Yes.{ }

(Kubes, Tr. at 2532) (Emphasis added.)

AC108RN are{

}

(Molle, Tr. at 3557-58). Also, Molle was not at the hearing for Kubes's testimony and had not read Kubes's deposition transcript, and therefore was unaware of Kubes' testimony on the subject. (Molle, Tr. at 3557-58).

Furthermore, as complainants correctly pointed out,{

} (CRBr at 17-18) (citing Intel Corp. v. U.S. International Trade Comm'n, 946 F.2d 821, 832 (Fed. Cir. 1991)).

Therefore, the administrative law judge finds that{

}

The AC108R and AC105R series of products are clearly devices, (Chang, Tr. at 1192; Kubes Dep. at Tr. 481), because, as Mick concluded,{

} (Mick, Tr. at 2202-03; CDX-192). The block diagram from respondent's AC108R datasheet shows repeater management ("Mgt Counter") capabilities. (CX-62). Therefore, the administrative law judge finds that the accused products are repeater management devices.

b) Capable Of Managing Multiple Repeaters

The AC108R series of products contains two repeaters, (Chang, Tr. at 1191-92;

Molle, Tr. at 3494): an internal 10Mbps repeater and an internal 100Mbps repeater. (CX-62 at 14; Chang, Tr. at 1198; Kubes Dep. at 454-55). Those repeaters conform to IEEE standards. (Kubes Dep. at 455). The repeaters in the AC108R series of products transmit an incoming packet to all outgoing ports in the same collision domain. (Kubes Dep. at 455). Respondent's products provide management for both repeaters. (Molle, Tr. at 3495).

The administrative law judge finds that the accused products are repeater management devices capable of managing multiple repeaters.

c) Implementing Full Repeater Management In Accordance To IEEE 802.3 Standard

Respondent argued that its AC108RM and AC105RM products do not implement full repeater management as mandated by the IEEE 802.3 standard. In support of that assertion, respondent pointed out that the{

} (RRBr at 114). Respondent also pointed out that complainants have not identified, either through their expert's testimony or otherwise,{

} (RRBr at 114-15).

Respondent further argued that complainants cannot rely upon the

} (RRBr at

116).

Respondent's products have{

} (Kubes Dep. at 455-56). Furthermore, respondent's products {

} (Kubes Dep. at 460). The products of respondent have management functions as defined by IEEE 802.3. (Chang, Tr. at 1199). Also, respondent's products have {

} (Chang, Tr. at 1204-06). {

}

The accused products' management functions include{

(Kubes Dep. at 456-57). {

} (Kubes Dep. at 458) Mick testified that the accused products included the required repeater management element because the first page of the AC108 datasheet (CX-62) shows a management counter which implies that it is collecting statistics. (Mick, Tr. at 2203; CDX-193). In comparing repeater management in the '603 patent to respondent's AC108R, Molle admitted that since they both provide IEEE compliant repeater management, implying a similarity in terms of the counters and registers.[55]

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[55] Molle testified accordingly:

Q Now, in comparing repeater management in the '603 patent to the Altima 108R, isn't it true that you believe that if -- that they both do the same IEEE management and that that implies similarity in terms of counters and registers?

(Molle, Tr. at 3499-00). Furthermore, Molle admitted that{

} (Molle, Tr. at 3495).

In addition, both the '603 patent and respondent's products provide{

} (Compare CX-2, col. 3, lns. 29-39 ('603 registers) with CX-62 at 31 (Altima "Repeater Configuration Register" table)). Both the '603 patent and respondent's product also use{

} (Compare CX-2 at col. 4 lns. 28-29 {

The administrative law judge finds that the{ }of products {

}[56]

A I don't see the interface, but the counters and registers are likely to be similar. (Molle, Tr. at 3499-00).

[56] Respondent also argued (RBr at 203) that its products

> do not include the same or equivalent structure for controlling and monitoring repeater functions related to the retransmission of data packets. Specifically, Altima's RM series products do not include any structure to 'snoop' an inter repeater bus in order to monitor repeater functions related to

c) External Channel For Out-Of-Band Management

Mick testified that the diagram at CX-62 at 1 shows that the AC108R series has a serial interface shown, which represents the external repeater management interface and which performs out-of-band management. (Mick. Tr. at 2203; CDX-193). Mick's conclusion is supported by Chang's testimony that{

} (Chang, Tr. at 1203-04). There is no discussion anywhere in respondent's datasheet (CX-62) of appending management information to data packets or adding management packets to the data channels. Instead, the respondent's product simply{ } (See e.g., CX-62 at 23-31).

In light of the aforementioned the administrative law judge finds that respondent's products manages repeaters{

}

---

the retransmission of data packets. (CX-2, '603 patent at col. 4, ll. 24-31)."

The portion of the '603 patent cited by respondent reads:

> A repeater data interface 210 is used by the management and address tracking function 208 as well as with the MAC 212, DMA controller 214, and FIFOs 216 for snooping the inter repeater bus.

Therefore the cited reference simply does not support respondents' contention that the ability to "snoop" the inter repeater bus is part of the repeater management means. Repeater management means is not mentioned at all, and the repeater management device (RMD) 200 is identified separately from the repeater data interface 210, management and address tracking function 208, the MAC 212, DMA controller 214, and FIFOs 216 which are described in the portion referenced by respondent as doing the "snooping".

e) Media Access Controller

The AC108R and AC105R series of products all have two MACs. (Kubes Dep. at 468; Molle, Tr. 3496). Respondent argued that these MACs{

} RBr at 205-06; CX-2 at col. 7, ln. 30.

According to the AC108R datasheet (CX-62), respondent's products "implement[] all functions of IEEE 802.3 MAC protocol." (CX-62 at 22). The two MACs of the AC 108R and AC 105R are part of the bridge, serving as the end points to the bridge, and are used to separate collision domains. (Kubes Dep. at 468; Molle, Tr. at 3496). Those two media access controllers accept packets from one repeater collision domain and optionally, transmit them on the other collision domain based on destination address. (Molle, Tr. at 3496). Respondent's MACs perform the media access function in accordance to the IEEE. (Molle, Tr. at 3497-98). { } (Molle, Tr. at 3497-98). { } (Molle, Tr. at 3497-98). Both the media access controllers in the '603 patent and the respondent's product are standard IEEE 802.3 Ethernet MACs. (Compare CX-2 at Col. 1:26-31 ('603 incorporates IEEE 802 standards) with CX-62 at 22 (the AC108R "implements all functions of IEEE 802.3 MAC protocol such as frame formatting, collision handling, etc.")).

The AC108R and AC105R media access controllers are portions of a complete IEEE 802.1d bridge. (CX-62). { } (Chang,

Tr. at 1221; 1226-27). Testifying as respondent's 30(b)(6) witness, Kubes admitted that the MACs in the AC108R and AC105R{ } (Kubes Dep. at 472). The two MACs in the AC108R and AC105R{ }(Kubes Dep. at 469). The two MACs in the AC108R and AC105R provide{ } (Kubes Dep. at 469). The MACs in the AC108R and AC105R determine whether the packet is good. (Kubes Dep. at 473). The MACs in the AC108R and AC105R provide handshake collision information. (Kubes Dep. at 473).

Mick concluded that the AC105s and AC108s MACs{

} (Mick, Tr at 2204-05). Even though respondent's RM series data sheets do not state specifically that respondent has a MAC that engages in "signal framing," CX-62 at page 22 states that the AC108's MAC implements all the functions of the 802.3 MAC protocol, and Chang specifically testified that the respondent's MAC engages in { } (Mick, Tr. at 2204-05; CX-62 at 22 ("The switch engine implements all functions of IEEE 802.3 MAC protocol such as frame formatting, collision handling, etc.")

Although Molle testified that respondent's media access controls{

}he admitted that his testimony was based on an inference about what would be best rather than what actually is.[57] (Molle, Tr. at 3498). In fact, Molle admitted not seeing

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[57] Molle testified:

Q Now, is it true that you have not seen detailed technical specifications of the inside of the Altima product?

A Yes.

detailed technical specifications of the inside of the respondent's product. (Molle, Tr. at 3498). Molle interpretted{

} (Molle, Tr. at 3311-12). Molle admitted that the best interpretation of the paragraph on page 22 of CX-6 (stating "media access control" and that the switch engine implements all functions of the IEEE 802.3 MAC protocol) is that{ } (Molle, Tr. at 3499).

Respondent further argued that the MACs in the accused devices did not satisfy claim 1 because they were not{ }Claim 1 does not require that the MACs be connected to the repeater data interface, only that they control access to the repeater data interface. Molle conceded that the two media access controllers on the accused devices form the end points of the bridge, accept packets from one repeater collision domain, and optionally, transmit them on the other collision domain based on destination address. (Molle, Tr. at 3496-97). As such the MACs control access to the repeater data interface,

---

Q And so when you gave your testimony that the Altima media access controls lacked a certain feature, that's really just an assumption?

A It was based on a - - one of the depositions that I had reviewed as well as the - - after reviewing that deposition transcript and then thinking about the nature of and 802.31d MAC bridge, that that would be the preferred way to do it.
If you don't provide an external source of sink of data packets, then there would be no advantage to doing that.

(Molle, Tr. at 3498).

whether or not they are in direct contact with it.

Therefore, the administrative law judge finds that the accused devices have MACs capable of performing signal framing and otherwise consistent with the '603 patent.

f) Bridging Support

Molle admitted that respondent's AC108R series provides a complete bridge, an IEEE 802.1 bridge, between two collision domains. (Molle, Tr. at 3496; see also Chang, Tr. at 1205). The purpose of the bridge on the AC108RM is to connect repeaters of different speeds. (Chang, Tr. at 1205). {

}(Chang, Tr. at 1209). As such, the bridge in the accused products are fully compliant with IEEE 802.1(d). (Chang, Tr. at 1206; 1209; Kubes Dep. at 464).). Mick was able to identify elements in the block diagram in CX-62 that represented bridge functionality; those being the address management SRAM controller and bridge MIB. Mick, Tr. at 2203-04).

The bridge in the AC108RM decides whether to forward packets based on the destination address in the packet. (Chang, Tr. at 1206; 1209). Both the '603 patent and respondent's product store addresses associated with their ports. (Compare CX-2 at 1:51-55, 4:54-64, 6:29-39; with CX-62 at 21-22). These stored addresses are compared to the destination address of incoming packets. (Compare CX-2 at 1:51-55, 4:54-64, 6:29-39; with CX-62 at 21-22). Based on this comparison, a packet is either "forwarded" across the bridge or "filtered". (Compare CX-2 at 1:51-55, 4:54-64, 6:29-39; with CX-62 at 21-22).

Respondent argued that because the accused products had the required "bridging support means" disclosed in the '603 patent, the accused products had full bridges, whereas, at

most the bridging support means referred to in the patent was a "half bridge." (RBr at 204-05). Respondent also claimed that the bridges in the accused products were not controlled by a CPU whereas the "bridging support means" disclosed in the '603 patent were. RBr at 204-05. Finally, respondent argued that the "bridging support means" disclosed in the '603 patent required{

} (RBr at 204-05).

The administrative law judge rejects respondent's arguments. As stated by complainants, "even if the '603 patent specified a [sic] 'half bridge,' if [the] Altima [device] has a full bridge, [the] Altima [device] would still infringe because a whole [bridge] includes two halves." CRBr at 21. Respondent also failed to provide any support or basis for its assertion that the bridges in the accused devices are not controlled by a CPU. Nor does claim 1 require the '603 patent's bridging support means be capable of performing semaphoring, rather this limitation is contained in claim 10, which complainants are no longer asserting.

In light of the aforementioned, the administrative law judge finds that the accused devices possess the required bridging support. Accordingly, the administrative law judge finds that complainants have established, by a preponderance of evidence, that respondent infringes claim 1 of the '603 patent.

2. Claim 2

Respondent's products include the required access port in the form of a serial port. (CX-62 at 10 ("Serial Management port")). Mick concluded that the products included the access port because respondent's datasheet (CX-62) talks about the serial management port, and Chang testified at the hearing that respondent's products have an HDLC port for attaching

a remote management station. (Mick, Tr. at 2205).

The CPU is connected to the AC108RM through the HDLC interface, which is also called the serial management interface. (Chang, Tr. at 1200). The user of AC108RM can set configuration parameters for repeaters through a microprocessor, then through the HDLC interface, to access the AC108RM{ } (Chang, Tr. at 1199-00). The user of the AC108R can also use the CPU to issue commands through the HDLC port to gain access to this counter data. (Chang, Tr. at 1204-05). The CPU is external to the AC108RM (Chang, Tr. at 1203), and therefore the the HDLC port is an external port. (Chang, Tr. at 1202).

Both the AC108R and AC105R have an HDLC interface, also known as a serial management interface. (Kubes Dep. at 473-75). The HDLC interface allows a user to send information to, and receive information from, management status and configuration registers of the repeaters and bridge. (Kubes Dep. at 475-76). The AC108R's and AC105R's HDLC interfaces connect to a CPU or terminal. (Kubes Dep. at 476). As stated on the front cover of respondent's datasheet, "64 and 32-bit SNMP and RMON management counters are accessible via a high-speed serial management bus." (CX-62 at 1). Furthermore, in the respondent's products, "[t]he Serial Management Interface (SMI) provides system access to the SNMP, RMON and port status registers of the device." (CX-62 at 14). This management interface is also depicted in the block diagram from the first page of respondent's datasheet ("Serial I/F" connected to "Mgt Counter"). (CX-62A; CX-62 at 1). Molle admitted that the respondent's product has a serial management interface to attach an external CPU to allow a user to have access to the repeater management function. (Molle, Tr. at 3495).

The administrative law judge finds that the accused devices possess the access port required by claim 2.

3. Claim 3

The AC108RM's serial management interface is used to{

} (Kubes Dep. at 460-61; Chang, Tr. at 1210).{ }

Kubes, Depo Tr. 459:13-17 and 20-22 and 23-24; Chang, Tr. at 1206-07; 1210). The

{

} (Kubes, Depo Tr. 459:13-17 and 20-22 and 23-24; Chang, Tr. at 1206-07; 1210).

{

} (Kubes Dep. at 459; CX-63). {

} (Kubes Dep. at 460; CX-63).

The AC108RM's serial management interface is used{

} (Chang, Tr. at 1210-11).

Accordingly the administrative law judge finds that the accused devices' bridging support means are controlled by the repeater management means as required by claim 3.

4. Claim 4

The AC108RM and AC105RM have management counters, configuration registers and status registers. (Kubes Dep. at 455-56). Accordingly, the administrative law judge finds that the accused devices' management means comprises a plurality of counters for traffic control as required by claim 4.

5. Claim 5

The accused devices' two media access controllers accept packets from one repeater collision domain and, optionally, transmit them on the other collision domain based on destination address. (Molle, Tr. at 3496) Respondent's MACs perform the media access function in accordance to the IEEE. (Molle, Tr. at 3497-98). {

} (Molle, Tr. at 3497-98). A normal component of respondent's MAC is to perform error filtering. (Molle, Tr. at 3497-98). Both the media access controllers in the '603 patent and respondent's product are standard IEEE 802.3 Ethernet MACs. (Compare CX-2 at Col. 1:26-31 ('603 incorporates IEEE 802 standards) with CX-62 at 22 (respondent 'implements all functions of IEEE 802.3 MAC protocol such as frame formatting, collision handling, etc.")).

The AC108R and AC105R media access controllers are portions of a complete IEEE 802.1d bridge. (CX-62). { } (Chang, Tr. at 1221; 1226-27). Testifying as Altima's 30(b)(6) witness, Kubes admitted that the{

(Kubes Dep. at 473). The two MACs in the AC108R and AC105R handle collision termination. (Kubes Dep. at 469). The two MACs in the AC108R and AC105R provide transmit and receive functions of packets. (Kubes Dep. at 469). { } (Kubes Dep. at 473). The MACs in the AC108R and AC105R handshake collision information. (Kubes Dep. at 473).

Respondent argued that the accused devices do not infringe upon claim 5 because they do not employ MACs that{ }and in support of this assertion

Altima relied upon the testimony of Molle. Molle admitted that he had wrote in his initial expert report "that as far as the dependent claims were understandable, they merely list features found in fundamental standards in data communications through a network." (Molle, Tr. at 3491). In light of this statement, the administrative law judge finds that the "error correcting codes" referred to in claim 5 are CRC codes. The administrative law judge further finds that the such codes are implemented by the MACs of the accused products, as it has already been determined that said MACs are fully IEEE compliant, and therefore infringe claim 5.

6. Claim 6

The AC108RM and AC105RM have{

} (Kubes Dep. at 455-56). The administrative law judge finds that the limitation of claim 6 – that the repeater management means further comprises registers for storing the attributes for repeater functions – is met by the accused products.

7. Claim 7

In the AC108R and AC105R a packet traveling from the 10 Mbps repeater to the 100 Mbps repeater would travel from the 10 Mbps repeater to the 100 Mbps MAC. (Kubes Dep. at 472). This MAC will then write the packet to a buffer. (Kubes Dep. at 472). The administrative law judge finds that the limitation of claim 7 – the media access port for providing data packets received by the media access controller via the repeater data interface – is met by the accused devices.

8. Claim 8

Complainants rely solely on the testimony of Molle to support their contention that the

accused devices infringe upon claim 8. While Molle conceded that two media access controllers on the accused devices form the end points of the bridge, accept packets from one repeater collision domain and optionally transmit them on the other collision domain based on the destination address (Molle, Tr. at 3496-97), the administrative law judge finds that this is insufficient to meet the limitation of claim 8. Claim 8 states that "the media access controller determines whether a data packet is to be sent across the bridge for forwarding to a destination address connected to the bridge port or whether a data packet is to be transmitted via the repeater data interface." While Molle's testimony supports the contention that the MACs on the accused products determine whether or not the data packet should be forwarded across the bridge, he can find no evidence of what happens with the data packets if the MACs on the accused products decide not to forward the data packets. Therefore, the administrative law judge finds that complainants have not established, by a preponderance of evidence, that the accused device infringes claim 8 of the '603 patent.

9. Claim 9

The AC108R includes two backplanes. (Chang, Tr. at 1227; CX 62 at 1 ("Two integrated back-planes, one operating at 10 Mbps and one at 100 Mbps, allow port expansion up to 288 ports.")) { } (Kubes Dep. at 478); { } (Chang, Tr. at 1227). The { }(Chang, Tr. at 1227). { } (Chang, Tr. at 1228). In the context of AC108R,{ } (Chang, Tr. at 1233). {

} (Chang, Tr. at 1236-37). When{

} (Chang Tr. at 1238). The administrative law judge finds that the accused devices have the inter repeater backplanes required by claim 9.

B. The '410 Patent

Complainants asserted that respondent's AC105RM, AC105RU, AC105RV, RC108RM, AC108RN, AC108RV, AC108RKPB and AC108SU series of products infringed claims 1-3, 7, 8, 13-19, and 23-29 of the 410 patent.[58] Insofar as claims 1-3, 7, 8, 13-19, 25, 26 and 28 have already been found to be not valid over prior art, see supra Section V B(1)(a), the infringement analyses will be conducted only for the remaining claims (i.e., claims 23, 24, 27 and 29). Dependent claims 23, 24, 27 and 29 are set out in Section IV B. supra. As set

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[58] Although complainants in their complaint, as supplemented, alleged that respondent's AC105, AC108 and AC1012 series of products infringed the asserted claims of the '410 patent, (435 Complaint at ¶8.3), in their post hearing brief complainants argued only that respondent's AC105RM, AC105RN, AC105RU, AC108RM, AC108RN, AC108RU, AC108RKPB and AC108SU series of products infringed the asserted claims of the '410 patent and made no mention of the AC1012 series of products. (CBr at 135). In the post hearing submissions, the only acknowledgment that the AC1012 was part of the investigation, as it related to the asserted claims of the '410 patent, was in respondent's post hearing brief (see, e.g., RBr at 73) and the staff's post hearing brief (SBr at 61). Moreover in complainants' rebuttal findings of fact, complainants dispute respondent's proposed finding of fact that "[c]omplainants have alleged that Altima's AC105, AC108, and AC1012 series of products infringe the Asserted Claims of the '410 patent" alleging only that Altima's 108R series, AC105R series and A08SU infringe the '410 patent without making mention of the AC1012. (CRRFF 467). Complainants, in addition to failing to make arguments in their post hearing brief concerning the AC1012's infringement of the '410 patent, only made cursory proposed findings of fact concerning the AC1012 which provided, at most, background information concerning the AC1012. (See CFF 35; 42; 44; 45; 60; 68 and 69).

forth in that section dependent claims 23, 24, 27, and 29 equate the "first distance" with the "second distance."

Respondent argued that none of the accused products (the AC105 and AC108 series of products) literally infringe any of the asserted claims of the '410 patent, including claims 23, 24, 27 and 29, because each of the accused products has a solder mask on the top and bottom of the product package, and therefore the accused products do not have an "exposed bottom external surface". The exposed bottom surface of the substrate does not "consist[ ] only of" an inner and outer array, as it consists of inner and outer array and the solder mask. The accused products do not have inner array of contact pads, but rather, in addition to an outer array of contact pads, they have a "large centrally-located metal plate" onto which solder balls can be affixed. (RBr at 73-80).

Complainants argued that the accused products do in fact consist of a substrate with an exposed external bottom surface consisting only of an inner and an outer array, because the solder mask may be part of the substrate. As stated above, see, supra, Section IV B1, the administrative law judge has already found that the solder mask is part of the substrate. Therefore the accused products' external bottom surfaces are exposed and possess two arrays of contact pads. Complainants argued that although{

} . . . . the solder mask has a series of holes in the center of the package that exposes a four by four array of circular contact pads." (CBr at 124). It is undisputed that the{

}and the solder mask defines the area on the bottom onto which the solder balls are attached. (Prince, Tr. at 3176-78). The contact pads of plastic ball grid arrays are

distinguished from the metal traces by the fact that they come into contac with the solder balls are defined by the circular openings in the solder mask. (Blanchard, Tr. at 4031-32). One of respondent's own experts admitted that the areas of the{

} For instance,{

(Pecht, Tr. at 2387) Pecht later testified, (Tr. at 2394-95):

[administrative law judge]: Now, would I be correct, in looking at the way this patent is written, that each area that contacts the solder ball is a separate contact pad, as that term is used in the patent?

[Pecht]: Normally that's the case.

In light of Pecht's testimony, the administrative law judge finds that the accused products have {

}

It is not disputed that the openings in the solder mask{

}(Prince, Tr. at 3178). There are 16 exposed openings in the solder mask{ }(Blanchard, Tr. at 2020-21). The inner array is comprised of 16 contact pads arranged in a 4x4 matrix, while the outer array of 256 contact pads is arranged in four concentric rows near the edge of the substrate. (JX-30 at 519-526). The solder balls on the accused products are arranged in same manner as the contact pads: an inner array of 16 solder balls arranged in a 4x4 pattern and an outer array of contact pads arranged in four concentric circles located on the periphery of the bottom of the package. The contact pads of the inner array are separated by a distance that is equal to the distance that the contact pads in the outer array are separated, these distances being less than the distance

which separates the two arrays. (Blanchard, Tr. at 1890-93). A solder ball is attached to each contact pad. (JX-30 at 525-26). The solder balls in the inner array are separated by a "first" distance, and the solder balls in the outer array are separated by a "second" distance, while the arrays are separated by a "third" distance. (JX-30 at 525-26). The "first" and "second" distances are equal to each other, but they are less than the "third" distance. (Blanchard, Tr. at 1891-92). {

} (Blanchard, Tr. at 1897-1902) {

}

(Blanchard, Tr. at 1897-98). The top of the substrate of the accused products have a plurality of bond pads, onto which an integrated circuit is attached. (Blanchard, Tr. at 1911-13; Chang, Tr. at 1311).

Therefore the accused products' substrate has an exposed bottom surface, which consists of only two arrays of contact pads, the distance between the contact pads in the inner array being the same as the distance between the contact pads in the outer array, but which is less than the distance between the two arrays. A solder ball is attached to each contact pad. Hence, the limitations of claim 23 are met with respect to the accused products. Additionally, the accused products have bond pads on the top surface of the substrate which are used, inter alia, to connect an integrated circuit to the top of the surface. Thus, the accused products meet the limitations of claim 24. A solder ball is connected to each contact pad, two arrays of solder balls are created, wherein the distance between the solder balls in the inner array is the same as the distance between the solder balls in the outer array, but less than the distance between the two arrays. Therefore, the accused products meet the limitations of claim 27.

Finally,{

}Thus, the limitations of claim 29 are satisfied.

Respondent argued that complainants failed to elicit any expert testimony concerning whether the accused products infringed claims 7, 8, 13-15, 19, 23-25, and 29 which included claims 23, 24 and 29 and as such failed to met their burden with respect to those claims. (RBr 74-75). Complainants argued that there was simply no authority mandating that a party has "to provide expert testimony as to the infringement of each asserted claim, individually, or that discharge of the burden of proof requires expert testimony at all " (CBr at 122-23). Respondent cited no case that mandates that a party must submit expert testimony in support of an asserted claim. To the contrary, Federal Rule of Evidence 702 makes it explicit that the use of expert testimony is discretionary. ("If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill experience, training, or education, may testify thereto in the form of an opinion, or otherwise . . . .") (Emphasis added). Moreover, the record reflects that complainants did elicit testimony from their expert witness, as well as respondents' own 30(b)(6) witnesses and expert witnesses, in support of their infringement case. For example, Blanchard testified about the solder balls located in the two arrays being separated by equal distances in the AC108 package, see supra. Such testimony is clearly applicable to each of claims 23, 24, and 29.

Based on the foregoing, the administrative law judge finds that complainants have established, by a preponderance of evidence, that the accused products infringe each of claims

23, 24, 27, and 29 of the '410 patent.

C. The '341 patent

Complainants asserted claims 1, 3, 10-13, 15, 16 and 19 of the '341 patent against respondent's AC101. Although those claims have already been found not valid, see supra Section V(C)(1), an infringement analysis will be performed consistent with the practice of this administrative law judge in other investigations. The proper claim construction of those claims has already been set forth. See supra Section IVC.

The AC101 has a multifunction pin, (Ward, Tr. at 3731), as is evidenced by CX-214 which is the data sheet created by respondent for the AC101 product, (Chang, Tr. at 1291; CX-214), which lists pin names, pin numbers, and pin descriptions for respondent's AC101 at page 12. (Blanchard, Tr. at 1524; 1525). The LEDSEL (LED Select) pin in respondent's AC101 QF/TF is listed on page 12 of the AC101 QF/TF datasheet (CX-214) as pin number 46 in the AC101 QF package. (CX-214). The LEDSEL pin of the AC101 is a multifunction pin. (Ward, Tr. at 3731). CX-214 at page 12 describes the LEDSEL pin. (Chang, Tr. at 1291).

The LEDSEL pin in respondent's AC101 is a configuration pin used to select from more than one configuration of LEDs. (Blanchard, Tr. at 1525). {

} (Ward, Tr. at 3731). {

}

(Ward, Tr. at 3732-33). {

}

(Ward, Tr. at 3681-82).

{ } is used to

{ } (Ward, Tr. at 3731). In respondent's AC101,{

}

(Blanchard, Tr. at 1524-25).

In accordance with claim 1, the LEDSEL pin is capable of{

}

(Ward, Tr. at 3609; CX-214 at 12). {

} (Chang, Tr. at 1292). {

}(Chang, Tr. at 1292).{

}(Chang, Tr. at 1295). { } the LEDSEL pin is an output pin. (Chang, Tr. at 1299). There is also no difference between the{

}(JX-15, Xi Chen, Dep. Tr. (2/26/01) at 36).[59] There is no difference between the{

} (Xi Chen, Dep. Tr. (2/26/01) at 36).

In the AC101, the means for sensing element of claim 1 is met by }

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[59] Respondent's Chen, in response to a question from counsel for complainants, "Is there any difference in the design of the {

} (JX-15 (Xi Chen Dep. (2/26/01) at 36).

{ } (Blanchard, Tr. at 530-32; 1567-68). The circuitry of the '341 patent includes a{

(Blanchard, Tr. at 1475). In the AC101, the "by means of a potential detected at a pin" language of claim 1 is met by the potential on the pad and the electrical connection between the pad and the input buffer, both which are shown{ } (Blanchard, Tr. at 1530-32; 1567-68). The operation of the LED pins during and after reset in the AC101 is summarized in the AC101 data sheet (CX-214). (Blanchard, Tr. at 1528-29). CX-214 at page 20 describes the multifunction capability of certain multifunction pins of Altima's AC101 as{

} (Blanchard, Tr. at 1528-29). {

} (Chang, Tr. at 1295-96). {

}(Chang, Tr. at 1300). When there is no

{

} (Chang, Tr. at 1302).

The LEDSEL pin also has the required "circuit means" of claim 1 and 13. The { } (Chang, Tr. at 1300; Blanchard, Tr. at 1526). On page 12 of CX-214,{

} (Chang, Tr. at 1301). On page 8 of the AC101QF/TF datasheet (CX-214), the{

}(JX-15, Xi Chen, Dep. Tr. (2/26/01) at 27; CX-214 at 8).{

} (Chang, Tr. at 1301). When the data sheet for the AC101 says "when this pin is pulled down by a 1 K ohm during reset" it is referring to

a resistor that is external to the chip that pulls the pin down to ground. (JX-15, Xi Chen, Depo. Tr. (2/26/01) at 43). The passive pull up, the P101 fixed bias transistor, is the mechanism that takes the voltage from 0 8 volts to about 3.3 volts in the LEDSEL pin. (Ward, Tr. at 3877). CX-214 at page 20 states that if a multifunction pin is pulled up during reset to select a particular function,{ }(Blanchard, Tr. at 1528-29). At the end of reset, the AC101 receives LED configuration information from { }(Chang, Tr. 1299:15-17 and 20; Ward, Tr. at 3745-50; Blanchard, Tr. 4044-46). The value read on LEDSEL pin of the AC101 causes the definition of{ } (JX-15; Xi Chen, Dep. Tr. (2/26/01) 44; CX-214 at 12).

A{ } (Ward, Tr. at 3782-83). { } allows the user of a chip the convenience of not connecting anything to the pin but still allowing a default value of one to be read. (Ward, Tr. at 3782-83). { } (Chang, Tr. at 1300; Blanchard, Tr. at 1526). { } (Chang, Tr. at 1301). The AC101 LEDSEL pin includes{ } (Ward, Tr. 3766; 3769). This{ } (Ward, Tr. at 3744; RX-268). { } (Ward, Tr. at 3769-3782).

The last element of claim 1 is met also as the sensing means is operative following a

reset and provides a control signal for determining an application associated with the application indication selected by the user. (CX-214 at 12). Therefore, the administrative law judge finds that complainants have established, by a preponderance of evidence, that the AC101 series of products infringes claim 1 of the '341 patent, assuming arguendo claim 1 is valid.

The "application sense means" element of claim 3 is met by{

} (Blanchard, Tr. at 1530; 1532; 1567-68). The voltage on the AC101 LEDSEL pin{ } (Ward, Tr. at 3731-32). The results of the{

} (Ward, Tr. at 3733-34). This value stored in{ } control LED configurations in the AC101 (Ward, Tr. at 3734). The LED select configuration of the AC101 occurs after{ } (Ward, Tr. at 3745-76). The value on the LEDSEL pin{

}(Ward, Tr. at 3745-46, 3749, 3750; Blanchard, Tr. at 4044-46). {

} (CX-1468). CX-1468 is a diagram drawn by Mr. Xi Chen, an Altima employee, during his Rule 30(b)(6) deposition. (Blanchard, Tr. 1539-40; CX-1468). CX-1468 shows circuit block{

} (Blanchard, Tr. at 1542; CX-1468). The pad shown on the{

} (Ward, Tr. at 3769-70; Xi Chen, Dep. Tr. (4/12/01) at 25-26). During reset of the AC101,{

} (Xi Chen, Dep. Tr. (2/26/01) at 61).

The general structure shown in either diagram of CX-299{

} (JX-15, Xi Chen, Dep. Tr. (2/26/01) at 70). CX-299 shows{

} (JX-15, Xi Chen, Dep. Tr. (2/26/01) at 70). The

{ }(JX-15, Xi Chen, Dep. Tr. (2/26/01) at 70). The input

{

} According to the published specs on page 33 of the data sheet (CX -214), high voltage is considered to be above 2.0 volts. When the input voltage to the LEDSEL pin is less than 0.8, then it's considered low voltage, it's considered zero. Between 0.8 to 2.0, it's unknown. (JX-15, Xi Chen, Dep. Tr. (2/26/01) at 99-102). If the voltage that the AC101 reads on LEDSEL pin is higher than a high threshold, the AC101 reads a digital one. (Chang, Tr. at 1300). If the voltage that the AC101 reads on its LEDSEL pin is lower than a low threshold, the AC101 reads a digital zero. (Chang, Tr. at 1300). The AC101 determines the logic level on its LEDSEL pin by comparing the voltage on the pin to a threshold or thresholds. (Chang, Tr. at 1300). One of the functions of the{

} (JX-15, Xi Chen Dep. Tr. at 102). Another function is to determine if the voltage is less than 0 8 volts. (JX-15, Xi Chen Dep. Tr. at 102). Therefore, the complainants have established, by a preponderance of evidence, that AC101 infringes claim 3, assuming arguendo claim 3 is valid.

The data sheet for the AC101 state that "when this pin [referring to the LEDSEL pin] is pulled down by a 1 K ohm during reset" it is referring to a resistor that is external to the chip

that pulls the pin down to ground. (JX-15, Xi Chen, Dep. Tr. (2/26/01) at 43). The passive

{

} (Ward, Tr. at 3877). An external 1 K ohm pull down on the LEDSEL pin of the AC101 will affect the LEDBTA pin. (JX-15, Xi Chen, Dep. Tr. (2/26/01) at 43-44). On CX-214, the AC101 data sheet, at page 12 states that when the LEDSEL pin is pulled down by a 1 K ohm external resistor during reset, the device becomes configured to use the advanced LED selection. (Blanchard, Tr. at 1560-61; CX-214 at 12). Therefore the AC101 uses an external pull down resistor to adjust the potential on the LEDSEL pin and as such complainants have met their burden in establishing, by a preponderance of evidence, that the AC101 infringes claim 10, assuming arguendo claim 10 is valid.

On CX-214, the AC101 data sheet, at page 12 states that when the LEDSEL pin is pulled down by a one K ohm external resistor during reset, the device becomes configured to use the advanced LED selection. (Blanchard, Tr. at 1560-61; CX-214 at 12). The AC101

{

} (Blanchard, Tr at 1565; CX-214 at 12). Therefore, complainants have established, by a preponderance of evidence that the AC101 infringes claim 11 of the '341 patent, assuming arguendo claim 11 is valid.

Pin 46 may be left floating, as required by claim 12 of the '341 patent. (Blanchard, Tr. at 1608-09; CX214 at 12). Hence, it is established that the AC101 infringes claim 12 of the '341 patent, assuming arguendo claim 12 is valid.

As required by claim 13, the AC101 has an "application sense pin" that can select one

of 2^N applications at reset unrelated to its non-reset function, in that the "N application sense pins" element of claim 13 is met by the LEDSEL pin and its associated pad. (Blanchard, Tr. at 1530; 1532; 1567-68).; See also, supra. As described for the infringement analysis for claim 1, the LEDSEL has the circuit means required by claim 13. See supra. The AC101 also has the logic means required by claim 13 for comparing the potential on the LEDSEL pin with a threshold value. See supra. As described in the analysis for claim 1, the LEDSEL pin has an application select means capable of selecting one of 2^N applications in response to the comparison of the potential on the LEDSEL pin with the threshold value and the application being determined by a binary logic level at the LEDSEL pin. See supra. Therefore, complainants have established, by a preponderance of evidence, that AC101 infringes claim 13, assuming arguendo claim 13 is valid.

As with claim 11, the AC101 has{ }as required by claim 15, see supra, and therefore complainants have established that claim 15 is infringed by the AC101, assuming arguendo the validity of claim 15. (Blanchard, Tr. at 1608; CX-214 at 12). Similarly, as with respect to claim 17 the LEDSEL pin can be left floating, i.e. left unconnected, see supra, therefore, complainants have established that the AC101 infringes claim 16, assuming arguendo the validity of claim 16. As discussed with respect to claim 10, an external pull down resistor may be used to adjust the potential of the LEDSEL pin, see supra, therefore the AC101 infringes claim 19, assuming arguendo the validity of claim 19.

Respondent argued that its AC101 does not infringe the asserted claims, assuming arguendo the validity of the asserted claims, because the AC101's circuitry is different from that of the '341 patent in that AC101's{ }

the '341 patent. The{

} (Ward, Tr. at 3737). The{

} (Ward, Tr. at 3737).

{

} (Ward, Tr. at 3738:10-14; CX-1468C, CX 1470C).

In{

}

(Ward, Tr. at 3738). {

} (Ward, Tr. at 3740-43; CX-1468C, CX1470C. CDX-63C and CDX66C). In the{ }

(Ward, Tr. 3740-43). The{

} (Ward, Tr. at 3745). That value is loaded in through the{

} (Ward, Tr. at 3745). As in the '341 patent, immediately following reset, the value on the LEDSEL pin{ } (JX-15, Xi Chen Dep. Tr. at 41; Ward, Tr. at 3745-46; 3749). This value is stored{ } and will effect the LED module behavior. (JX-15, Xi Chen Dep. Tr. at 106). The{

} (JX-15, Xi Chen Dep. Tr. at 105-06). The{

} (Ward, Tr. at 3744).{

}(Ward, Tr. at 3744). { } (JX-

15, Xi Chen Dep. Tr. at 106). The{ } (JX-15, Xi Chen Dep. Tr. at 106). { } (JX-15, Xi Chen Dep. Tr. at 106).[60] After the LEDSEL pin is sampled{ } (JX-15, Xi Chen Dep. Tr. at 41; Ward, Tr. 3745-46; 3749). An intended use of the LEDRX pin on the AC101 is that it would be connected to an LED,{ } (JX-15, Xi Chen Dep. Tr. at 42).

The '341 patent discloses a flip flop, which is a single bit storage device capable of storing a one or a zero. (Ward, Tr. at 3642-44). The flip flop has a D input or data input. (Ward, Tr. at 3642-44). The output of the flip flop, marked OT in figure 8 of the '341 patent, produces the voltage that is sensed on the pin during the reset interval, and routes it into the D input of this flip flop. (Ward, Tr. at 3642 44). The flip flop has a data input and a clock input. (Ward, Tr. at 3642-44). The data input of the flip flop tells the flip flop what data is to be stored in the flip flop's one bit storage element. (Ward, Tr. at 3642-44). The clock input tells the flip flop when to store data. (Ward, Tr. at 3642-44). Therefore the circuitry of the '341 patent includes a two input flip flop latch that receives LED configuration information on one input, and a reset signal on the other input, (Blanchard, Tr. at 1475), while the AC101 includes{ } (Ward, Tr. at 3687-88; 3735-38).

The administrative law judge finds that the D flip flop in the '341 patent is a two input

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[60] Respondent's expert, Ward, testified that the "reset"that Chen referred to as being { } (Ward, Tr. at 3744). Chen did not make any such distinction in his deposition testimony. See JX-15.

flip flop whereas{ } However, he further finds that analysis of{ } Even respondent's own expert, Ward, admitted that it would be reasonable to conclude that structure disclosed by '341 patent is equivalent to the corresponding structure of the AC101. (Ward, Tr. at 3682-83).

In its rebuttal brief, respondent argued that the AC101 did not infringe the '341 patent, assuming arguendo the validity of the asserted claims, because, inter alia,{ } Ward's admission (Tr. at 3682-83, see supra) is applicable to the{ } The LEDSEL's {

} (Blanchard, Tr. at 1952). Thus, the respondent's{

} (RX-267 at ALJT30288.3-84.{

}Blanchard, Tr. at 1952, 2017-19; Ward, Tr. at 3771-72).

A{ } Both perform the same function of establishing a default condition, the only difference being that during the non-reset period there will be some slight and insignificant amount of current flow through the { } However, the administrative

law judge {

VIII 35 U.S.C. §112 Defenses

A. '341 Patent

1. Written Description And Means Requirements

Respondent argued that the asserted claims are invalid for failure to comply with the definiteness requirements of 35 U.S.C. §112, para. 2 (written description) and para. 6 (means).[61] It was argued that while independent claims 1 and 13 require the presence of a "circuit means" for internally adjusting the potential of the sensing pin, or in the case of claim

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[61] Section 112, paragraph 2, reads, in relevant part:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Section 112, paragraph 6 reads as follows:

> An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, materials or acts described in the specification and equivalents thereof.

13, the potential of the N pins, there is no description in the specification of the '341 patent of any structure that can be used to perform this particular function. It is argued that the '341 patent fails to provide an adequate disclosure of structure that can perform all the recited functions of the "circuit means"; that while Figure 8 of the '341 patent shows that use of D flip flop 412 to store a bit representing the value sensed on a pin during the reset interval and the '341 patent also discloses that the data to be output from the pin after reset is provided to the block 402 through line 438, the '341 patent fails to disclose any circuitry between flip flop 412 and block 402, and fails to explain how any information provided by the flip flop is actually used to adjust the potential on the pin in response to the previously detected potential. Hence respondent argued that there is nothing in the specification of the '341 patent that describes any structure for accomplishing the recited function of internally adjusting the potential of the pin "in response to the detected potential." Respondent further argued that the indefiniteness of the claims of the '341 patent is compounded by the fact that the specification refers only to undefined "internal pull down" currents, such as the "internal pull down 14" shown in FIGURE 2 and current flow is not a structure; that mere reference to "pull down" is not a description of a particular structure, and the elements of FIGURES 2, 3 and 4 denoted 114, 124 and 134 would not disclose any structure to a person of ordinary skill in the art' and that symbols used in the figures of the '341 patent to denote a "current source" (or sink) are merely functional designations. (RBr at 136-38).

Complainants argued that respondent's arguments assume that the administrative law judge accepts the "arbitrary and tenuous claim construction" that respondent has advanced regarding the "circuit means" limitation for which respondent proposed that the "circuit

means" limitation requires a complex feedback relationship between the potential detected at the multifunction pin and mechanism for adjusting that potential, and that respondent's proposed construction was set up for the purpose of arguing that the '341 patent lacks sufficient disclosure to support respondent's proposed construction. (CRBr at 73-77).

The staff argued that the record evidence makes clear that one of ordinary skill would know how to construct an input/output pad in accordance with the teachings of block 402 in FIGURE 8 and associated figures, including being able to understand that use of the current source symbols in FIGURES 2, 3, 4 and 5(a)-(b) indicate that pull downs and pull ups are to be used. (SBr at 94-95).

The administrative law judge rejects respondent's arguments. See Section IVC2. The "in response to the detected potential" language of claim 1 relied upon by respondent, in support of its argument, merely refers to the fact that an internal pull down will result in a higher or lower potential at the pin over time, depending on the applied potential. (Ward, Tr. at 3784-85).

2. Definiteness Requirement

Respondent argued that claim 1 and dependent claims 3 and 10-12 are invalid because the specification fails to provide an adequate written description of the invention , as required by 35 U.S.C. §112, para. 1.[62] It is argued that claim 1 contains the element of a "circuit means for internally adjusting the potential of the pin in response to the detected potential";

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[62] Section 112, paragraph 1, reads, in relevant part:

[T]he specification shall contain a written description of the invention

and that there is nothing in the specification that includes a description of any structure that will perform the specific function of internally adjusting the pin potential in response to the detected potential. Respondent also argued that claim 13 includes a clause requiring N application pins "for selecting one of N^2 applications," and a requirement of an "application select means . . . for selecting one of the N^2 applications . . ."; that the specification contains no description of how the application sense pins or application select means of claim 13 can be used to choose from among N^2 applications; that to the extent there is any description of choosing applications, it is a choice from among 2^N applications; and that N^2 and 2^N are two completely distinct mathematical values, and a description of how to choose one from 2^N applications is not a description of how to choose one from N^2 applications. (RBr at 139-40).

Complainants argued that while respondent argued its tenuous complex feedback loop construction of the "circuit means" limitation and then argued that the '341 patent does not support its "wild construction," the '341 disclosure does not support respondent's construction of the "circuit means" limitations. It is argued that the result is not that the '341 claims are invalid but rather that the "correct result" is that respondent's construction should be rejected. (CRBr at 77-78). Complainants further argued the transposition of N^2 and 2^N is the kind of obvious error that one of ordinary skill recognizes as an obvious mistake, and that respondent's expert Ward admitted that one of ordinary skill would recognize that N^2 is an obvious error and should be 2^N, citing Tr. at 3722. (CRBr at 78).

The staff argued that one of ordinary skill would know that one of the N^2 pins cannot be selected from N pins based merely upon his or her knowledge; that the specification of the '341 patent correctly and expressly describes the operation of a binary select when multiple

pins are used thereby leading one to the conclusion that the use of N^2 in the claim was erroneous; and that a review of the claims depending from claim 13 further confirms that 2^N should be used. (SBr at 95).

The administrative law judge rejects respondent's arguments. See Section IV(C)(2),(3), and (4). supra.

VIII. Domestic Industry

A. The '410 Patent

Respondent argued that complainants cannot show that their product, used to show domestic industry practices, the claims of the '410 patent, either literally or under the doctrine of equivalents; and that while Intel relies on the 82371EB ("371EB") PCI to ISA Bridge and 82443BX ("443BX") Host Bridge, which are BGA-packaged chips of the 62440BX chipset product to satisfy the domestic industry requirement, neither package is covered by any of the asserted claims of the '410 patent. It was argued that all asserted claims require a substrate having a top surface and an uncovered external bottom surface and recite a substrate with a "consisting only of" transition and hence the uncovered external bottom surface of the substrate must include only an outer array of contact pads or solder balls, and a center array of contact pads or solder balls. It was argued that each of the 443BX package and the 371EB package includes a solder mask on their respective bottom surface; that as a result the Intel 443BX package does not have an "exposed external" bottom surface of a substrate and also does not "consist only of" the arrays, as claimed in the '410 patent; and that, therefore, complainants have failed to sustain their burden of demonstrating the existence of a domestic industry with respect to the '410 patent. (RBr at 84).

Complainants argued that respondent's argument is identical to its non-infringement argument and that for the same reasons respondent is wrong about infringement, it is wrong about domestic industry. (CRBr at 126).

The staff argued that the presence of solder mask on the bottom of the package of Intel's "8443" BX Host Bridge/Controller is the sole basis for respondent's contention that said product does not practice any claims of the '410 patent; and that since the term "substrate," when properly construed, encompasses the presence of solder mask, the Intel "8443" BX product practices claim 1 of the '410 patent. (SBr at 105).

The administrative law judge finds that complainants have established a domestic industry with respect to the '410 patent. {

}

40BX-CR (CPX-52; Jamieson, at Tr. at 1147-48). Intel's 82443BX is packaged in a ball grid array package. (CPX-52; Blanchard, Tr. at 1889-90, 93). CX-1055C is a set of drawings that shows the substrate designs for the 440BX and 440BX-CR. (Jamieson, Tr. at 1149-50). Intel's 82443BX uses the package footprint depicted at LOC031289 of CX-1055C. (Jamieson, Tr. at 1151). {

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Intel's 82443BX comprises a substrate, bond wires, an inner and an outer array of solder balls, a molding compound or encapsulent, and an integrated circuit. (CPX-52; CX-1055C; Blanchard, Tr. at 1889-90, 93; Jamieson, Tr. at 1162; 1158-59). The BGA packages of Intel's 82443BX has a bulls-eye solder ball pattern. (CPX-52; CX-1055C at LOC031276, 287, 289; Blanchard, Tr. at 1889-90, 93).

The solder balls on Intel's 82443BX are arranged in two arrays, a center array and an outer array. (CPX-52; CX-1055C at LOC031276, 287, 289; Blanchard, Tr. at 1889-90, 93). The center array of solder balls on Intel's 82443BX is separated from the outer array by a region with no solder balls. (CPX-52; CX-1055C at LOC031276, 287, 289; Blanchard, Tr. at 1889-90, 93). The substrate of Intel's 82443BX comprises a top surface on one side, and an exposed external bottom surface on the other side. (CPX-52; CX-1055C. Blanchard, Tr. 1889-90, 93). The substrate of Intel's 82443BX comprises vias that extend through the substrate, connecting the top and internal metal layers, if any, with the bottom metal layer (including the contact pads). (CX-1055C at LOC031270, 81; Jamieson, Tr. at 1161; Blanchard, Tr. at 1889-90, 93). The exposed external bottom surface of Intel's 82443BX comprises a solder mask layer with circular openings that expose circular areas of the conductive materials in the underlying bottom metal layer of the substrate (CPX-52; CX-1055C at LOC031276, 287; Blanchard, Tr. at 93; Jamieson, Tr. at 1158-59, 1162). The

arrays of contact pads in Intel's 82443BX are defined by the pattern of circular holes in the bottom solder mask layer of the substrate (CX-1055C at LOC031276, 287, CPX-52; Blanchard, Tr. at 1889-90, 93). The exposed external bottom surface of Intel's 82443BX is not covered by encapsulent or molding compound, or any other substance. (CX-1055C, CPX-52; Blanchard, Tr. at 1889-90, 93). The exposed external bottom surface of the substrate of Intel's 82443BX consists only of two arrays of contact pads. (CX-1055C, CPX-52; Blanchard, Tr. at 1889-90, 93). The contact pads in the outer array of Intel's 82443BX are separated from each other by a "first distance." (CX-1055C at LOC031276, 287, 289, CPX-52; Blanchard, Tr. at 1889-90, 93). The contact pads in the inner array of Intel's 82443BX are separated from each other by a "second distance." (CX-1055C at LOC031276, 287, 289; CPX-52; Blanchard, Tr. at 1889-90, 93). The inner array of contact pads on Intel's 82443BX is separated from the outer array by a third distance which is greater than the first and second distances. (CX-1055C at LOC031276, 287, 289; CPX-52; Blanchard, Tr. at 1889-90, 93). The first and second distances between the contact pads in Intel's 82443BX are equal. (CX-1055C at LOC031276, 287, 289; CPX-52; Blanchard, Tr. at 1889-90, 93). Therefore the 82443BX practices claim 23 of the '410 patent.

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A solder ball is attached to each contact pad on the bottom surface of the substrate of Intel's 82443BX. (CX-1055C at LOC031276, 287, 289, CPX-52; Blanchard, Tr. at 1889-90, 93). The solder balls of Intel's 82443BX consist only of two arrays of solder balls, an inner array, and an outer array. (CX-1055C at LOC031276, 287, 289, CPX-52; Blanchard, Tr. at 1889-90, 93). The solder balls in the outer array of Intel's 82443BX are separated from each other by a "first distance." (CX-1055C at LOC031276, 287, 289, CPX-52; Blanchard, at Tr. 1889-90, 93). The solder balls in the inner array of Intel's 82443BX are separated from each other by a "second distance." (CX-1055C at LOC031276, 287, 289, CPX-52; Blanchard, Tr. at 1889-90, 93). The inner and outer arrays of solder balls on Intel's 82443BX are separated from each other by a third distance that is greater than the first and second distances. (CX-1055C at LOC031276, 287, 289, CPX-52; Blanchard, Tr. at 1889-90, 93). The first and

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}

second distances between the solder balls on Intel's 82443BX are equal. (CX-1055C at LOC031276, 287, 289, CPX-52; Blanchard, Tr. at 1889-90, 93). In Intel's 82443BX, the distance between the solder balls in the outer array is equal to the distance between the solder balls in the inner array. (CX-1055C at LOC031276, 287, 289, CPX-52; Blanchard, Tr. at 1889-90, 93). Therefore the 82443BX practices claim 27 of the '410 patent.

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Therefore the 82443BX practices claim 29, as the dimensional profile of the integrated circuit of the 82443BX lies between the inner and outer array of solder balls. (Blanchard, Tr. at 1919:16; CDX-126; CPX-52; CX-1055).

Respondent argued that the 82443BX did not practice any of the claims of the '410 patent because the 82443BX did not have an exposed bottom surface consisting only of two arrays of contact pads or solder balls, because of the presence of a solder mask on the bottom surface. (RBr at 84). This argument is rejected, in light of the administrative law judge's earlier finding that the solder mask is part of the substrate. See supra Section IV(B)(1).

B. The '603 Patent

Respondent argued that the LXT980, LXT9860, and LXT9880 products that complainants relied upon to satisfy the economic prong of the domestic industry requirement do not practice any claims of the '603 patent. Respondent further argued that if the claims of the '603 patent are given respondent's claim interpretation, then respondent would not contest

that the LXT930 practices at least claim 1 of the '603 patent although it argued that complainants cannot agree to respondent's interpretation because that would establish that the AC108RM product does not infringe any claim of the '603 patent. It is further argued that complainants have not demonstrated that the{ } boards satisfy either the economic or technical prong of the domestic industry requirement.[64] (RBr at 231-241).

Complainants argued that Level One practices the '603 patent with its LXT980 and LXT98x0 products by inducement and that the data sheets and design guides for the LXT980 and LXT98x0 show customers how to build single boards that practice the '603 patent using the LXT980/LXT98x0 and a bridge chip. It is argued that Level One grants said customers an implied license to practice the '603 patent using the LXT980/LXT98x0 and receives a built-in royalty as part of the purchase price of those products. Regarding respondent's technical prong arguments, complainants argued that the arguments were the same as respondent's non-infringement arguments. (CRBr at 25-29).

The staff argued that the evidence shows that Level One's LXT930, LXT980 and LXT98x0 products practice at least claim 1 of the '603 patent and that "Level One-designed boards . . . practice the '503 patent." (SBr at 103).

The administrative law judge finds that complainants have established the existence of a domestic industry with respect to the '603 patent. Thus, the record shows that Level One encouraged customers of the LXT980 and LXT98x0 to practice the '603 patent. CX-614 is the

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[64] Respondent noted that Order No. 29, which involved the economic prong of the domestic industry requirement, only addressed the LXT980, LXT9860, and LXT9880 products themselves and did not address the Cisco and Hewlett Packard boards.

data sheet for the LXT980 managed repeater. (Holland, Tr. at 582; CX-614; Feuerstraeter, Tr. at 338-39). CX-829 is the data sheet for the LXT98x0 family of managed repeaters. (Holland, Tr. at 582; CX-829). The LXT98x0 family includes the LXT9860 and LXT9880 managed repeaters. (Holland, Tr. at 582; CX-829). The LXT9860 and LXT9880 have the same functionality, but the LXT9880 has eight twisted pair ports and the LXT9860 has six twisted pair ports. (Holland, Tr. at 582). Holland has assisted customers in their design of applications involving bridged, dual-speed, managed stackable repeaters. (Holland, Tr. at 582). The major customers that Holland assisted in designing these bridged, dual-speed, managed, stackable hubs include{ } (Holland Tr. at 582-83.0). Figure 14 on page 41 of CX-614 refers to the typical bridged, dual-speed, managed repeater application that Holland assisted customers in designing. (Holland, 583; CX-614). Figure 14 on page 41 of CX-614 shows four LXT980s broken up as two stacked repeater boxes with two LXT980s in each box. (Holland, Tr. at 588; CX-614). The bridge chip in the left box is connected between the two LXT980s to bridge between the 10 and 100 mega bit segments and a serial controller chip connected to the two stacked boxes to gain access to management. (Holland, Tr. at 588; CX-614).

Figure 18 of CX-829 shows a single LXT9880 with a bridge chip between the two MII ports to bridge between the 10 megabit and 100 megabit segments and a serial controller chip connecting to the serial port to access the management functionality. (Holland, Tr. at 590; CX- 829). Figure 19 of CX-829 shows four LXT9880s with a bridge chip connecting between the MII ports of two LXT9880s to bridge between the 10 megabit and 100 megabit segments, and a serial controller chip connecting the serial ports of all of the chips together, to gather the

management statistics. (Holland, at 590; CX-829). Level One also publishes an application note (CX-780) describing how to design an application using an LXT980 managed repeater with a Galileo GT 48006 bridge. (Holland, Tr. at 593; Feuerstraeter, Tr. at 338-39). Holland, as an applications engineer, has assisted customers in implementing designs described in CX-780. (Holland, 593). Figure 1 of CX-780 shows an application using four LXT980s, which provide repeater management and 16-ports, and the Galileo GT 48006 bridge chip, which bridges between repeaters in the LXT980 operating at 10 or 100 megabits. (Holland, Tr. at 593; CX-780). {

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The figure also shows a connection with an inter-repeater back plane between the two LXT980s. (Feuerstraeter, Tr. at 342-43). This entire design provides a complete solution including 10 meg repeater, 100 meg repeater, bridging and repeater management across multiple ports. (Feuerstraeter, Tr. at 342-43).

The purpose of CX-614 and CX-780 is to assist Level One customers in the design of their box or system. (Feuerstraeter, Tr. at 339-40). In this case, the meaning of "box" or a "system" is what the customers sell. (Feuerstraeter, Tr. at 339-40). So in the case of the CX-614 this document is what a customer would use to actually go about designing their end product. (Feuerstraeter, Tr. at 339-40). The connection between the LXT980 and the GT 48006 in CX-780 is depicted as a single board. (Feuerstraeter, Tr. at 443).

Holland testified that it was preferable to put the LXT980 or LXT98x0 repeaters and a bridge on the same board; as putting the LXT980 or LXT98x0 repeaters and a bridge on the same board, obviates the need to include connectors for connecting boards interfacing the

repeaters to the board containing the bridge. (Holland, Tr. at 611). Connectors that interface between boards cause signal degradation when a signal passes through the connector; but putting the LXT980 or LXT98x0 repeaters and a bridge on the same board, obviates the need to put a driver circuit on a board to provide signal strength sufficient to drive the signal across the connector. (Holland, Tr. at 611).

Of the boards built by Level One customers incorporating the LXT980 and LXT98x0, complainants specifically rely upon{

} as boards practicing the '603 patent. CPX-68 is a 12-port dual-speed, bridged, stackable managed repeater; CPX-69 is a 24-port version of the same platform as CPX-68, a dual-speed, bridged, stackable managed repeater. (Holland, Tr. at 601-02). Holland is familiar with CPX-68 and CPX-69 because he worked with Cisco on the design review and layout review for these products. (Holland, Tr. at 600-01). Since joining Level One in June of 1998, Holland has been an applications engineer. (Holland, Tr. at 580-81). Holland's role as an applications engineer was to aid customers in designing in Level One's managed repeaters, LXT980 and the LXT98x0, into their final product (customer applications) and to debug any issues with those applications. (Holland, Tr. at 581).

The bridges and the LXT980s in CPX-68 and CPX-69 are contained on a single board. (Holland, Tr. at 606). Mick testified that the printed circuit board and the contents thereof in CPX-68 practice the '603 patent, because the primary printed circuit board of CPX-68 contains all elements or components of claim 1. (Mick, Tr. at 2211-13). Mick also bases his opinion on his knowledge of Level One literature regarding how to design products around the Level One LXT980. Mick, Tr. at 2211-13). The primary circuit board in CPX-68

is a single circuit board. (RRCFF 2019). CX-937 shows schematics for a 24-port, dual-speed, bridged, managed, stackable repeater. (Holland, Tr. at 607; CPX-937). The{ } design shown in CX-937 is contained on a single board because the schematic shows no other connectors for joining additional boards. (Holland, Tr. at 610-611). Page 22 of CX-937 shows that the Galileo GT 48006 bridge is incorporated in this{ }design. (Holland, Tr. at 609; CPX-937). Therefore, as there is no dispute that a single circuit board constitutes a device, the{ } boards relied upon by complainants constitute single devices.[65]

CPX-68 includes three LXT980 managed repeaters, and CPX-69 includes six LXT980 managed repeaters. (Holland, Tr. at 605-06). CPX-68 and CPX-69 also include a Galileo 48006 bridge chip. (Holland, Tr. at 606). Mick testified that CPX-68 and CPX-69 are repeater management devices for communication networks, the repeater management device controlling repeaters and routing data packets between a receiving port and a destination port. (Mick, Tr. at 2211; 2213). Pages 13, 14, and 15 of CPX-937 show three LXT9880 managed repeaters in this{ } design. (Holland, Tr. at 609; CPX-937). As such these boards

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[65] Respondent's expert witness Molle testified (Tr. at 3344-45):

> Q Dr. Molle, have you considered whether the LXT980 practices the claims of the '603 patent?
>
> A Yes, I have.
>
> Q What is your opinion?
>
> A If -- I could imagine a board that had an LXT980 together with other components that one could design such a board to have an interface connection to the rest of the system that would be similar to what is described in the '603 patent. [Emphasis added]

manage multiple repeaters as required by the preamble to claim 1.

The{ } boards, CPX-68 and CPX-69 include the repeater management means of claim 1 because they include LXT980s. (Holland, Tr. at 605). The design for the{ } boards, CX-937C, includes LXT9880s which also has the repeater management means required by claim 1. (Holland, Tr. at 607-609). The LXT980 data sheet demonstrate that this product has repeater management means for controlling and monitoring repeater functions related to the retransmission of the data packets and for providing status of and control over repeater functions via an external repeater management interface. (CX-614; CX-829; Mick, Tr. at 2214-15). Feuerstraeter testified that the LXT980 includes repeater management as defined by IEEE 802.3. (Feuerstraeter, Tr. at 444). The LXT 980 and the LXT98x0 are managed repeaters. (Holland, Tr. at 581-82). Mick testified that the LXT980 includes the repeater management of claim 1. (Mick, Tr. at 2214).

The LXT980 and LXT98x0 data sheets describe the management functionality for "controlling and monitoring repeater functions related to the retransmission of the data packets and for providing status of and control over repeater functions." (CX-614 at 1; CX-829 at 1). The data sheets state these products "support[] SNMP and RMON management via on-chip 32- and 64-bit counters. The counters and control information are accessible via high speed Serial Management Interface (SMI)." (CX-614 at 1; CX-829 at 1). The data sheets also state in the "Management Support" section, "Configuration and Status: The LXT980[/LXT98x0] provide[] management control and visibility of the following functions:" and then list various events for which status information can be obtained. (CX-614 at 20; CX 829 at 31).

The LXT980 and LXT98x0 data sheets describe the serial management interface, which

is the "external repeater management interface." (CX-614 at 1; CX-829 at 1; Mick, Tr. at 2214-15). The data sheets state that the management "counters and control information are accessible via a high-speed Serial Management Interface (SMI)" (CX-614 at 1; CX-829 at 1; Mick, Tr. at 2214-15).

Mick also testified that the LXT980 includes an external repeater management interface based on his review of the LXT980 data sheet and from the physical instantiation of the interface through the connector on CPX-68. (Mick, Tr. at 2214-15). From Mick's review of the data sheet, Mick also concluded that the LXT980 provides out of band management. (Mick, Tr. at 2214). Feuerstraeter also explained that the LXT980 provides out-of-band management. (Feuerstraeter, Tr. at 443-45). Referring to CX-614, the LXT980 data sheet, the block diagram on the first page shows blocks labeled "ENET" and "PHY" that, in general, are ports through which packets travel. (Feuerstraeter, Tr. at 443-45). The serial port depicted on the block diagram allows access to the repeater management as defined in 802.3. (Feuerstraeter, Tr. at 443-45). The data packets going through the PHY port, are in-band packets because they are in the communications channel. (Feuerstraeter, Tr. at 443-45). Management information traveling via the serial management port is out-of-band because it travels outside the communication channel. (Feuerstraeter, Tr. at 443-45).

Holland further confirmed the LXT980 and LXT98x0 provide out of-band management. (Holland, Tr. at 603). On the back of CPX-68 and 69 is a console port which is used to connect these boxes to a management agent for gathering the statistics from the logical repeater in an out of band fashion. (Holland, Tr. at 603). Holland also identified the serial management bus on the{ }containing the LXT98x0, as being for out-of-band

management. (Holland, Tr. at 610).

Mick testified that CPX-68 and CPX-69 include repeater management means for controlling and monitoring repeater functions related to the retransmission of the data packets and for providing status of and control over repeater functions via an external repeater management interface, as required by claim 1. (Mick, Tr. at 2014-15).

Accordingly, a single LXT980/LXT98x0 board containing the Galileo GT-48006, such as the{ }practices the repeater management element of claim 1.

The{ }boards, CPX-68 and CPX-69 both include a Galileo 48006 bridge chip. (Holland, Tr. at 606). As for the{ }design, page 22 of CPX-937 shows that the Galileo GT 48006 bridge is incorporated in this{ }design. (Holland, Tr. at 609; CPX-937). Holland is familiar with the Galileo GT 48006 bridge based on his evaluations of the Galileo bridge. (Holland, Tr. at 594). To evaluate Galileo GT 48006 bridge,{

} Mick's basis for concluding that the product has the bridging support required by claim 1 was that the board has on it a Galileo GT-48006 chip, and Mick knew from review of the previous documents that that is a bridging chip.

(Mick, Tr. at 2215).

Level One teaches its customers how to bridge its LXT980/LXT98x0. (Holland, Tr. at 593). Table 1 of CX-780 shows the interconnection between the Galileo GT 48006 bridge and the LXT980. (Holland, Tr. at 593). The left-hand column of Table 1 of CX-780 shows which pins the GT 48006 are interfaced to which pins of the LXT980. (Holland, Tr. at 593; CX-780). For instance, in the first row of the left hand column shows that pin 66 of the Galileo bridge is interfaced to pin 29 of the LXT980. (Holland, Tr. at 593; CX-780). CX-780 shows the customer how to interface the pins of the LXT980 with the pins of the Galileo bridge. (Holland, Tr. at 593; CX-780). Page 6 of CX-780 is a schematic representation of a table for connecting the Galileo GT 48006 bridge with two LXT980s. (Holland, Tr. at 594; CX-780).

Therefore an LXT980/LXT98x0 board containing the Galileo GT 48006 bridge contains the bridging support means required by claim 1.

The{ }boards, CPX-68 and CPX-69, include a Galileo 48006 bridge chip, which includes Media Access Controllers (MACs). (Holland, Tr. at 606). As for the { } design, page 22 of CPX-937 shows the Galileo GT 48006 bridge, which includes MACs. (Holland, Tr. at 609). The Galileo GT 48006 bridge also includes two media access controllers ("MAC"), which are compliant with IEEE 802.3. (Holland, Tr. at 595-96; CX-1293 at 1). Holland confirmed that the GT 48006 included two MACs through his evaluations of this bridge. (Holland, Tr. at 596-97). Mick's basis for concluding that this product includes the required media access control element of claim 1 is his knowledge of documentation that he has reviewed regarding the Galileo product. (Mick, Tr. at 2215). The conclusion he drew

from that was that it does include two complete 10/100 media access controllers. (Mick, Tr. at 2215).

Therefore the{ }boards possess the MAC required by claim 1 and therefore contain all of the elements required by claim 1.

An LXT980/LXT98x0 board containing a bridge such as the Galileo GT-48006 includes an access port (a serial port) for attaching a remote computer or terminal for management, thus satisfying claim 2. The LXT980 and LXT98x0 data sheets identify the "Serial Port" in the block diagram of the first page. (CX-614; CX-829). The{ }hubs, CPX-68 and CPX-69, include a console port on their back panel. (Holland, Tr. at 603). The console port is used to connect CPX-68 and CPX-69 to serial management port of the LXT980 for gathering the statistics from the logical repeater out of band. (Holland, Tr. at 603).

Mick testified that the{ }product also practiced claim 2 because, according to Mick, one can access the repeater management functions of the LXT980/LXT98x0s remotely through a serial port. (Mick, Tr. at 2215-16). This capability is documented in the data sheet for the LXT980, and there is a physical manifestation of this connection which is the connector located on the printed circuit board, the connector being available from the back of the box. (Mick, Tr. at 2215-16).

Therefore the{ }products practice 2 as they have an access port to allow an external user to access the management functions.

An LXT980/LXT98x0 board containing a bridge such as the Galileo GT-48006 supports SNMP and RMON management via on-chip 32- and 64-bit counters. (Mick, Tr. at 2215-16). Therefore, the{ }boards, have a plurality of counters

and registers and as such practice claim 4.

Mick testified that the media access controller in an LXT980/LXT98x0 board containing a bridge such as the Galileo GT-48006 further comprises means for generating preambles and error correcting codes, means for detecting error correcting codes, means for handling deferrals and collisions, means for controlling and handling back off conditions, and means for retrying data transmission. (Mick, Tr. at 2216). Accordingly the { } boards practice claim 5.

An LXT980/LXT98x0 board containing a bridge such as the Galileo GT-48006, such as the{ } boards, includes registers that store attributes relating to repeater functions and, therefore, practices claim 6. (Mick, Tr. at 2216).

Mick testified that an LXT980/LXT98x0 board containing a bridge such as the Galileo GT-48006, such as the{ } boards, also comprised a media access control port for providing data packets received by the media access controller via the repeater data interface to memory, therefore satisfying claim 7. (Mick, Tr. at 2216).

On the back side of CPX 69, there is a dual-high stacking connector, which provides a stacking backplane, allowing one to stack multiple boxes on top of each other to create one logical repeater as classified by IEEE 802.3. (Holland, Tr. at 602-03). Using the stacking connectors of CPX-68 and CPX-69, a customer can stack CPX-68 and CPX-69 by plugging a cable into the up stacking connector of the lower unit and into the down stacking connector of the lower unit. (Holland, Tr. at 603). A mini-SCSI cable is used to connect, or stack, between CPX-68 and CPX-69. (Holland, Tr. at 603).

The{ } design also includes the inter-repeater backplane. (Holland,

Tr. at 609; CPX-937). Page 25 of CPX-937 shows the stacking connectors for this { } design. (Holland, Tr. at 609; CPX-937). On the stacking connector (block containing "LOWER UPPER") on page 25 of CPX-937, the serial data and serial clock signals pins A15, A16 and C 15 and C 16 are shown. (Holland, Tr. at 610; CPX-937). Having the serial data and serial clock signals pins on the stacking connector indicates that the serial management bus goes across the back plane so that the management for multiple boards stacked together would be considered out-of-band management. (Holland, Tr. at 610).

Mick also concluded that the LXT980 practices claim 9, because the LXT980 data sheet shows that this product provides two inter repeater backplanes: one interrepeater backplane to support operation of the 10 megabit repeater, and one interrepeater backplane to support operation of the 100 megabit repeater operation. (Mick, Tr. at 2216; CX-614 at 1; CX-829 at 1). The data sheets also indicate that the backplane can be used to connect up to 60 LXT980s to form a single logical repeater, that would be as many as 240 ports, which is probably more than anybody would want to put on a single collision domain. (Mick, Tr at 2216; CX-614 at 1; CX-829 at 1).

Feuerstraeter also identified inter-repeater backplanes in the LXT980, referring to page 17 of CX-614. (Feuerstraeter, Tr. at 445-46). Feuerstraeter, referring to page 36 of Exhibit CX-614, explained that what is depicted in Figure 11 is basically a stacking system whereby the management (as shown at the top by the network manager block) connects two boxes for purposes of management, accessing the management functionality within the LXT980s. (Feuerstraeter, Tr. at 446-48). The type management show in this figure is out-of-band. (Feuerstraeter, Tr. at 446-48).

Therefore the{ } boards practice claim 9 of the '603 patent.

In light of the above findings that he{ } boards do practice the '603 patent, respondent's argument that those boards do not satisfy the technical prong of the domestic industry requirement is rejected. Respondent, seeking to re-open this administrative law judge's ruling in Order No. 29, which the Commission determined not to review on April 2, 2001[66] argued that complainants cannot rely upon on the{ }boards or the{ } boards, or any unidentified boards, to satisfy the domestic industry requirement, because complainants' have not made any showing that their have been any domestic activities relating to the assembly of the boards so as to satisfy the economic prong of the domestic industry requirement. Respondent's argument ignores the fact that the administrative law judge has already found that the LXT980, LXT986C and LXT9880 major component parts of the boards in question satisfied the domestic industry requirement. The domestic industry prong requires only that there be a nexus exist between the domestic industry in the United States and the patent in question. In the Matter of Certain Salinomycin Biomass and Preparations Containing Same, 337-TA-370, Initial Determination (Nov. 6, 1995) at 124 the administrative law judge found that the economic prong of the domestic industry requirement for a process patent was satisfied even though the patented process occurred overseas, it being sufficient that a licensee made significant domestic investments in buying the bulk material from the patent holder, importing it into the United States, combining it with animal feed and then selling the animal

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[66] In Order No. 29, the Administrative Law Judge granted Complainants' motion for summary determination that the LXT980, LXT9860, and LXT9880 products satisfy the economic prong of the domestic industry requirement. (Order 29 at 12-13).

feed in the United States. As the Federal Circuit stated in Schaper Mfg. Co. v. United States Int'l Trade Comm'n, 717 F.2d 1368, 1373 (Fed. Cir. 1983) that "in proper cases 'industry' may encompass more than the manufacturing of the patent item." In this investigation complainants have demonstrated a significant domestic investment with regard to the LXT980 and LXT98x0, which are component parts in boards that practice the '603 patent. As such complainants have already demonstrated a significant domestic investment regarding the { } boards. See Order No. 29.

The administrative law judge also rejects respondent's final argument concerning the { } boards, viz., that complainants cannot now rely upon the efforts of their licensees, i.e. purchasers of the LXT980 and LXT98x0, after representing in the complaint for investigation 337-TA-430 that "Level One has not licensed its '603 patent." ('430 complaint at ¶8.1). Complainants not only sold the LXT980 and LXT98x0 to their customers, such as{ } but they also assisted their customers in implementing the purchased LXT980 and LXT98x0. Some of the implementations practiced the '603 patent. As such, complainants granted their customers a license to use the '603 patent in the various implementations of the LXT980 and LXT98x0, as "'[n]o formal granting a license is necessary in order to it effect. Any language used by the owner of the patent, or any conduct on his part exhibited to another from which that other may properly infer that the consents to his use of the patent [i.e., patented invention] . . . constitutes a licenses.'" Blais v. United States, 31 Fed. Cl. 422, 425-26 (1994) (quoting De Forest Tel. Co. v. United States, 273 U.S. 236, 241 (1927). The license granted to complainants' customers is permission to use the LXT980 and LXT98x0 in one of the uses advertised by complainants including implementing boards practicing the '603 patent.

The administrative law judge does not interpret complainants' disclaimer in the complaint for investigation 337-TA-430 that the '603 had not been licensed as encompassing the use of complainants' products that have been sold.

C. The '341 Patent

Respondent argued that the product LXT914 Version B, relied on by complainants for the existence of the domestic industry, does not practice any asserted claim of the '341 patent because of the absence of elements corresponding to the limitations added to the independent claims by amendment to overcome prior art rejections. Hence, it is argued that the economic activities identified in Order No. 29, granting summary determination on the economic prong, was not shown to be related to any "article protected by the patent, and complainants failed to demonstrate the existence of any domestic industry with respect to the '341 patent. (RBr at 157-161).

Complainants argued that respondent relies on its "erroneous construction" of the claimed term "circuit means"; that a simple internal pull up or pull down is sufficient to meet the circuit means element, { } also argued that because claim 13 allows for one or more pins, the LXT914 Version B meets this claim limitation as well. {

The staff argued that the evidence of record demonstrates that Level One's LXT914 Version B practices at least claim 1 of the '341 patent. (SBr at 104).

The administrative law judge finds that complainants have established the existence of a

domestic industry regarding the '341 patent. Thus, as required by claim 1 of the '341 patent,

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IX. Remedy

Where a violation of section 337 has been found, the Commission has the authority to enter an exclusion order, a cease and desist order, or both. 19 U.S.C. § 1337(d)(f). In a section 337 investigation evidence regarding remedy "should, whenever possible, be presented to the ALJ, so that its accuracy and probative value can be evaluated by the ALJ and other

parties prior to its presentation to the Commission in the remedy phase of the investigation." In the Matter of Certain Agricultural Tractors Under 50 Power Take-Off Horsepower, USITC Inv. No. 337-TA-380, Comm'n opinion (March 1997), at 27 n. 105 (Tractors).

A. Exclusion Order

Complainants, in closing argument argued that any exclusion order should cover the infringing products by name and should further specify "integrated repeaters, transceivers and switches, . . . the same title that's given to this investigation. We don't want to have a situation where the products are simply renamed". (Tr. at 4270).

Complainants also argued that since respondent was recently acquired by Broadcom, the administrative law judge should recommend an exclusion order barring importation, not only by respondent but also by any of its affiliated companies, parents, subsidiaries, contractors or other related business entities or their successors or assigns. (CBr at 195). In addition, it was argued that any exclusion order should cover third party products containing the products specified in the exclusion order. (CBr at 194).

Respondent argued that if there is a finding of violation, the remedy should be a limited exclusion order directed to the infringing repeaters, switches and transceivers imported by or on behalf of respondent that are the subject of this investigation; that any exclusion order should not be extended to other entities or to other products, and that any remedial order should not extend to respondent's products "originally accused in the complaint and later dropped due to Complainants' shifting claim construction." (RBr at 246-47). As for any exclusion order covering downstream products, respondent, at closing argument, argued that there is no evidentiary basis for supporting findings under any of the nine points set forth by

the Commission and affirmed by the Federal Circuit in Hyundai v. US International Trade Commission, 899 F.2d 1204 (Fed. Cir. 1990) (Hyundai) (Tr. at 4276).

Respondent also argued that any remedy should be addressed solely to the respondent's integrated repeaters, switches and transceivers and to importation or other activities by or on behalf of respondent which language would ensure that legitimate trade in Broadcom products is allowed to continue. (RRBr at 141).

The Commission has broad discretion in selecting the form, scope, and extent of a particular remedy. Viscofan, S.A. v. U.S. Int'l Trade Comm'n, 787 F.2d 544, 548 (Fed. Cir. 1986). In determining whether to exclude downstream products, the following factors are considered: (1) the value of the infringing articles compared to the value of the downstream products in which they are incorporated; (2) the identity of the manufacturer of the downstream products, i.e., whether it can be determined that the downstream products are manufactured by the respondent or by a third party; (3) the incremental value to the complainant of the exclusion of downstream products; (4) the incremental detriment to respondents of exclusion of such products (5) the burdens imposed on third parties resulting from exclusion of downstream products; (6) the availability of alternative downstream products that do not contain the infringing articles; (7) the likelihood that the downstream products actually contain the infringing articles and are thereby subject to exclusion; (8) the opportunity for evasion of an exclusion order that does not include downstream products; (9) the enforceability of an order by Customs; and any other factors the Commission determines to be relevant. Certain Erasable Programmable Read-Only Memories, USITC Inv. No. 337-TA-276, Comm'n Opinion (May 1989), (EPROMs) aff'd sub. nom. Hyundai (Emphasis added).

Complainants, relying on deposition testimony of Kubes for the inclusion of downstream products in any exclusion orders, argued that respondent sells (1){

}(2){

} (3){

} (4) the{

(5) the{

} (6){

}(7){

}(8){

} (9){

} (10){

} (11){

} (12){

} (13){

} (14)

} (15){

} (16)

{ }(17){

}(18){

}(19){

} and (20){

} (CRRFF 2499 to 2518).

It was also argued by complainants that the accused products are inoperable unless mounted on printed circuit boards by third parties and additionally that the record demonstrates that third parties,{

}citing CFF 2331-2337. There is no objection by respondent to the fact that{ } (CFF 2331);{ } (CFF 2332);{

}(CFF 2333);{

}(CFF 2334); and that{

}(CFF 2335). However, while complainants asserted that respondent has {

} the administrative law judge agrees with respondent that the only support for those findings are

excerpts of a deposition which excerpts were not admitted into evidence.

Aside from the facts that certain infringing products are found in downstream products and the identity of certain manufacturers of downstream products, there is little evidence in the record relating to the factors specifically set out in EPROMs, even though such evidence, whenever possible, should be presented to the administrative law judge. See Tractors supra.

In closing argument, complainants argued, as to the value of the infringing product versus the downstream product, that Kubes (Tr. at 2636) estimated the value of the infringing product as compared to the downstream product was{

} However, Kubes's testimony does not support a conclusion that

} Thus, Kubes testified (Tr. at 2636-37) that the cost for managed repeaters was{

}

uch a difference results in a large differentiation in the value of infringing articles compared to the value of the downstream products in which they are incorporated. In addition, the administrative law judge finds the record lacking evidence as to factors (3), (4), (5), (6), (7), and (8) of EPROMs, supra.

The staff argued that if a violation is found, a limited exclusion order excluding respondent's infringing products, and at least carriers and motherboards manufactured by or on behalf of respondent that contain the infringing products, would be appropriate. (SBr at 107).

In Certain Flash Memory Circuits And Products Containing Same Inv. No. 337-TA-382 Comm'n Opinion (June 1997), (Flash Memory), complainant sought a limited exclusion order that would apply to flash memory chips produced by respondent but yet would be broad

enough to cover not only chips themselves but also "downstream" products of third parties containing infringing flash memory chips. Id. at 27. The Commission stated that the administrative law judge did not mention, let alone seek to apply, the EPROMs balancing test in the recommended determination. Moreover, the Commission found the evidence of record, when taken as a whole, simply insufficient to justify extending any exclusion order to even respondent's downstream products Id. at 37. However, the Commission did make an exception "for carriers and circuit boards that are manufactured and imported by . . . [respondent] and that contain . . . [respondent's] infringing flash memory chips." (Emphasis added). The basis for the exception was that, while "[m]any downstream products, such as flash cards, flash disks, and digital cameras are final products that are sold as unitary packages" and their packaging makes it very difficult, if not impossible, to remove the flash chips without opening and ruining the product itself, carriers and circuit boards are intermediate products from which the flash memory chips are readily accessible and can be easily removed by the consumer. Id. at 37, 38. Based on the admitted evidence in this investigation, the administrative law judge finds the record too spotty to recommend that the exclusion order should include carriers containing accused products of any recommended exclusion order. However, he is recommending that any exclusion order include circuit boards that contain said accused products since the private parties are in agreement that the devices of certain of the asserted claims are used in circuit boards[68] and are presumably easily

[68] While the private parties are in agreement that the asserted devices of the '603 patent can be found in circuit boards, said parties differ as to whether said claimed devices should be restricted to a single circuit board or can relate to more than one circuit board. See, e.g., RBr at 172-173.

removable.[69] He is also recommending that any exclusion order issued be directed to respondent which would include its principals, stockholders, officers, directors, employees, agents, licensees, distributors, controlled and/or majority owned business entities and their employees, and agents, successors and assigns and that said order prohibit the importation and sale in the United States. He is further recommending that the exclusion order be directed to (1) integrated repeaters, including respondent's AC105R and AC108R series of integrated repeaters that infringe any of claims 1, 2, 3, 4, 5, 6, 7, 9, and 10 and of the '603 patent and (2) PBGA packages including respondent's AC105RM, AC105RN, AC105RU, AC108RM, AC108Rn, AC108RU, AC108RKPB and AC1085U series of packages that infringe any of claims 23, 24 27 and 29 of the '410 patent.

B. Cease And Desist Order

A cease and desist order directs a party to stop its unfair acts, and is generally directed toward domestic respondents that maintain substantial inventories of infringing substantial inventories of infringing products in the United States. See Flash Memory at 26. There should be evidence that "significant inventories of infringing articles" are maintained in the United States. See Hyundai 899. F.2d at 1210.

Complainants argued that an effective remedy must include a cease and desist order

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[69] The '410 patent discloses that one type of integrated circuit board is a ball grid array (BGA) package which is soldered to a printed circuit board. (CX-3, col. 1, lns. 13-17, 55-58). There is no evidence that the packages are either easily removable or not easily removable from the circuit boards. Moreover the record is lacking as to specific downstream products for the BGA packages found to infringe certain claims of the '410 patent.

which should extend to respondent or any of its affiliated companies, parents, subsidiaries, contractors, or other related business entities, or their successors or assigns. (CBr at 198).

Respondent argued that complainants failed to meet their burden of introducing the one piece of evidence required for a cease and desist order, viz., the presence of commercially significant inventory in the United States. Moreover, it was argued that respondent proved that even the entire amount of its "worldwide sales of managed repeaters" is completely insignificant.

At closing argument complainants argued that there is evidence of a "commercially significant inventory." (Tr. at 4294). As for evidence, CRRFF 2519 is cited. That finding relies on certain deposition testimony of Kubes (Id).[70] Kubes, however, merely testified that { } (Tr. (11/21/00) at 371). (Emphasis added.) There was no evidence before the administrative law judge which showed whether there was an actual inventory{ } let alone the quantity of the inventories, assuming the existence of inventories. The administrative law judge finds that complainants have failed to establish any basis for a cease and desist order. Hence he is not recommending any cease and desist order.

X. Bonding

Section 337(j) provides for the entry of infringing articles and sales of such articles from inventory upon the payment of a bond during the 60-day Presidential review period. The

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[70] When the administrative law judge asked if there was anything else other than CRRFF 2519 that complainants were relying on, complainants replied: "[t]hat's the finding we will rely on." (Tr. at 4295).

bond is to be set at a level sufficient to "protect complainant from any injury" during the Presidential review period. 19 U.S.C. §1337(j). See also Commission rule 210.50(a)(3).

Complainants argued that the bond should be set at an amount sufficient to protect complainants from "any injury," which is 100 percent of the entered value or of respondent's July 2000 offering price for respondent's products, "whichever is higher." (CBr at 200).

Respondent argued that the price of its products{

}and that complainants have not presented any evidence to the contrary. It is further argued that the only objectively reasonable, nonspeculative evidence of an appropriate bond to protect complainants against injury due to importation during Presidential review indicates that the bond for "managed repeaters" should be set at{ }percent.[71] (RRBr at 143).

The staff argued that, in light of the "wide range of products" involved and their disparate price, a bond of 100 percent of entered value would be appropriate in this investigation. (SBr at 108).

Where the evidence indicates that the compilation of price information indicates that the accused products have a wide price range, and hence it is impossible to calculate what level of bond based on price differentials will protect a complainant from injury, a bond of 100 percent of entered value will be set. See Certain Neodymium-Iron-Boron Magnets, Inv. No. 337-TA-372, Comm'n Opinion on Remedy, the Public Interest and Bonding at 15, USITC Pub. No. 2964 (1996).

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[71] The {

} (RRBr at 142-143).

While each of complainants and the staff argued for a bond of 100 percent of entered value, neither has put forth any substantive evidence that the products of the recommended exclusion order have a wide price range. Moreover, respondent has cited no Commission precedent for applying a rule of thumb that a reasonable royalty{

} On that point, the administrative law judge can find no substantive evidence relating even to whether a royalty was ever obtained for said products. Referring to complainants' argument that respondent's July 2000 offering prices should be considered, complainants in their opposition filed on August 23, 2002 to respondent's motion to consolidate 337-TA-430 and 337-TA-435 asserted, at 2, that the managed integrated repeaters, which comprise Level One's domestic industry, are{

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On the basis that the market for managed integrated repeaters is diminishing, which could result in a wide price range for said repeaters, the administrative law judge is recommending a bond of 100 percent of the entered value of the products set out in the recommended exclusion order. It is recognized however that the recommended exclusion order is not limited to repeaters.

XI. ADDITIONAL FINDINGS

A Parties

1. Complainant Intel is a Delaware corporation with its principal place of business in Santa Clara, California. ('430 complaint, ¶ 2.1). Intel is one of the world's largest manufacturers of semiconductor products, including microprocessors and chipsets that it sells to original equipment manufacturers and others throughout the world. ('430 complaint, ¶¶ 2.1 - 2.2, ¶ 5.4, 5). Intel is the owner of the '410 patent by assignment. ('435 complaint, ¶¶ 1.3 - 1.4, ¶¶ 5.1 - 5.2, ¶¶ 6.1 - 6.2).

2. Complainant Level One is a California corporation with its principal place of business in Sacramento, California. ('430 complaint, ¶ 2.3). Level One is a wholly-owned subsidiary of Intel. ('435 complaint). Level One manufactures semiconductor devices, including integrated repeaters and transceivers used in local area network (LAN) switching and in wide area network (WAN) access for high-speed telecommunications and networking applications. (Id., ¶ 2.4, ¶ 7.1). Level One is the owner of the '603 and '341 patents by assignments. ('430 complaint, ¶ 1.3, the '435complaint, ¶ 1.5; ¶ 7.1).

3. Level One was founded in the mid 1980s by four engineers whose purpose was to develop communications devices, specifically physical layer communication devices. (McConnell, Tr. at 107).

4. Stephen Michael McConnell joined Level One in 1993 as employee number 64 and is still employed by Level One. (McConnell, Tr. at 107).

5. In August of 1999, Level One had approximately 760 employees and was sold to Intel for $2.2 billion. (McConnell, Tr. at 107).

6. McConnell graduated from New Mexico State University in December of 1978 with a Bachelor's degree in Electrical Engineering. (McConnell, Tr. at 113-17).

7. Upon graduation, McConnell was employed by MosTek Corporation in an

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8. Mark Feuerstraeter is a named co-inventor of the 603 patent. (CX-2).

9. Feuerstraeter joined Level One in October of 1993. (Feuerstraeter, Tr. at 305).

10. Feuerstraeter received a bachelor of science degree in electronic engineering from Cal Poly San Luis Obispo. (Feuerstraeter, Tr. at 305).

11. Karen Perry is Level One's sales operation manager. (Perry, Tr. at 536).

12. As the sales operation manager, Ms. Perry manages the customer service department, which is responsible for processing customer purchase orders, price quotations, sample requests and any type of delivery issue having to do with product to customers. (Perry, Tr. at 536).

13. Dennis Holland joined Level One in June of 1998 as an applications engineer, which is his current position with Level One. (Holland, Tr. at 580-581).

14. Holland's role as an applications engineer is to aid customers in designing Level One products into their final product (customer applications) and to debug any issues

with those applications. (Holland, Tr. at 581).

15. Holland supports Level One's managed repeater line, which includes the LXT 980 and the LXT98x0. (Holland, Tr. at 581).

16. Altima is a California corporation with its principal place of business at 2055 Gateway Place, Suite 700, San Jose, California 95110. {

}

17. In 1997, Altima's name was Adhoc Technology. (Chang, Tr. at 1189).

18. Altima has merged with Broadcom Inc. (See Order No. 11 which issued on January 16, 2001).

B. Colin Mick

19. Mick received a Master's degree in Communications Research from Stanford University in 1969, and a Ph.D. in Communications Research from Stanford University in 1972. In the 1960's, while at Stanford, Mick used and programmed shared mainframes, and taught others to use these mainframes. (Mick, Tr. at 2107-08; CDX-158)

20. Mick prepared the slides that are Exhibits CDX 158 through 164. (Mick, Tr. at 2114-15).

21. In the 1970's and 1980's, Mick was employed in the communications industry. In the 1970's he researched others' use of information technology and explored use of new telecommunications technologies, including on-line databases and communications satellites.

(Mick, Tr. at 2108; CDX-158) In the 1980's, working primarily with personal computers, Mick designed and built computers and computer systems that supported primarily legal and medical professionals. (Mick, Tr. at 2108; CDX-158).

22. Mick's experience in the Ethernet networking industry began in the 1989, when he joined LanQuest Labs. (Mick, Tr. at 2109) At LanQuest, Mick designed, built and maintained complex Ethernet networks. Mick also created and operated a network test lab at LanQuest to analyze network adapters, repeaters, bridges, routers, and analyzers, and he published multiple articles based on this testing. Mick designed a network test tool used to stress test prototype Ethernet equipment. (Mick, Tr. at 2109, CDX-159).

23. Mick became the Technical Director for Network Products at Comdisco Systems in 1990. In that position, he was the Project Lead in creating network (including Ethernet) simulation and design tools and managed development from product definition through product testing. Those simulation tools simulated traffic – the passage of data packets or frames over a network. As part of this work, Mick was a named inventor on United States Patent No. 5,440,719 for a method for simulating data traffic on a network in accordance with a client/server paradigm. (Mick, Tr. at 2109-10, 2218-19; CDX-160; CX-434).

24. Mick was involved in developing the IEEE standards defining Ethernet. In 1993, Mick was retained by 3Com to assist in the development of IEEE 802.3u for Fast Ethernet standards. He managed the creation of Fast Ethernet over copper (100BASE-T2) and Gigabit Ethernet over copper (1000BASE-T) from competing DSP-based proposals. Sponsors included 3Com, Bay Network, Broadcom, Cisco, Hewlett Packard, IBM, Intel, Level One, Packet Engines and Sun. Mick drafted clauses 21 and 29 of the IEEE 802.3 and contributed

technical content to many of the other clauses. (Mick, Tr. at 2110-11; CDX-161). Mick also drafted changes to clauses 1, 2, 3, and 4 which defined the Media Access Control (MAC) an element of the '603 patent. (Mick, Tr. at 2104). Additionally, Mick was the liaison for the 802.1 bridge IEEE standards. (Mick, Tr. at 2103-04).

25. In 1994 and 1995, Mick designed and hand built leading edge networking technology demonstrations for the Fast Ethernet Alliance. (CDX-162). In the 1990's Mick was involved with Network Processing Forum and MLDesign Technology. (See CDX-163).

26. Mick worked very closely with many electrical engineers during the IEEE 802.3u project. While that project was in force, they were having weekly meetings on specific clauses or specific problems. Depending on where Mick was focused, he would be attending one or perhaps as many as three or four of those meetings a week during the 1994/1995 time period. (Mick, Tr. at 2145; CDX-164).

C. Other Experts

27. Richard Blanchard was qualified as an expert for complainants in semiconductor circuitry and semiconductor packaging. (Tr. at 4202).

28. Mark Molle was qualified as an expert for respondent in computer networks including repeaters, switches and receivers, products containing those components, and a computer network architecture, network communications, and computer systems for modeling, analyzing and evaluating the performance of such systems. (Tr. at 2792, 2793).

29. Michael Pecht was qualified as an expert for respondent in the field of packages. (Tr. at 2342).

30. John Prince was qualified as an expert for respondent in the area of

semiconductor packaging. (Tr. at 3026).

31. Steven Ward was qualified as an expert for respondent in the field of digital logic circuitry. (Tr. at 3570).

D. Ordinary Skill

32. For the '603 patent, one of ordinary skill in the art would be a person who would have experience with networking technology going back at least to 1990. Somebody could do it with less time than that. However on the average, the person would need to be aware of developments within the field during that period. (Mick, Tr. at 2141-42; Molle, Tr. at 3542).

33. For the '410 patent, a person of ordinary skill in the art in March of 1996 is one with a Master's Degree in Electrical or Mechanical Engineering, or alternatively, one with a Bachelor of Science Degree in Electrical or Mechanical Engineering as well as two to four years experience in packaging from a company that makes or uses semiconductor packages. (Pecht, Tr. at 2365). A Master's Degree graduate student in Electrical or Mechanical Engineering, or an undergraduate with "some years of experience" with a company that makes or uses semiconductor packages, "could understand [the '410] patent." (Pecht, Tr. at 2365).

34. For the '341, patent a person of ordinary skill in the art would typically be someone with a Master's and Bachelor's degree in an engineering discipline, for example, electrical engineering, computer architecture, digital logic, etc., and 2-4 years of relevant experience in a related field. Another person of ordinary skill in the art might be a person with no degree but who has a considerable amount of practical experience, for example working for Intel or Altima designing the circuitry that is the subject matter of the '341 patent.

(Ward, Tr. at 3576-77; Blanchard, Tr. at 1482-84).

E. Prosecution Of The '603 Patent

35. Originally filed claim 1 of the '603 patent read:

1. A repeater management device for communication networks, the repeater management device controlling repeaters and routing packets between a receiving port and a destination port, comprising:

repeater management means for controlling and monitoring repeater functions related to the routing of the data packets; and

bridging support means, coupled to the repeater management means, for receiving the data packets on the receiving port and for routing the received data packets to the destination port in accordance with repeater functions controlled by the repeater management means.

(CX-5 at 18).

36. As originally filed, claim 1 of the '603 patent was not limited to a "repeater management means" for "providing status of and control over repeater functions via an external repeater management interface." (CX-5 at 18).

37. The Examiner in the Office Action dated June 12, 1997 rejected original claims 1-6 under 35 U.S.C. § 112 as follows (CX-5):

> 2. Claims 1-6 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
>
> In claim 1, line 3, "packets' should be changed to - -data packets - - so that it provides antecedent basis.
>
> In claim 2, lines 2-3, it is not clear what is meant by "the attributes". "the attributes" lacks antecedent basis.
>
> In claim 3, line 5, it is not clear what is meant by "the ports". Does it mean the receiving port and the destination port?
>
> In claim 6, line 2, "the media access controller" lacks antecedent basis.

38. The examiner in an Office Action dated June 12, 1997 rejected all the original 13 pending claims under 35 U.S.C. § 102(e) as anticipated by U.S. Patent No. 5,414,694 to Crayford. In that Office Action the Examiner stated:

Crayford et al disclose an address tracking over repeater based networks comprising a repeater management means for monitoring and controlling repeater functions related to the routing of the data packets (10 of fig. 3); bridging support means for receiving the data packets on the receiving port and for routing the data packets to the destination port (12 of fig. 3); a media access controller for providing signal framing of the data packets and for controlling access to the ports (Fig. 8); means for maintaining attributes relating to the repeater functions (102, 104 of fig. 4). (CX-5).

39. In response to the Office Action dated June 12, 1992 received by the Patent Office on September 16, 1997 the Office Action applicants (cancelled original claims 3 and 7-13 and amended original claim 1 as follows (bracketed material refers to deleted matter and underlined material refers to added matter) (CX-5):

> 1. (Amended) A repeater management device for communication networks, the repeater management device controlling repeaters and routing data packets between a receiving port and a destination port, comprising:
>
> repeater management means for controlling and monitoring repeater functions related to the [routing] retransmission of the data packets and for providing status of and control over repeater functions via an external repeater managment interface; [and]
>
> bridging support means, coupled to the repeater management means, for receiving the data packets on the receiving port and for [routing] forwarding the received data packets to the destination port in accordance with [repeater functions controlled by the repeater management means] a destination address; and
>
> media access controller, coupled to the repeater management means, for providing signal framing of the data packets and for controlling access to a repeater data interface.

Applicants also cancelled original claims 3 and 7-13.

40. In the 9/16/97 response to the Office Action dated June 12. 1997, applicants also amended original claim 2 as follows (CX-5):

> 2. (Amended) The repeater management device of claim 1 wherein the repeater management means further [comprising] comprises an access port for providing access to [the] attributes relating to repeater functions.

Applicants further added the following new claims in the 9/16/97 response (CX-5):

> 14. (New) The repeater management device of claim 1 wherein the repeater management means further comprises registers for storing the attributes relating to repeater functions.
>
> 15. (New) The repeater management device of claim 1 further comprising a media access control port for providing data packets received by the media access controller via the repeater data interface to memory.
>
> 16. (New) The repeater management device of claim 1 wherein the media access controller determines whether a data packet is to be sent to the bridge for forwarding to a destination address connected to the bridge port or whether a data packet is to be retransmitted via the repeater data interface.
>
> 17. (New) The repeater management device of claim 1 wherein the repeater data interface comprises an inter-repeater backplane.
>
> 18. (New) The repeater management device of claim 1 wherein the repeater management means further comprises a processor interface for providing direct memory access and semaphoring functions to support bridging functions of the bridging support means and media access control functions of the media access controller.

Above claims 14, 15, 16, 17 and 18 correspond respectively to patent claims 6, 7, 8, 9 and 10.

41. Applicants, in the September 16, 1997 response, traversed the rejection on Crayford et al as follows (CX-5):

> The applicants respectfully traverse the rejection. Crayford et al. teach an integrated multiport repeater device having a hardware implemented management information base device (HIMIB). The repeater/HIMIB provides monitoring for network activities detected by the repeater. The repeater/HIMIB stores statistics based on the network activity. which can then be accessed by an external host advice that typically provides network management information. The repeater/HIMIB compares source address and destination address fields to provide authentication and security features. However, Crayford et al. do not teach a media access controller for providing signal framing of data packets and for controlling access to repeater via a repeater data interface. Further, Crayford et al. do not teach bridging functions included with a repeater manager for controlling and monitoring repeater functions related to the retransmission of the data packets and for providing status of and control over repeater functions via an external repeater management interface and the media access controller.
>
> In contrast to Crayford et al , the Applicant's invention is a repeater manager for controlling and monitoring repeaters and for providing status of and control over repeater functions via and external repeater management interface bridging support means for receiving the data packets on the receiving port and for forwarding the received data packets to the destination port in accordance with a destination address, and a media access controller for providing signal framing of the data packets and for controlling access to a repeater data interface. Applicants' invention therefore provides upper-layer services for repeaters, including management, security, full MAC functionality and bridging.
>
> Note that the Applicants' invention is an external management device for a repeater via the repeater data interface, e.g., a inter-repeater backplane, rather than a repeater having some additional management functionality added thereon. Applicant's invention also provides additional advantages including a processor interface for providing

direct memory access and semaphoring capability to facilitate MAC and bridging functions with low CPU overhead.

Accordingly, Applicants submit that claims 1-2, 4-6 and 14-18 recite novel features not shown by the cited reference.

42. The Examiner on October 15, 1997 issued a notice of allowability stating that claims "1, 2, 4, 5, 6, 14, 15, 16, 17, 18 renumbered 1-10 respectively" have been allowed. (CX-5).

43. According to Molle, the Crayford patent refers to MACs, and near the bottom of column 8, starting at line 51, there is a description of a function where an Ethernet MAC is taking source addresses from different ports on the repeater and it is making a comparison of those source addresses. Molle does not see the word "bridge" there though. The MAC and the address table are being used for security purposes. In this context, "security" means that if the wrong person is found attached to the network, the system can either disable a port or perhaps scramble the data if it is supposed to be blocked. (Molle, Tr. 3463-65).

44. The Crayford patent teaches using MAC to track source and destination addresses for security purposes. (RX-646 at col. 3 ln 21 to col. 4, ln 10)

45. Crayford discloses that packets can be blocked based on address if, for example, an eavesdropper is detected. (RX-646 at col. 3 lns. 42-54) .

46. The Crayford patent teaches using a management device, the HIMIB, to control and monitor a separate repeater, the IMR-4 . This is shown in figure 3 of the Crayford patent (RX-646):

47. Crayford et at patent discloses (RX-646):

Referring now to FIG. 3, the present invention comprises two devices in

a preferred embodiment. One is entitled The Hardware Implemented Management Information Base (HIMIB) Device 10 and the other is an Integrated Multiport Repeater (IMR) device 12. The IMR device provides the basic repeater function, performing signal amplitude and timing restoration, incorporating 8 individual 10BASE-T ports, and one Attachment Unit Interface (AUI) port. The AUI port allows connection of the 10BASE-T ports to an existing coaxial wired Ethernet/Cheapernet network. The IMR device also provides an inter-module expansion bus, which allows multiple IMR devices to be cascaded together, and still be treated as a single repeater. In addition, the IMR device also has a management port, to allow configuration and monitoring of the operational state of the repeater, and a simple reporting function to provide an external indication of which port is receiving at any time.

The HIMIB device is a companion device to the IMR circuit, and provides monitoring for all network activity detected by the IMR device. The HIMIB collects statistics based on the type of network activity, and stores this information internally as registers which can be accessed by an external host device, such as a microprocessor. The host typically uses the data collected and stored by the HIMIB device to provide network management information, in order to more easily administer the operation and/or fault diagnosis of the network.

These two devices 10 and 12 cooperate to provide the advantages above described. (RX-646, col. 5:8-39, Emphasis added.)

48. There are blocks labled IMP Plus and HIMIB in figure 3 of the Crayford patent. IMP Plus is a typo that should be IMR Plus. Molle stated that in this figure there is a repeater, the IMR Plus, and a separate management device, the HIMIB. (Molle, Tr. at 3465).

49. Molle stated that the Crayford patent at col. 5, lines 8-13, refers to the HIMIB and the IMR as separate devices. (Molle, Tr. at 3467).

F. Prosecution Of The '410 Patent

50. The '410 patent application was filed on March 28, 1996, with sixteen original claims. (RX-6).

51. Original sixteen claims read:

1. A ball grid array package, comprising;

a substrate which has a top surface and an opposite bottom surface, said bottom surface having an outer array of contact pads each separated from each other by a first distance, and a center array of contact pads each separated from each other by a second distance, said center array of contact pads being separated from said outer array of contact pads by a third distance which is larger than the first and second distances; and,

a plurality of solder balls attached to said contact pads of said substrate.

2. The package as recited in claim 1, wherein said top surface of said substrate has a plurality of bond pads.

3. The package as recited in claim 2, wherein said top surface of said substrate has a ground bus that is connected to said center array of contact pads by a plurality of vias that extend through said substrate.

4. The package as recited in claim 3, wherein said outer array of contact pads has at least five rows of contact pads.

5. The package as recited in claim 4, wherein said top surface of said substrate has a power bus that is connected to said center array of contact pads by a plurality of vias that extend through said substrate.

6. The package as recited in claim 5, wherein said center array of contact pads is arranged in a four by four matrix.

7. A ball grid array integrated circuit package, comprising:

a substrate which has a top surface and an opposite bottom surface, said top surface having a plurality of bond pads, said bottom surface having an outer array of contact pads each separated from each other by a first distance, and a center array of contact pads each separated from each other

by a second distance, said center array of contact pads being separated from said outer array of contact pads by a third distance which is larger than the first and second distances;

a plurality of solder balls attached to said contact pads of said substrate; and.

an integrated circuit that is mounted to said substrate and coupled to said bond pads.

8. The package as recited in claim 7, wherein said top surface of said substrate has a ground bus that is coupled to said integrated circuit and connected to said center array of contact pads by a plurality of vias that extend through said substrate.

9. The package as recited in claim 8, wherein said outer array of contact pads has at least five rows of contact pads.

10. The package as recited in claim 9, wherein said top surface of said substrate has a power bus that is connected to said center array of contact pads by a plurality of vias that extend through said substrate.

11. The package as recited in claim 10, wherein said center array of contact pads is arranged in a four by four matrix.

12. The package as recited in claim 11, wherein said integrated circuit is enclosed by an encapsulant.

13. The package as recited in claim 7, wherein said outer array of contact pads is located outside an outer dimensional profile of said integrated circuit.

14. A method for assembling a ball grid array integrated circuit package, comprising the steps of:

a) providing a substrate which has a top surface and an opposite bottom surface, said bottom surface having an outer array of contact pads each separated from each other by a first distance, and a center array of contact pads each separated from each other by a second distance, said center

array of contact pads being separated from said outer array of contact pads by a third distance which is larger than the first and second distances;

b) mounting an integrated circuit to said top surface of said substrate; and,

c) attaching a plurality of said solder balls to said contact pads.

15. The method as recited in claim 14, further comprising the step of encapsulating said integrated circuit.

16. The method as recited in claim 15, further comprising the step of coupling said integrated circuit to said substrates with a plurality of bond wires.

52. In the first Office Action dated February 21, 1997, the Examiner rejected all sixteen claims over prior art. (RX-6). Thus the Examiner rejected claims 1, 2, 6, 9, and 12-16 under 35 U.S.C. § 102 as anticipated by Newman U.S. Patent No. 5,490,324, and rejected claims 3-5, 7, 8, 10 and 11 under 35 U.S.C. § 103(a) as obvious over Newman in view of Marrs et al. U.S. Patent No. 5,355,283, and Lin et al. U.S. Patent No. 5 450,283. (RX-6).

53. In rejecting claim 1 in the first Office Action, the Examiner stated that:

Reference Claim 1, Newman discloses a ball grid array package, comprising: a substrate (Figure 4, items 404 and 402) which has a top surface and an opposite bottom surface having an outer array of contact pads (item 516, Figure 5) each separated from the other by a first distance, and a center array of contact pads (item 512, Figure 5) each separated from the other by a second distance, said center array of contact pads being separated from said outer array of contact pads by a third distance, and a plurality of solder balls attached to said contact pads of said substrate (item 512 and 516, Figure 5).

(RX-6).

54. The Examiner, in his February 21, 1997 Office action, also made the following rejections (RX-2):

Claims 3-5, 7, 8, 10 and 11 rejected under 35 U.S.C. 103(a) as being unpatentable over Newman and further in view of Marrs et al. [U.S. Pat. No. 5,355,283] and Lin et al. [U.S. Pat. No. 5,450,283]. Reference Claim 3, Lin et al. disclose a package (item 10, Figure wherein said top surface of said upper substrate is at ground potential and could be connected to provide a ground for the center array of contact pads by a plurality of vias that extend through the substrate. Reference Claim 4, Marrs et al. disclose an array of contact pads which, though not specified, could be any number of rows. Reference Claim 5, Lin et al. disclose a package wherein said top of said substrate (Figure 6, item 12) has a pattern of conductive traces (Figure 6, items 14 and 15) connections to an array of contact pads by a plurality of vias that extend through the substrate (Figure 6, items 16). Reference Claim 7, Marrs et al. disclose in column 4, the first paragraph under Detailed Description the Drawings and shown in Figure 2, item 201, an integrated circuit package with a substrate, a plurality of bond pads, a plurality of solder balls attached to contact pads of substrate and an integrated circuit that is mounted to substrate and coupled to bond pads. Reference Claim 8, Lin et. al. disclose a package wherein said top of said substrate (Figure 6, items 12) has a pattern of conductive traces (Figure 6, items 14 and 15) connections to an array of contact pads by a plurality of vias that extend through the substrate (Figure 6, items 16). Reference Claim 10, Marrs et. al. disclose electrically conductive traces on the top surface of the substrate that is connected to contact pads and extend to vias shown in Figure 2, item 207. Reference Claim 11, Marrs et. al. disclose an array of contact pads which could be arranged in a four by four matrix. Therefore it would seem obvious to a person of ordinary skill in the art at the time of the invention was made that Newman's package could be modified by Lin et al. to provide a ground for the center array of contact pads in Claim 3; that Newman's number of rows of contact pads in Claim 4 could be substituted by Marrs et al; that Lin et al. disclosure of conductive trances for Claim 5 could modify Newman to meet all the limitation of that claim, that Newman could be modified by Marrs et. al. disclosure for meet the limitations of Claim 7; that Lin et. al. disclosure for substrate and conductive traces could modify Newman to meet the limitations of claim 8; that Marrs et. al. disclosure for electrically conductive traces could modify Newman for a ground and meet the limitations of the Claim 10; and that Marrs et al. contact pads could be arranged in a four by four matrix to meet the limitations of Claim 11.

55. The Examiner, in his first Office action, as to rejecting other claims in Newman, stated (RX-6):

Reference Claim 2, Newman discloses a package wherein said top surface of said substrate has a plurality of bond pads (item 428, Figure 4 and paragraph 4

column 8). Reference Claim 6, Newman discloses contact pads which could be arranged in a four by four matrix. Reference Claim 9, Newman discloses an outer array of contact pads with at rows of contact pads (Figure 5 item 510). Reference Claim 12, Newman shows in Figure an encapsulant, item 432 which encapsulant the integrated circuit. Reference Claim 13, Newman discloses in Figure 5, item 510, a package wherein said outer array of contact pads is located outside an outer dimensional profile of said integrated circuit. Reference Claim 14, Newman discloses a method for assembling a ball grid array integrated circuit package in column 11 paragraph number 1 entitled, A method for fabricating an integrated circuit package. Reference Claim 15, Newman discloses in column 11 paragraph 1 and 2 the steps of encapsulating said integrated circuit. Reference Claim 16, Newman discloses in column 11 paragraphs #3 the step of coupling said integrated circuit to said substrate with a plurality of bond wires.

56. In response to a rejection of all claims in the first Office Action, the applicant submitted an amendment dated May 19, 1997, amending all independent claims to recite:

> "a substrate which has a top surface and an [opposite] exposed external bottom surface, said external bottom surface having an outer array of contact pads each separated by a first distance, and a center array of contact pads each separated by a second distance . . . ." (RX-6).

57. In the May 19, 1997 response to the first Office Action, applicant also added new claims 17-24. (RX-6).

The remarks in the May 19, 1997 response read in part:

> The applicant submits that the prior art does not disclose, teach or suggest an integrated circuit package which has a center array of contact pads and an outer array of contact pads as disclosed and claimed in the present invention. The center and outer array of contact pads are located on an exposed external bottom surface of the package. This is to be distinguished from the Newman reference which discloses a plurality of bond pads that are internal to the package. The applicant would like to direct the Examiner's attention to Fig. 6 of the Newman reference which clearly shows that bond pads 514 and 516 are located internal to the package. These features are not on the exposed external bottom surface of the package with the other solder balls 510 of the Newman package. None of the secondary references cited by the Examiner disclose, teach or suggest the present claimed invention. For these reasons the applicant submits that the claims are neither anticipated nor rendered obvious by the prior

art.

58. Dependent claims 23 and 24 recite that "the first distance is the same the second distance." (RX-6).

59. In the Final Office Action dated June 23, 1997, the Examiner rejected claims 1, 2, 6, 9, 12-18, and 22 under 35 U.S.C. § 102(e) as anticipated by Newman and rejected claims 3-5, 7, 8, 10, 11, and 19-21 under 35 U.S.C. § 103(a) over Newman in view of Marrs et al. and Lin et al. He also stated:

Allowable Subject Matter

> 6. Claims 23 and 24 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. [RX-6]

60. In an amendment filed July 18 1997 , the applicant amended claims 1, 7, 14, and 17, in part, changing the phrase "said external bottom surface having an outer array of contact pads . . ." to "said external bottom surface consisting only of an outer array of contact pads . . . ." (RX-6).

61. In the Remarks to the Amendment dated July 18, 1997, the applicant argued that:

> Fig. 5 of Newman discloses a bottom view of a package with the encapsulent removed to show the inner bonding shelves. The contact pads 512 and 516 are not located on the external bottom surface of the substrate as disclosed and claimed in the present invention. The contact pads of Newman are located on internal bond shelves of a package which are covered by an encapsulent shown in Fig. 6 of the reference. The contact pads on the external surface of the package are designated in Fig. 5 as reference number 510. The arrangement of the contact pads shown in Newman clearly do not meet the limitations recited in the claims of the present invention. For this reason the applicant submits that the claims are not anticipated by Newman.

(RX-6).

62. In the amendment filed July 18 1997, the applicant added claims 25-29. Claims 27 and 29 included the limitation "the first distance is equal to the second distance." (RX-6).

63. After issuance of a Notice of Allowability, on October 23 1997, the applicant filed a continuation application under 37 C.F.R. § 1.62, along with the following items: (1) a Preliminary Amendment, correcting a single typographical error in the specification, (2) an Information Disclosure Statement submitting a drawing of a package dated April 1995 found in a catalog entitled "Semiconductor Group Package Outlines, Reference Guide," provided by Texas Instruments and stating that page 6-30 of the Reference Guide includes a ball grid array package which has a ball grid array number to the package disclosed and claimed in the patent application art (3) a cover sheet of the disclosed Texas Instrument Guide which shows a date of 1996, and (4) a Declaration of the applicant under 37 C.F.R. § 1.131, which the information disclosure statement states establishes that the inventor conceived and reduced to practice the claimed invention prior to the reference date of the drawing in the Reference Guide, April of 1995. Neither the declaration or the Information Disclosure Statement States that the Texas Instrument Guide is prior. (RX-6).

64. On November 21, 1998, the Examiner issued a Notice of Allowability, allowing all claims. The Examiner's comment attached to the notice stated (RX-6)

> The examiner has not considered the 1449 listed Other Art Texas Instruments, Semiconductor Group Package Outlines. Reference Guide, 1996, pg. 6-20, as it was not included in Applicant's amendment.

Conclusion

3. The prior art made of record and not relied upon is considered pertinent to

applicant's disclosure. The best art to consider with this application can be found in Newman, (5,490,324), Marrs et. al. (5,355,283), Lin et al. (5,450,283), Pastore et al. (5,285,352) and Lin et al. (5,216,278) All of the above references discloses a BGA package, however, none disclose a BGA package with the overall arrangement and combination of components as does applicant.

G. Prosecution Of The '341 Patent

65. The original application that led to the issuance of the '341 patent, Ser. No. 437,621, was filed on May 9, 1995, and included 23 claims. (RX-2).

66. Original claim 1 read:

A device for selectively controlling internal functions of an integrated circuit comprising:

means for sensing an application indication by means of a potential detected at a pin, the sensing means being operative following a reset to provide a signal for determining an application associated with the application indication selected by a user. [RX-2]

Original claims 2 to 23 read (RX-2):

2. A device as claimed in claim 1 wherein the means for sensing is digital means having a high switching threshold.

3. A device as claimed in claim 1 wherein the sensing means comprises means for comparing a voltage at a node of a pin with a threshold voltage.

4. A device as claimed in claim 1 wherein the application is sensed by a binary logic level at an application select pin, and having two applications select pins for selecting four applications.

5. A device as claimed in claim 4 wherein the two pins for sensing an application select pin are used, after sensing, for a respective function unrelated to sensing.

6. A device as claimed in claim 4 further comprising means for having the four applications being selectively

one of three LED applications and a LED default application.

7. A device as claimed in claim 1 wherein the signal provided by the sensing means chooses between a primary application and a secondary/alternate application.

8. A device as claimed in claim 1 wherein the means for operating the selected application comprises flip flop means and wherein the output from the sensing means is directed to an input of the flip flop means, and wherein the flip flop means is responsive to a condition of reset and not-in-reset.

9. A device as claimed in claim 8 wherein the flip-flop means comprises means responsive to a control signal such that when the flip flop means is not-in-reset, the flip flop means latches to a first condition representative of a first potential, and in a second condition the flip flop means latches to a potential other than the first potential.

10. A device as claimed in claim 1 further comprising circuit means for internally adjusting a potential of the pin.

11. A device as claimed in claim 10 further comprising external resistor means for adjusting the potential of the pin.

12. A device as claimed in claim 3 further comprising, for at least one pin, at least one of a pull up resistor for selecting a logic high or a pull down resister for selecting a logic low.

13. A device as claimed in claim 3 further comprising a floating pin or an input to an external logic device for selecting a logic low.

14. A device for selectively controlling internal functions of an integrated circuit comprising:

at least one application sense pin on an integrated circuit, the pin having an application sense function and a

respective function unrelated to sensing;

circuit means, coupled to the application sense pin, for internally adjusting a potential of the pin;

logic means, coupled to the application sense pin, for comparing the potential at the pin with a reference voltage; and

application select means, coupled to the logic means, for selecting the application for the circuit in response to the comparison.

15. A device as claimed in claim 14 wherein the means for sensing is digital means having a high switching threshold.

16. A device as claimed in claim 13 wherein the application select means chooses between a primary application and a secondary/alternate application.

17. A device as claimed in claim 14 wherein the application is sensed by a binary logic level at an application select pin, and including having two applications select pins for selecting four applications.

18. A device as claimed in claim 17 further comprising means for having the four applications being selectively one of three LED applications and a LED default application.

19. A device claimed in claim 17 further comprising, for at least one pin, at least one of a pull up resistor for selecting a logic high or a pull down resistor for selecting a logic low.

20. A device as claimed in claim 17 further comprising a floating pin or an input to an external logic device for selecting a logic low.

21. A device as claimed in claim 14 wherein the application select means further comprises flip flop means and wherein the potential at the application sense pin is converted to a logic level by the logic means, the logic level being directed to an input of the flip flop means, and wherein the flip flop means is responsive to a

condition of reset and not-in-reset.

22. A device as claimed in claim 21 wherein the flip-flop means comprises means responsive to a control signal such that when the flip flop means is not-in-reset, the flip flop means latches to a first condition representative of a first potential, and in a second condition the flip-flop means latches to a potential other than the first potential.

23. A device as claimed in claim 14 wherein the circuit means further comprises external resistor means for adjusting the potential of the pin.

67. Certain claims of the application that led to the '341 patent were rejected in a first Office Action dated Feb. 13, 1996, by the U.S. Patent Office as anticipated by U.S. Pat. No. 5,051,622, which issued to Pleva. (RX-2).

68. In the Feb. 13, 1996 Office Action, the Examiner stated (RX-2):

> Claims 3-6, 8-9, 12-13, 15 and 17-20 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. With respect to claim 3, that is meant by "a node of a pin"? An IC "pin" is generally metallic and thus considered an equipotential region or one circuit "node". Furthermore, what is the operative relationship between the recitation "a voltage at ... a pin" and the parent claims 4 and 17, "sensed" in line 2 would appear to be more appropriate as, e.g. determined, since a "logic level" is not a circuit and hence cannot "sense". In claim 8, what is the antecedent basis for "the means for operating "? In claim 15, there is no antecedent basis for "the means for sensing" The remaining claims are rejected for depending upon a rejected claim.
>
> * * *
>
> Claims 1-3, 7-9, 12-16 and 21-23 are rejected under 35 U.S.C. §102 as being anticipated by Pleva. In Fig. 4, Pleva teaches a "device for selectively controlling internal functions of an integrated circuit" including "means for sensing" or 136 and

150, and "pin" 130, similarly coupled for operation as claimed by applicant. Note the teaching in col. 3 third paragraph, of the "means for sensing" latch 150 being "operative following a reset" since, as shown in Fig. 3, the RESET signal occurs beginning with the leading edge of its signal, whereas the LATCH signal latches the logic level of the input to 150 at the training edge of its signal. With respect to claim 2, the adjective "high" as used in the limitation "high switching threshold" has meaning only in relation to some other term such as 'low'. Accordingly, buffer 136 may be said to have a "high switching threshold". With respect to claim 3, buffer 136 reads on the claimed "means for comparing" since it inherently has an internal "threshold voltage", usually around half the nominal power supply voltage, to which the input signal from "pin" 130 is compared, for determining its output level With respect to claim 7, see col. 2, lines 38-43. With respect to claim 8, clearly latch 150 comprises a "flip flop" and, since the LATCH signal is related to the RESET signal, 150 is also 'responsive to a condition of reset and not in rest". With respect to claim 9, clearly "flip flop" 150 latches a "first condition" of having a logic high output which is "representative" of a "first potential" or a logic high at its input, when enabled by the LATCH signal or "not-in-reset", and furthermore latches a logic low as a "second condition" as claimed. With respect to claims 12-13, note the external "resistor" for "selecting" either a "logic high" or a "logic low" to the input of 155, which reads on the claimed "external logic device", which pulls pin 130 "low" when the resistor is connected to ground. See col. 3, lines 17-23. With respect to claim 14, pin 130 reads on the claimed 'application sense pin" output buffer 131 reads on the claimed "circuit means for internally adjusting the potential of the pin" as it drives 130 either high or low when providing an output signal. 136 reads on the claimed "logic means" since it compares the potential at pin 130 with its internal threshold "reference voltage", and latch 150 reads on the "application select means" since it selects the mode of operation. The remaining claims are rejected for being anticipated by Pleva as noted above.

* * *

Claims 4-5, 17 and 19-20 are rejected under 35 U.S.C. §103 as being unpatentable over Pleva, as used above. With respect to claim 4, note the teaching in col. 2, lines 64-66 of the

chip having 'many mode select input pins'. Since each mode select pin has a binary logic signal present at same, then for N mode select pins there would be 2^N possible distinct modes encoded as binary logic levels on the N mode select pins, as is well-known in the art. Given the importance of conserving input pins to the integrated circuit as taught in col. 1, third and fourth paragraphs of Pleva, it would have been obvious to one of ordinary skill in the art of integrated logic design, at the time of applicant's invention, to have used "two" mode 'select pins" to encode one of "four" different modes or "applications" as claimed, since for the case of N =2, $2^N = 4$. With respect to claim 5, clearly "pin" 130 functions as an output pin for chip 110, which comprises a "function unrelated to sensing" which is an input function, after termination of same. Claim 17 is similarly rejected as being obvious in view of Pleve for the reasons given above. With respect to claims 19-20, see the external "resistor" noted above for "selecting" either a "logic high" or a "logic low" to the input of 155 which reads on the claimed "external logic device.

69. With respect to original claims 10-11, the Examiner in the February 13, 1996 Office Action stated (RX-2):

> Claims 10-11 are objected to for depending upon a rejected claim, but if represented in independent form, along with claims 6 and 18 being further amended to obviate any grounds of indefiniteness, would be deemed allowable over the prior art.

70. The Examiner in the Feb. 13, 1996 Office Action also stated (RX-2):

> The following prior art is cited of interest: Tashiro et al [U.S. Pat. No. 5,113,083] teach a mode select circuit which enables mode selection after a RESET signal exceeding a high threshold is applied; Simpson [U.S. Pat. No. 4,902,917] discloses a multiple-mode circuit using the binary encoding rule $M = 2^N$, where N is the number of mode select pins and M is the maximum number of distinct modes possible; Aoki [foreign pat. 404,017,414A] discloses the use of on-chip LED lighting patterns to indicate customized data; and Josephson et al [U.S. Pat. No. 5,237,218] teach multiplexing of input pins for in-system programming of an integrated circuit.

71. Original claim 14 eventually became issued independent claim 13. (RX-2).

72. Pleva discloses a reset configurable device with a multipurpose pin, as shown in Figure 2. (RX-544 Figure 2).

73. Responding to the Office Action of Feb. 13, 1996, applicants in a response received on Aug. 22, 1996 by the Patent Office cancelled claims 10, 15, 17 and 18, amended claims 1, 3, 4, 8, 11, 14, 19, 20, 21 and 23, and added new claim 24 as follows [bracketed material refers to deleted matter and underlineed material refers to added matter]:

> 1. (Amended) A device for selectively controlling internal functions of an integrated circuit comprising means for sensing an application indication by means of a potential detected at a pin, and circuit means for internally adjusting the potential of the pin in response to the detected potential, the sensing means being operative following a reset to provide a control signal for determining an application associated with the application indication selected by a user.
>
> 3. (Amended) A device as claimed in claim 1 wherein the sensing means comprises means for comparing [a voltage at a node of a] the potential of the pin with a threshold voltage.
>
> 4. (Amended) A device as claimed in claim 1 wherein the application is determined [sensed] by a binary logic level at an application select pin, and having two applications select pins for selecting four applications.
>
> 8. (Amended) A device as claimed in claim [1] 3 wherein the comparing means [for operating the selected application] comprises flip flop means and wherein the output from the sensing means is directed to an input of the flip flop means, and wherein the flip flop means is responsive to a condition of rest and not-in-reset.
>
> 11. (Amended) A device as claimed in claim [10] 1 further comprising external resistor means for adjusting the potential of the pin.
>
> 14. (Amended) A device for selectively controlling internal

functions of an integrated circuit comprising:

N [at least one] application sense [pin] pins on an integrated circuit for selecting one of N^2 applications, the pins having an application sense function and a respective function unrelated to sensing;

circuit means, coupled to the N application sense pins, for internally adjusting a potential of the pins;

logic means, coupled to the N application sense pins, for comparing the potential at the pins with a reference voltage; and

application select means, coupled to the logic means, for selecting [the] one of the N^2 applications [application] for the circuit in response to the comparison, the application being determined by a binary logic level at the N application select pins

19. (Amended) A device as claimed in claim [17] 14 further comprising, for at least one pin, at least one of a pull up resistor for selecting a logic high or a pull down resistor for selecting a logic low.

20. (Amended) A device as claimed in claim [17] 14 further comprising a floating pin or an input to an external logic device for selecting a logic low.

21. (Amended) A device as claimed in claim 14 wherein the application select means further comprises flip flop means and wherein the potential at the N application sense ping is converted to a logic level by the logic means, the logic level being directed to an input of the flip flop means, and wherein the flip flop means is responsive to a condition of reset and not-in-reset.

23. (Amended) A device as claimed in claim 14 wherein the circuit means further comprises external resistor means for adjusting the potential of the N pins.

24. (New) A device as claimed in claim 14 wherein the N^2 applications comprise one of three LED applications and a LED default application.

Applicants in the Aug. 22, 1996 response stated (RX-2):

> Applicants respectfully traverse this rejection [on Pleva] but in the interest of expediting prosecution, have amended the claims as suggested in the Office Action. Claim 1 has been amended to incorporate the limitations of claim 10. Claim 14 has been amended to include the limitations of claim 18. Further, as stated above, the claims have been amended to overcome the indefiniteness and claims 10, 17 and 18 have been cancelled as a result. Finally, new claim 24 has been added. Support for claim 24 is found on page 5, lines 14-19 of the specification.

74. On Aug. 29, 1996 the Examiner issued a notice of allowability allowing claims 1-9, 11-14, 16, 19-24. (RX-2).

75. Amended claims 11, 14, 19, 20, 21, 23, 24 became respectively patent claim 10, 13, 15, 16, 17, 19, 20. (RX-2).

76. Original claims 12, 13, 16, 22 became respectively patent claims 11, 12, 14, 18 (RX-2).

H. The '410 Patent

77. A substrate described in the '410 patent is a generally flat piece of material consisting of a top surface, an exposed external bottom surface, two arrays of contact pads, bond pads, a ground bus, and vias. (Blanchard, Tr. at 1870 to 1871).

78. The term "substrate" as used in the '410 patent, and as understood in the packaging industry, is a broad term that encompasses a wide range of materials and processes. (Blanchard, Tr. at 1870-71; Pecht, Tr. at 2378; Barrow, Tr. at 1069-70; 1074; Prince, Tr. at 3053).

79. In reference to ball grid array packages, the substrate is used to electrically connect the integrated circuit to the solder balls at the bottom of the package. (Pecht, Tr. at 2378:11-16).

80. The meaning of "substrate" differs between a conventional printed circuit board substrate and a co-fired ceramic substrate, in that the former may include a solder mask and the latter may not. (Prince, Tr. at 3052-53; Pecht, Tr. at 2388-93; Blanchard, Tr. at 1927-28).

81. "Co-fired ceramic packaging processes" are distinct from the printed circuit board processes used to make plastic BGA substrates and are used to fabricate ceramic BGA substrates. (Barrow, Tr. at 1071-72).

82. Co-fired ceramic packaging substrates are made out of clay layers, with tungsten and inks that are fired at a kiln at 1600 degrees C into a solid mass. The ceramic substrate would then be used to house a semiconductor die. (Barrow, Tr. at 1075).

83. Ceramic is a different material system altogether from printed circuit board technology. (Barrow, Tr. at 1074).

84. Conventional printed circuit board and co-fired ceramic packaging processes known in the art are two distinct packaging processes. (Prince, Tr. at 3053).

85. Ceramic BGA substrates do not include solder mask. (Barrow, Tr. at 1088; Blanchard, Tr. at 1928).

86. The term "substrate," as used in the '410 patent, could include an insulating material such as Bt resin, multiple layers of patterned metal, contact pads, vias and solder mask. (Blanchard, Tr. at 1874-76).

87. One of ordinary skill in the art would consider a solder mask, if present, to be part of a BGA substrate. (Blanchard, Tr. at 1874-76).

88. It is well known in PC board fabrication that solder mask typically covers vias. (Blanchard, Tr. at 2022). Pecht testified (Tr. at 2379-80):

JUDGE LUCKERN: . . .
But I see in this packet, ['410 patent] this word "substrate" is used a lot in this patent, for example, Doctor, if you look at column 2, you say at line 27, you say a substrate, 12 and then it's characterized as a substrate 12, same thing in column 2, line 44, substrate 12, and then talks about the substrate in the same paragraph, and if you go over at page column 3, you see repeated references to the substrate 12, et cetera.

And then of course you see it in the claim.

Is this word "substrate" back in '95, when this was applied for, was there a conventional term used in this art, substrate was a common term, or is this a word that s rather unique to this patent, if you know? Do you have any opinion?

I mean, have you ever seen this word "substrate" used by anybody in this art, other than you see in this patent? Do you understand what I'm trying to ask you?

THE WITNESS: Yes, Your Honor. And first to give you a chance, I've written more than ten books. And I was looking through my books, and I think every book uses the word "substrate."

JUDGE LUCKERN: What are these books about?

THE WITNESS: Electronic packaging.

JUDGE LUCKERN: Go ahead.

THE WITNESS: And the use of the word "substrate" falls under this same kind of categories as I told you when we discussed packaging, there's-- it depends on the level of packaging, the word "substrate" is used many different ways by many different people.

JUDGE LUCKERN: In this particular field?

THE WITNESS: In the field of electronic packaging, yes. So, now, if you talked about substrates in reference to ball grid array packages, then the word

"substrate" has more definite meaning. And in that case, the substrate is used to electrically connect the integrated circuit to the solder balls at the bottom of the package.

JUDGE LUCKERN: Okay

THE WITNESS: The substrate serves that purpose of the electrical, you could see the electrical routing. And so, the substrate material has to be an insulating material and then on or within that material there has to be some electrically conducting material to route the signals and the power and the ground.

JUDGE LUCKERN: Have you ever heard of this expression "solder mask," solder mask?

THE WITNESS: Yes.

JUDGE LUCKERN: What do you understand by that word or that phrase?

THE WITNESS: Well, a mask is just like you put on a mask, it's a covering. So a solder mask is used in some cases to cover areas that you don't want let's say solder wicking so I'll give you an example. In ceramics you wouldn't use it, in some polyamides, depending on how you have the ball grid array, you may not need to use it, in printed circuit boards like FR4 that I talked about, the conventional printed circuit boards you could, there's many printed circuit boards that don't use the solder mask, but there's printed circuit boards that also do use the solder mask.

And the solder mask would cover the traces so that when you, let's say, go through a soldering process, that you don't have bridging or wicking between the traces. And the traces being the things that are electrically connecting one component to the other.

JUDGE LUCKERN: In your opinion, would a solder mask ever be considered to be a part of the substrate?

THE WITNESS: I think that depending upon who you talk to in the printed circuit board entry, somebody could

say that it's a part of the substrate. but it's not usually associated with the substrate, it's another process.

So you can have a printed circuit board without a solder mask.

JUDGE LUCKERN: But could you have it with a solder mask?

THE WITNESS: And you could have it with a solder mask. Some again you wouldn't have ceramic with a solder mask?

JUDGE LUCKERN: All right. Why do you say you wouldn't have ceramic with a solder mask?

THE WITNESS: Because there would be -- well. forever nor a ball grid array package, because there would be no need to put it on. [Emphasis added]

89. The purpose of a via is to move an electronic signal from one layer of the substrate to 3.0 another. Some vias extend all the way through a substrate, others do not, depending on the function the via is supposed to perform. (Blanchard, Tr. at 2022-23).

90. A conventional circuit board might not include a solder mask if there was no concern about wicking between traces. (Pecht, Tr. at 2390).

91. Pecht is aware of substrates in the packaging art which have included a solder mask which defines boundaries of conductive elements used to electrically connect the substrate to other elements in the package. (Pecht, Tr. at 2391).

92. At least some conventional circuit boards include solder masks. (Pecht, Tr. at 2443).

93. Pecht is aware of plastic BGAs that include solder masks on the outer surface of the bottom of the package. (Pecht, Tr. at 2444).

94. Prince has not seen an ordinary plastic BGA package without solder mask on it. (Prince, Tr. at 3148-49).

95. Where BT resin is used as part of the printed circuit board of a PBGA package, there would be instances where solder masks would be on the bottom of the package. (Pecht, Tr. at 2447).

96. Exhibit RX-239, an article authored by a Motorola employee, refers to solder mask as being part of the substrate of a plastic ball grid array package. (Pecht, Tr. at 2449; RX-239, pg. 2, table 1).

97. A PBGA package designer could use either a substrate with a solder mask, or a substrate without solder mask in designing a PBGA package, but there are considerations that would need to be taken into account. (Prince, Tr. at 3169).

98. Solder balls are metal spheres that reflow (melt) at a set temperature to allow the package to be mounted to external conductive contacts, forming continuous electrical connections with the contacts. (Blanchard. Tr. at 1872).

99. It is well known in the art of printed circuit board technology to use solder mask (Blanchard, Tr. at 1882-83).

100. LSI Logic is a semiconductor manufacturer that produces custom integrated circuits for their customers. LSI's complete solution to the customer includes the design, manufacture and packaging of integrated circuits. (Weihe, Tr. at 1725).

101. LSI is not in the business of selling semiconductor packages to its customers. Packaging is only part of the total ASIC solution LSI provides to its customers. (Weihe, Tr. at 1726).

102. LSI Logic's corporate representative Ivor Barber does package engineering for LSI Logic. (JX-67, Tr. at 22 to 23).

103. Dr. Gary Weihe was employed for five years at LSI Logic in a product marketing capacity, initially hired by LSI Logic in the position of Product Marketing Manager for Packaging Technology. (Weihe, Tr. at 1724-25).

104. Weihe was not directly involved in the development of LSI's 503 EPBGA package, but he was intimately involved with its development, because he had to communicate to customers what was coming out of the development in terms of successes. Weihe was the primary technical interface with the customers to answer their questions about the package, so he had to be very knowledgeable about the package and its development. (Weihe, Tr. at 1808-09).

105. **[There is no FF 105]**

106. **[There is no FF 106]**

107. The LSI Logic Package Selector Guide was compiled in June of 1994. (Weihe, Tr. at 1731).

108. Weihe and his group at LSI were responsible for compiling the 1994/1995 LSI Logic Package Selector Guide, RX-928 ("LSI Logic Package Selector Guide). (Weihe, Tr. at 1731).

109. The LSI Logic Package Selector Guide includes a print code on the bottom left corner of the last page reading: "Printed in USA, 694," meaning that it was printed in June of 1994. (Weihe, Tr. at 1739).

110. Weihe confirmed that the "694" code on the last page of the LSI Logic Package

Selector Guide means that it was printed in June of 1994, by contacting Karen Soudy, an ex-LSI employee, who contacted Alice Quanta, an LSI employee at least as of January 2001 and who had the function of ordering documents such as the LSI Logic Package Selector Guide. Weihe understands that Alice Quanta actually looked up on her computer system and verified that the "694" code was the print code and that her records indicated that the LSI Logic Package Selector Guide was printed in June of 1994. (Weihe, Tr. at 1827-28).

111. The purpose of the LSI Logic Package Selector Guide is to document the package offerings that LSI is making available for sale to LSI customers in support of their custom integrated circuits. (Weihe, Tr. at 1732).

112. The LSI Logic Package Selector Guide was printed immediately after it was compiled and checked, within a matter of days after it was compiled. (Weihe, Tr. at 1731).

113. After the LSI Logic Package Selector Guide was printed in June of 1994 it was immediately distributed to the LSI sales and design centers throughout the world, so that it could then be given to customers outside of LSI. (Weihe, Tr. at 1739, 1827-28, and 1732).

114. The LSI Logic Package Selector Guide was given freely to customers without any restrictions. (Weihe, Tr. at 1733).

115. The LSI Logic Package Selector Guide, RX-928, was published prior to March 28, 1995. (Weihe, Tr. at 1731-33, 1739, and 1827-28).

116. Barber indicates that the LSI Package Selector Guide is produced by LSI marketing to be given to LSI customers to show available packages. (JX-67 at 37).

117. Barber regarded Weihe as the author of the LSI Package Selector Guide, and indicated that Weihe was responsible for compiling and publishing the LSI Package Selector

Guide. (JX-67 at 38).

118. The LSI Logic Package Selector Guide, RX-928, was printed in June of 1994 and soon thereafter made available to customers of LSI Logic, prior to March 28, 1995. (Weihe, Tr. 1731-10, 1739, and 1827-28)

119. When provided a better quality copy of the second edition of the LSI Package Selector Guide, RX-607-A, Weihe was able to clearly see the print code on LSI38197, reading "1294," which Weihe indicated meant that it was printed in December of 1994. (Weihe, Tr. at 1760-62).

120. Weihe did recall occasionally giving the Package Selector Guide to customers at presentations. (Weihe, Tr. at 1823).

121. Weihe states that the LSI Package Selector Guide clearly was printed before its errata sheet, which states that it was printed in December of 1994. (Weihe, Tr. at 1829).

122. The packages shown in the Package Selector Guide were in development form and could be ordered by customers, if the customer's program time line was consistent with the projected development time line for the selected package. When a customer wants an ASIC, the customer will select an ASIC and a package at the same time for a complete solution. By the time an ASIC is designed and built, months have transpired, so when the LSI Package Selector Guide came out, the packages in the guide were being offered for sale. (Weihe, Tr. at 1830).

123. **[There is no FF 123]**

124. Blanchard, admitted that the LSI Logic 503 EPBGA Package discloses all of the claim limitations of all of the asserted claims of the '410 patent except the specific footprint

recited by claims 23, 24, 27, and 29. (Blanchard, Tr. at 4096-97).

125. LSI Logic has never manufactured a flip chip version of the 503 EPBGA. (JX-67 at 125).

126. The dimensional profile of the integrated circuit housed inside of the LSI 503 EPBGA Package is located in the depopulated region, or between the outer array and the center array of contact pads. (RX-928 at 3-27; RX-565 at LSI000473, LSI000475, LSI000490, LSI000505; Prince Tr. at 3090-91, 3107-08, 3107; Pecht Tr at 2394-2398).

127. **[There is no FF 127]**

128. The LSI 503-Lead EPBGA package houses a single integrated circuit die centrally attached to the top surface of the substrate, leaving the die edge above a depopulated region in between the outer and center arrays of contact pads, and associated solder balls. (Prince, Tr. 3092-98 and 3107; Pecht, Tr. at 2395-96; RX-556C at LSI 473 and 475, 503 EPBGA Kickoff).

129. The dimensional profile of the integrated circuit housed inside of the LSI 503 EPBGA package is located in the depopulated region, or between the outer array and the center array of contact pads. (RX-565 at LSI000473, LSI000475, LSI000490, LSI000505; JX-67, at 57).

130. The purpose of a BGA package is to house an integrated circuit chip and interface the chip with the outside world. (Prince, Tr. at 3099).

131. **[There is no FF 131]**

132. The purpose of the 503-Lead EPBGA package is to house an integrated circuit die, facilitating interconnection of the die to the outside world. (Prince, Tr. at 3099; Pecht,

Tr. at 2404; RX-928 at 8-29 to 8-31, LSI Package Selector Guide Interconnect Table).

133. LSI Logic only put in{

} (Barbar, JX-67 at 102).

134. The prevalent packaging practice for BGA packages has been and is to centrally attach a single integrated circuit die to the top surface of the substrate in a BGA package to facilitate wire bond connection to the pads on the die. A single integrated circuit die is centrally attached to the top surface of the substrate. (Prince, Tr. at 3090-98 and 3107; Pecht, Tr. at 2397).

135. Weihe recalled a letter dated October of 1994 that he sent to a customer,{ } which enclosed six 503 EPBGA packages with functional working die. (Weihe, Tr. at 1822).

136. On May 26, 1994, LSI Logic, through{ } issued a standard business quotation to{ } (Barber JX-68, at 65-67; RX-1070-2 (Exh. 3), LSI quote to{ } at LSI38525).

137. LSI Logic advised{ } that "LSI Logic will hold the terms of the enclosed quotation firm for 30 days" for LSI Logic s ROUZIC ASIC products to be packaged in the 503 PBGA package. (Barbar JX-68, at 67-68; RX-1070-2 (Exh. 3), LSI quote to{ } at LSI38525).

138. The LSI Logic product quoted to{ } bore the LSI Logic Device number LCA500618 with 180,000 usable gates, which represented LSI Logic's product manufactured with its 500K technology. (Barbar, JX-68. at 69-70; RX-1070C-2 (Exh. 3), LSI quote to { } at LSI38526).

139. The LSI Logic product quoted to{ } was in the amount of{ }

(RX-1070C-2 (Exh. 3), LSI quote to{ } at LSI38526).

140. On June 16, 1994,{ }through{ }issued a purchase order to { } at LSI Logic, stating a purchase price in the amount of { } for the same product and package stated on LSI Logic's quotation of May 26, 1994. (JX-68, at 73-75; RX-1070C-3 (Exh. 4),{ } purchase order).

141. The{ } transaction was verified by a separate LSI Logic internal document entitled "LSI Logic 500K ASIC Booked Design Profiles" generated in{ } by its ASIC product marketing department for use in tracking customer orders for the 500 K technology. (Weihe, Tr. at 1783; RX-907, Internal LSI Logic Booked Design Profiles).

142. A 500K ASIC product having 180,000 usable gates, and packaged with the 503 EPBGA package was offered for sale to{ } during Q2 (April-June) of 1994 and sold to{ } in June, 1994. (Weihe, Tr. at 1784-7; RX-907).

143. **[There is no FF 143]**

144. **[There is no FF 144]**

145. **[There is no FF 145]**

146. LSI's 479 cavity down and 503 cavity up packages{ } at least as late as the time that the cited passage on page 3-8 of RX-928 was written; however, these packages were available for customers to purchase. At that time, the form, fit and function of the packages was not going to change. (Weihe, Tr. at 1754-55).

147. Weihe stated that solder mask was on the bottom of the 503 EPBGA package, and he believed that it was also on the top of the package. (Weihe, Tr. at 1755-56).

148. Weihe is not aware of LSI Logic ever using dummy solder balls, which he

defines as having no electrical or thermal function, on the 503 EPBGA package. (Weihe, Tr. at 1778-79).

149. LSI's field salespeople were the prime interface with the customer, but not the sole customer interface. Others at LSI interfaced with customers, including application design engineers, tactical marketing employees, product marketing employees, and package engineers. Anybody that interfaced with a customer would be subjected to customer requests. (Weihe, Tr. at 1809-10).

150. Qualification of a package means that the package has gone through a battery of accelerated life tests and passed LSI Logic's requirements, so that with a very, very high level of confidence, LSI deems the package suitable for the customer's use, application, reliability and lifetime perspective. Availability means that a customer can receive a prototype of the package, a physical working functional semiconductor in the package, or mechanical samples or daisy chain samples of the package for testing. (Weihe, Tr. at 1852-53).

151. Some customers for the new packages would request production before the package was qualified, as the customer's needs necessitated this, though LSI preferred to have the package fully qualified before moving into production. (Weihe, Tr. at 1853).

152. **[There is no FF 152]**

153. LSI on many occasions made the 503 EPBGA package available before { } (Weihe, Tr. at 1853).

154. The{ } sales data pertaining to the 503 EPBGA was stored in LSI Logic's { } a database system that LSI Logic relied on and used to track and manage the business. (Weihe, Tr. at 1784).

155. Availability means that a customer can receive a prototype of the package, a physical working functional semiconductor in the package, or mechanical samples or daisy chain samples of the package for testing. (Weihe, Tr. at 1852-53).

156. From a review of the documents shown during Barber's depositions, Barber concluded that{ } was "obviously" a customer of LSI's in June of 1994. (JX-68 74).

157. There were construction details that were changed for the 503 EPBGA package. However, the package that LSI was showing and selling to customers was a form, fit and function which did not change from the time that LSI started disclosing the package until the time that the package was qualified and customers began putting their custom integrated circuits into the package. So the body size of the package remained constant, the solder ball layout on the bottom remained constant, the position of the solder balls remained constant, the fact that the package was cavity up remained constant, the fact that it was wire bonded remained constant, and the interconnectivity from the die to the package remained constant. (Weihe, Tr. at 1811-12).

158. { } of LSI Logic began developing the 503 EPBGA package between late 1991 and early 1992. (Barber JX-67 at 27).

159. { } completed his design of the footprint of the 530 EPBGA package no later than{ } and generated drawings bearing this date. (Weihe, Tr. at 1769; Barber JX-67, at 84; RX-565, 503 EPBGA Program Kick-Off Meeting, at LSI000474).

160. { } completed his design of remaining portions of the 530 EPBGA package no later than{ } and generated cross-sectional drawings of the package bearing this date. (Weihe, Tr. at 1769; Barber JX-67 at 85; RX-565, 503 PBGA Program

Kick-Off Meeting, at LSI000475).

161. { } drawing shows a footprint of the 503 EPBGA package having an outer array of contact pads/solder balls and an inner array of contact pads/solder balls. (RX-565 at LSI000474; Weihe, Tr. at 1769).

162. { } drawing of the 503 EPBGA is essentially the same as Figs. 4 and 5 of the '410 patent. (RX-565 at LSI000474; RX-5).

163. { } drawing shows the cross-section of the 503 EPBGA package that is essentially identical to Fig. 3 of the '410 patent. (RX-565 at LSI000475; Weihe, Tr. at 1769; RX-5).

164. Between 1992 and 1993, LSI Logic engaged in extensive reliability testing on the 503 EPBGA package. (Barber, JX-67 at 31-33).

165. LSI Logic held a "kick-off meeting" for the 503 EPBGA Package on{ } (RX-565, 503 PBGA Program Kick-Off Meeting, at LSI000470; Weihe, Tr. at 1769).

166. During the LSI Logic "kick off meeting" for the 503 EPBGA on{ } the package was formally introduced to key members of the development, marketing and test teams. (Weihe, Tr. at 1768).

167. After the "kick-off" meeting, LSI Logic conducted mechanical and thermal simulations of the 503 EPBGA package{ } (Barber, JX-67 at 94).

168. Mechanical and thermal simulations of the 503 EPBGA{ } (Barber, JX-67 at 94).

169. **[There is no FF 169]**

170. U.S. Patent No. 5,367,435 to Andros et al. (Andros et al.) is titled "Electronic Package Structure and Method of Making Same" and was filed on November 16, 1993. (RX-157).

171. The package described in Andros et al consists of a first substrate 11, a second substrate 13, with solder balls sandwiched between the two substrates. Therefore, the surfaces of the substrates that contact the solder balls are not "external" as required by each claim of the '410 patent. (RX-157, Figure 1 and col. 3, lns. 29-31).

172. Andros et al. never mentions or shows arrays of solder balls. The figures in Andros show partial view of the package. FIG. 1 is an elevational view, partly in section and on a much enlarged scale, of an electronic package structure in accordance with one embodiment of the invention. FIG. 2 is a partial plan view of the invention as taken along the line 2--2 in FIG. 1.

173. Andros et al does not show contact pads in arrays To the contrary, Andros simply show metal strips placed randomly on the surface of the second substrate 13. (RX-157, Fig. 2).

174. The few solder balls shown in the figures 1 and 2 of Andros et al are separated by many different distances, and, appear to be drawn at random on the bottom of the second substrate 13. Therefore, they are not separated from each other by a first distance or a second distance. (RX-157 at Figure 2).

175. RX-157 does not show wire bonds or encapsulent (Pecht, Tr. at 2425-26).

176. Figure 2 of the Andros et al patent, (RX-157), discloses a package with two

separate substrates, a center substrate element which is identified by the number 33 and an outer substrate element, 13. (Pecht, Tr. at 2471).

177. The Amkor article, entitled "Surface Mount Process Technology for Ball Grid Array Packaging" by Freyman et al which is one of the published Articles from the August 29-Septemeber 2, 1993 Surface Mount International Conference, discloses a ball grid array package. (Prince, Tr. at 3122; Pecht, Tr. at 2423; RX-901 at 81-83).

178. The Amkor article discloses a substrate with a top surface and a bottom surface. (Prince, Tr. at 3122; Pecht, Tr. at 2422-23; RX-901 at 81-83).

179. The Amkor article discloses a integrated circuit die centrally attached to the top surface of the substrate. (Prince, Tr. at 3120; Pecht, Tr. at 2423; RX-901 at 81-83).

180. Neither the Amkor article, nor any of the cited testimony, discuss connecting the integrated circuit to solder balls through thermal ground vias. (RX-901 at 81-83).

181. The Amkor article says nothing about a central array of solder balls being connected to a ground bus. (Prince, Tr. at 3121-22).

182. Nothing in the Amkor article mentions a center region of solder balls tied to ground and nothing in the article or the cited testimony mentions removal of heat from the integrated circuit die by way of thermal/ground vias, or by any other means. (Pecht, Tr. at 2423; RX-901 at 81-83).

183. Nothing in the Amkor article discusses arrays of contact pads. At most, the article talks about removal of certain solder balls. It does not discuss removal of the corresponding contact pads. (RX-901 at 81-83).

184. The Amkor article discloses a encapsulent over the integrated circuit die.

(Prince, Tr. 3120; Pecht, Tr. at 2423; RX-901 at 83).

185. The Amkor article states that, in certain situations, it may be necessary to depopulate solder balls at the edge of the die. It then states that the BGAs are currently shipping in desktop computer and handheld telecom applications with no reported field failures after more than four years. (RX-901 at 82).

186. U.S. Patent No. 5,506,756 to Haley (Haley) is titled "Tape BGA Package Die-Up/Die Down" and was filed on February 17, 1995. (RX-775).

187. The claims of the Haley patent all require that the second surface of the integrated circuit (the side to which solder mask "may be applied") be exposed. (RX-9, 775, col. 4. lns. 31-32).

188. Haley shows a substrate which is a flexible circuit board with an opening through which the integrated circuit is exposed. (Blanchard, Tr. at 4029; RX-775, col. 2, lns. 2-4).

189. The flexible circuit board disclosed in RX-775 has a square hole in the center of it. (Pecht, Tr. at 2477).

190. RX-775 show an integrated circuit positioned in the hole in the flexible circuit board. (Pecht, Tr. at 2477-78).

191. The bottom of the integrated circuit is exposed through the opening in the flexible circuit board shown in RX-775. (Pecht, Tr. at 2478).

192. The flexible circuit board disclosed in Figures 1 and 3 of RX-775 only has a single array of solder balls attached to it. (Pecht, Tr. at 2478).

193. Ordinarily, silicon isn't used as a substrate for integrated circuit packages.

(Prince, Tr. at 3175).

194. The Haley patent recites "[t]he flexible circuit board 16 has a plurality of conductive lines 22 on a first surface 24 of the tape 20. The lines 22 terminate at Vias 26 which extend through the tape 20 to surface pads 28 located on the second surface 30 of the flexible circuit board 16." (RX-775, col. 2, lns. 50-55).

195. Figure 1 of the Haley patent is a side view of a package showing some solder balls attached to the bottom surface of a substrate, and other solder balls attached to the bottom surface of an integrated circuit which is exposed through a hole in the center of substrate. (RX-775, Figure 1).

196. Figure 3 of the Haley patent shows an outer array of solder balls attached to the bottom surface of a substrate, and an inner array of solder balls attached to the bottom surface of an integrated circuit which is exposed through a hole in the substrate. (RX-775, Figure 3).

197. Haley states that "[a]s shown in figure 3, attached to each surface pad 28 is a solder ball 32." It makes no reference to an array. (RX-775, col. 2, lns. 56-57).

198. Haley states: "The die 12 also has a plurality of second surface output pads 38 located on a second opposite surface 40 of the integrated circuit 12. . . . The opening 42 [in the substrate] allows solder balls 32 to be attached to the second surface pads 38 of the integrated circuit 12. The solder balls 32 located on the die 12 directly couple the integrated circuit 12 to the printed circuit board. . . " (RX-775, col. 3, lns. 8-16)

199. While Haley discloses that the solder balls of the center array are separated by a second distance, Haley does not specify any distances. (RX-775, Figures 1 and 3).

200. The Haley patent shows an outer array of solder balls attached to the bottom

surface of a substrate, and an inner array of solder balls attached to the bottom surface of an integrated circuit which is exposed through a hole in the substrate. (RX-775, Figures 1 and 3).

201. Haley discloses an outer array of solder balls attached to "surface pads" on a substrate, and a center array of solder balls attached to "surface pads" on the bottom surface of an integrated circuit. (RX-775, col. 2, lns. 56-57, col. 3, lns. 13-14).

202. Haley shows an integrated circuit with solder balls attached directly to it, said integrated circuit being mounted in a hole in a substrate, which substrate also has solder balls attached to it. (RX-775 at Figures 1 and 3).

203. The Haley patent does not mention "bond pads" or "bond fingers." Instead, it states that the bond wires attach the pads on the top surface of the integrated circuit to "traces 22 of the tape 16." There is no evidence in the record that these "traces" are analogous to bond pads. (RX-775, col. 3, lns. 4-6).

204. Haley states that the conductive lines on the top of the flexible circuit board (the substrate) terminate at vias, which extend through the tape (the substrate) to surface pads located on the second surface of the flexible circuit board. (RX-775), col. 2, lns. 50-55).

205. The vias mentioned in Haley are not associated with a ground bus, and cannot be associated with the center array of surface pads or solder balls, because these are directly attached to the integrated circuit---no connection through a substrate by vias would be needed. Pecht never testified that the center solder balls are attached to a ground bus by vias, as required by claims 3, 8, and 19 of the '410 patent. (Pecht, Tr. at 2429-2430; RX-775 col. 2, lns. 50-55).

206. Haley states: "The additional pins [attached directly to the bottom of the

integrated circuit] can be dedicated to ground or power thereby increasing the number of data signals that can be routed to the IC through the top surface pads 34 of the die 12." (RX-775 col. 3, lns. 27-29).

207. Pecht testified in reference to Haley: "You don't see a ground bus." (Pecht, Tr. at 2430).

208. Pecht quoted the language in Haley, that the solder balls attached directly to the integrated circuit could be dedicated to ground. He did not state that this suggests the presence of a ground bus. (Pecht, Tr. at 2430).

209. The flexible circuit board disclosed in RX-775 has a square hole in the center of it. (Pecht, Tr. at 2477).

210. Haley does not disclose or suggest an integrated circuit mounted to the top surface of a substrate. (RX-775).

211. Haley does not disclose or suggest vias connecting a ground bus to a center array of contact pads. (RX-775).

212. Exhibit RX-776 does not illustrate a BGA package with the perimeter and a center array of solder balls. (Pecht, Tr. at 2479).

213. RX-776 contains figures of full array BGAs. (Prince, Tr. at 3188 and 3189).

214. RX-776 contains drawings of perimeter array BGAs. (Prince, Tr. at 3189).

215. RX-776 contains discussion about full array BGAs and about perimeter array. (Prince, Tr. at 3189).

216. RX-776 does not refer in any way to "adding" solder balls to a perimeter array BGA package. (RX-776).

217. Robert Munroe has worked in the engineering field for over 30 years. During that time, he has had major responsibilities in the area of semiconductor packaging for both IBM and Motorola. (Munroe, Tr. at 2040).

218. Munroe has been employed by Motorola since 1991 as a Design Group Manager and Section Manager with primary responsibility for packaging power PC products. (Munroe, Tr. at 2041-42).

219. According to Munroe, research and development efforts at Motorola before at least 1996 were focused on full-array BGAs, since that was perceived to be the target market. (Munroe, Tr. at 2065-66).

220. Munroe was not aware of any bull's-eye BGA work done at Motorola prior to 1996. (Munroe, Tr. at 2053; 2055).

221. Munroe could not recall the first time he saw a product with a bull's-eye BGA prior to 1997. (Munroe, Tr. at 2056).

222. Munroe has no knowledge of testing performed at Motorola prior to 1996 that involved either Motorola bull's-eye BGA designs or competitors' designs (Munroe, Tr. at 2056-57).

223. According to Munroe, while Motorola was aware of the so-called "die edge problem," Motorola's proposed solutions to the problem included using a thicker laminate, using a thinner die, using a compliant adhesive, and using a stiffer substrate. (Munroe, Tr. at 2059).

224. Monroe believes that solder mask can be considered within the industry to be part of the substrate in a PBGA package. (Tr. at 2064).

225. Monroe has worked for Motorola for eight years ten months during which he had worked as a design group manager with the primary responsibility of packaging power PC products and ceramic ball grid arrays after which he became a section manager with several departments reporting to him. During his tenure at Motorola, he had worked with ceramics and plastic ball grid arrays (PBGA) having full arrays or bull's eye arrays. (Tr. at 2041-42).

226. Motorola's proposed solutions to the die edge problem specifically excluded designing a bulls-eye PBGA. (Munroe, Tr. at 2057-58).

227. In full-array BGA packages, heat removal is often facilitated by means of solder balls, which are located directly beneath the die and electrically connected to ground. (RX-776 at 142).

228. The Electronic Design Article states that a perimeter array with a small matrix of solder balls in the center for improved thermal dissipation can be implemented in the form of a full array BGA by means of ground bumps located directly beneath the die. (RX-776 at 142).

229. The TI Semiconductor Group Package Outlines 1995, contains outline drawings of GFW (S-PBGA-N388), a 388-Lead Ball Grid Array (BGA) package with a center array of solder balls and an outer array of solder balls. (RX-343 at 6-20).

230. The TI Semiconductor Group Package Outlines 1995 does not show contact pads. (RX-343 at 6-20).

231. The TI Semiconductor Group Package Outlines 1995 shows a BGA package with a top surface and exposed external bottom surface. It also shows two arrays of solder balls, an inner array and an outer array, attached to the bottom surface of the substrate. It does

not show contact pads. (RX-343 at 6-20).

232. The solder balls within the outer array of the package depicted in RX-343 at 6-20 are separated by a first distance. The drawing does not show contact pads. (RX-343 at 6-20).

233. The solder balls within the center array of the package depicted in RX-343 at 6-20 are separated by a first distance. The drawing does not show contact pads. (RX-343 at 6-20).

234. The outer and center arrays of solder balls in the package depicted in RX-343 at 6-20 are separated by a third distance that is greater than either the first or the second distance. (RX-343 at 6-20).

235. The drawings on 6-20 of RX-343 show the outline of a ball grid array package, i.e., the external structure of the package. The drawings do not show, or even suggest the internal structure of a package that might use this outline, including the presence of an integrated circuit. (RX-343).

236. RX-343, page 6-20 does not explicitly disclose an integrated circuit. (Prince, Tr. at 31115; 3195).

237. The drawings on 6-20 of RX-343 do not show bond pads. (RX-343 at 6-20).

238. It is not necessarily true, from looking at the illustration in 6-20 of RX-343, that only a single integrated circuit would be encapsulated by the package on that page. (Prince, Tr. at 3195).

239. It is not necessarily true that bonding wires would exist in the packages as they are illustrated in RX-343, page 6-20. (Prince, Tr. at 3197).

240. It is possible that the packages shown in RX-928 at 8-27 or in RX-343 at 6-20 were designed to house flip chips rather than wire-bonded chips. (Pecht, Tr. at 2464).

241. Prince cannot tell whether there is a plate under the center array of solder balls in RX-343 at 6-20, and cannot tell from that reference whether it is electrically connected. (Prince, Tr. at 3180).

242. Prince cannot tell by looking at RX-343 at 6-20, whether the solder balls in the center array are whether it is electrically connected. (Prince, Tr. at 3180 3198).

243. It is possible to attach an integrated circuit to contact pads with routing through the outer edges of the substrate instead of using a via. (Pecht, Tr. at 2405).

244. RX-343, page 6-20 does not explicitly disclose an integrated circuit. (Prince, Tr. at 3111; 3195).

245. The dimensional profile of the integrated circuit is not explicitly shown in figure 6-20 of RX-343C. (Pecht, Tr. at 2420-21).

246. The outline drawings at page 6-20 of RX-343 depict a BGA package with an encapsulent over a portion of the top surface of the substrate. (RX-343 at 6-20).

247. The Package Selector Guide contains outline drawings of a ball grid array package, called the 503-Lead Enhanced Plastic Ball Grid Array (EPBGA) package. (RX-928).

248. Neither RX-928 at 8-27 nor RX-343 at 6-20 expressly shows vias as that term is used in the claims of the '410 patent. (Pecht, Tr. at 2466-67).

249. The package in the Guide does not have a first and second distance that are the same. (Prince, Tr. at 3105).

250. The requirement in claims 23, 24, 27 and 29 of the '410 patent that the first

distance be the same as the second distance is not explicitly taught by the LSI Package Selector Guide, RX-928. (Pecht, Tr. at 2407).

251. Equal first and second distances is not inherent in view of the '503 EPBGA Package because the '503 explicitly shows a footprint with exactly the opposite-unequal sparing. (RX-928, 8-27).

252. Limiting the number of solder balls, in a BGA package is economical, as royalties are often based on a per ball basis. (Pecht, Tr. at 2467-08).

253. The distance of the package in the Guide between the center and outer arrays of solder balls is approximately 7.64 mm, computed by substituting into the following equation the dimensions on page 8-28 for the package as shown on page 8-27: Estimated Distance = (D1 - D3 - (8)(e))/2. (RX-928 at 8-27 and 8-28, LSI Package Selector Guide).

254. The distance of the package in the Guide between the center and outer arrays of solder balls is greater than the pitch between solder balls in the outer array. (Prince, Tr. at 3083-84; Pecht, Tr. at 2361, 2363; RX-928 at 8-27 and 8-28)

255. The distance of the package on the Guide between the center and outer arrays of solder balls is greater than the pitch between solder balls in the center array. (Prince, Tr. at 3083-84; Pecht, Tr. at 2361, 2363; RX-928 at 8-27 and 8-28).

256. The LSI Package Selector Guide does not show contact pads. (RX-928 at 8-27; Prince, Tr. at 3084).

257. The LSI Package Selector Guide does not state how many or what type of electrical device is to be housed in the 503 EPBGA. (RX-928).

258. The LSI Package Selector Guide RX-928 at page 8-27 does not expressly

disclose an integrated circuit. (Prince, Tr at 3192).

259. The Package Selector Guide discloses an encapsulent covering a central region of the top surface of the substrate. (Prince, Tr. at 3084-85; Pecht, Tr. at 2405-06; RX-928 at 8-27, LSI Package Selector Guide; RX-923B, Pecht Annotations on a Copy of RX-928 at 8-27).

260. At page 8-27, the Guide shows an encapsulent, labeled with dimension A2 which is shown on page 8-28 to be between 1.04 and 1.45 mm. The guide does not show an integrated circuit. (RX-928 at 8-27 and 8-28).

261. The LSI Package Selector Guide does not show a ground bus in relation to the 503 EPBGA. It especially does not indicate a ground bus on the top surface of the substrate. (RX-928 at 8-27 to 8-31).

262. A ground bus is not shown outside of the encapsulated region of the package. (RX-928 at 8-27).

263. The Package Selector Guide does not show vias in relation to the 503 EPBGA. (RX-928 at 8-27 to 8-31; Pecht, Tr. at 2406-67).

264. The LSI Package Selector Guide does not disclose a plurality of bond pads on

{ }

CONCLUSIONS OF LAW

1. The Commission has in rem jurisdiction, subject matter jurisdiction and in personam jurisdiction.

2. There has been an importation of certain integrated repeaters, switches, transceivers, PBGA packages and products containing same in issue which are the subject of the unfair trade allegation.

3. An industry exists in the United States, as required by subsection (a) (2) of section 337, that exploits each of the '341, '603 and '410 patents in issue.

4. Respondent has failed to establish that the asserted claims of each of the '603 patent and asserted claims 23, 24, 27 and 29 of the '410 patent are not valid.

5. Respondent has established that asserted claims 1, 3, 7-8, 13-19, 25, 26 and 28 of the '410 patent are not valid.

6. Respondent has established that the asserted claims of the '341 patent are not valid.

7. Complainants have established that the asserted claims 1, 2, 3, 4, 5, 6, 7, and 9 of the '603 patent and claims 23, 24, 27 and 29 of the '410 patent are infringed by respondent.

8. Complainants have not established that asserted claim 8 of the '603 patent is infringed by respondent.

9. Respondent is in violation of section 337, based on its importation into the United States, sale for importation, and sale within the United States after important of certain integrated repeaters, PBGA packages and products containing same.

10. It is recommended that a limited exclusion order issue, as indicated in the remedy

section. Section IX, supra.

11. It is recommended that a bond of 100% entered value be required during Presidential review, as indicated in the bonding Section. See Section X, supra.

ORDER

Based on the foregoing findings of fact, conclusions of law, the opinion, and the record as a whole, and having considered all of the filings, it is the administrative law judge's final initial determination that there is a violation of section 337 in the importation into the United States, sale for importation, and the sale within the United States after importation of certain integrated repeaters, and PBGA packages. It is also the administrative law judge's recommendation that a limited exclusion order should issue and that a bond of 100% of entered value should be imposed during Presidential review.

The administrative law judge hereby CERTIFIES to the Commission his final initial and recommended determinations together with the record consisting of the exhibits admitted into evidence. The pleadings of the parties filed with the Secretary and the transcript of the hearing, including closing arguments, are not certified, since they are already in the Commission's possession in accordance with Commission rules.

Further it is ORDERED that:

1. In accordance with Commission rule 210.39, all material heretofore marked in camera because of business, financial, and marketing data found by the administrative law judge to be cognizable as confidential business information under Commission rule 201.6(a) is to be given in camera treatment continuing after the date this investigation is terminated.

2. Counsel for the parties shall have in the hands of the administrative law judge those portions of the final initial and recommended determinations which contain bracketed confidential business information to be deleted from any public version of said determinations, no later than August 10, 2001. Any such bracketed version shall not be served by telecopy on

the administrative law judge. If no such bracketed version is received from a party it will mean that the party has no objection to removing the confidential status, in its entirety, from these initial and recommended determinations.

3. The initial determination portion of the "Final Initial and Recommended Determinations," issued pursuant to Commission rule 210.42(h)(2), shall become the determination of the Commission forty five (45) days after the service thereof, unless the Commission, within that period shall have ordered its review or certain issues therein or by order has changed the effective date of the initial determination portion. The recommended determination portion, issued pursuant to Commission rule 210.42(a)(1)(ii), will be considered by the Commission in reaching a determination on remedy and bonding pursuant to Commission rule 210.50(a).

Paul J. Luckern
Administrative Law Judge

Issued: July 19, 2001

CERTAIN INTEGRATED REPEATERS, SWITCHES, TRANSCEIVERS, AND PRODUCTS CONTAINING SAME

Investigation No. 337-TA-435

CERTIFICATE OF SERVICE

I, Marilyn R. Abbott, hereby certify that the attached **Final Initial and Recommended Determination** was served by hand upon Juan Cockburn, Esq., and upon the following parties via first class mail, and air mail where necessary, on February 1, 200.

Marilyn R. Abbott, Acting Secretary
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CERTAIN INTEGRATED REPEATERS, SWITCHES, TRANSCEIVERS, AND PRODUCTS CONTAINING SAME

Investigation No. 337-TA-435

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