

**UNITED STATES OF AMERICA
BEFORE FEDERAL TRADE COMMISSION**

In the Matter of

RAMBUS INCORPORATED,

a corporation.

Docket No. 9302

COMPLAINT COUNSEL'S POST-HEARING BRIEF

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INTRODUCTION

*The most valuable patents are ones that must be used
in order to be in compliance with a standard.¹*

These words, authored by Rambus's primary JEDEC representative, Richard Crisp, capture the essence of this case, and the essence of Rambus as a company. Mr. Crisp, based on four years of participation in JEDEC's open standards process, was well acquainted with JEDEC's rules and its purposes. Yet he understood that Rambus's corporate objectives were fundamentally at odds with JEDEC's objectives.² Geoffrey Tate, the only CEO in Rambus's history, whom Rambus elected not to call as a witness at trial, knew this as well. His objective, set out in the Rambus business plan he drafted in June 1992, just months after Rambus began attending JEDEC meetings, was to gain control of the dominant DRAM industry standards. Indeed, Tate and others at Rambus fully appreciated that the company's intellectual property – its only real asset – would become valuable only if it was embedded in an industry standard. This case is not about an innovative company that emerged as a monopolist through the quality of its inventions. Rather, it is about a company whose inventions have come to possess immense market value solely because the company subverted an open standards process through deception and bad faith.

As Your Honor has ruled, this case comes down to three basic questions:

- Did the Respondent, Rambus Inc., engage “in a pattern of deceptive, exclusionary conduct by subverting an open standards process”?
- Did Rambus utilize “such conduct to capture a monopoly in technology-related markets”?

¹ CX0903 at 2 (emphasis added).

² In the same paragraph of the previously cited document, Mr. Crisp wrote: “The job of JEDEC is to create standards which steer clear of patents which must be used to be in compliance with the standard whenever possible.” CX0903 at 2 (emphasis added).

- Does Rambus’s challenged conduct violate “well-established principles of antitrust law”?

See Order Denying Respondent’s Motion for Summary Decision at 12 (Apr. 14, 2003). The voluminous evidentiary record – the product of a 54-day administrative hearing involving 44 live witnesses and roughly 1770 admitted exhibits – compels the same answer for each question: a resounding yes. As explained in this post-hearing brief, through its challenged conduct Rambus did indeed violate well-established principles of antitrust law, subjecting itself to liability under Section 5 of the FTC Act, 15 U.S.C. § 45.

Section I provides an overview of how the evidence developed through the administrative hearing substantiates every material allegation contained in the Commission’s Complaint.

Section II discusses the elements of the Commission’s claims, the overarching theory of liability, the relevant burdens of proof, and certain inferences and presumptions that should be taken into account in assessing the sufficiency of the proof.

Section III analyzes the central legal and factual issues bearing upon the subject of liability and explains why Rambus should be held liable under each of the three counts outlined in the Commission’s Complaint.

Finally, Section IV addresses the subject of relief and demonstrates why Rambus’s conduct warrants a broad, forward-looking remedy that will effectively restore competitive conditions to the markets at issue and bar Rambus from further exploiting its ill-gotten monopoly power to the detriment of competition and consumers.

Although Complaint Counsel has endeavored in this post-hearing brief to provide a comprehensive discussion of the record facts as they bear on issues of liability and remedy, the

brief should be read in conjunction with Complaint Counsel’s Proposed Findings of Fact (“CCFF”), which distills the factual record in considerably greater detail.³

I. THE RECORD SUBSTANTIATES ALL MATERIAL ALLEGATIONS OF THE COMMISSION’S COMPLAINT

The Complaint in this matter sets forth detailed factual allegations that, in the unanimous view of the Commission, warranted this enforcement action against Rambus, and the assertion of three separate claims of liability – monopolization (Count I), attempted monopolization (Count II), and unfair methods of competition (Count III). The legal and economic underpinnings of the Commission’s Complaint are sound. Commission precedents, antitrust case law, well-accepted principles of economic theory (on which Rambus’s own experts, among others, have written), and this Court’s pretrial rulings all validate the theory of liability upon which this case is predicated.⁴ The Complaint’s allegations have now been proven by overwhelming evidence, and that evidence conclusively establishes Rambus’s liability under each count in the Commission’s Complaint.

Broadly speaking, the record in this case can be summarized by reference to several categories of evidence, which closely track the Complaint’s allegations:

³ More generally, Complaint Counsel incorporates herein CCFF 1-3.

⁴ See, e.g., Mark A. Lemley, *Intellectual Property Rights and Standards Setting Organizations*, 90 Cal. L. Rev. 1889, 1930 (2002) (“It is certainly feasible for an IP owner to gain a market advantage by concealing its IP rights from an SSO long enough for the SSO to adopt a standard. And where adoption of the standard is likely to determine the way the market develops, one wielding the power to control that standard may ultimately control the market. This is an antitrust risk that needs to be addressed.”); *id.* at 1930 n.163 (“[C]ompanies that subvert cooperative standard setting processes to create their own proprietary, closed systems should face severe penalties.”), quoting Dennis W. Carlton and Robert H. Gertner, *Intellectual Property, Antitrust and Strategic Behavior* (Nat’l Bureau of Economic Research, Working Paper No. 8976, 2002), at 3.

The DRAM Industry (Complaint ¶¶ 7-13). As a foundation for understanding the conduct at issue here, the relevant markets, and the manner in which Rambus's conduct has injured competition and consumers in such markets, Complaint Counsel has developed a thorough factual record relating to the nature of dynamic random access memory ("DRAM"), the processes through which it is produced, the economic factors affecting supply and demand, the technologies used in designing DRAMs, and the evolutionary development of the DRAM industry and DRAM industry standards, throughout the relevant time period (roughly 1990 to the present). *See* CCF 10-131, 239-257, 500-658, 2600-30.

The Nature and Importance of DRAM Industry Standards and JEDEC (Complaint ¶¶ 13-16). Complaint Counsel has likewise developed a comprehensive factual record relating to the importance of industry standards in this marketplace, the nature and purposes of JEDEC, the composition of JEDEC's membership, and the central role that JEDEC has played, and continues to play, in the development of DRAM industry standards. *See* CCF 112-131, 200-267, 300-443, 500-658, 2631-58, 2566-68.

JEDEC Policies, Rules, and Procedures (Complaint ¶¶ 17-24). The record contains a substantial body of evidence relating to JEDEC's policies, rules, and procedures, the manner in which they were applied and followed throughout the relevant period, and the manner in which various JEDEC members, including Rambus, understood such policies, rules, and procedures. *See* CCF 200-267, 300-443, 600, 612-615, 635, 640, 749, 755-59, 761, 818-31, 835-54, 1602, 1625-1630, 1755. This evidence, taken in its entirety, plainly substantiates the relevant allegations of the Commission's Complaint, including the allegation that JEDEC members who knew or believed they possessed patents or patent applications that might involve the standard

setting work at JEDEC had a duty to disclose the existence of the issued or pending patents and to identify the aspect of JEDEC's work to which they related. *See* Complaint ¶ 24.

Development of JEDEC's Synchronous DRAM Standards (Complaint ¶¶ 25-30). In addition, this Court now has access to a detailed factual record relating to the work of JEDEC – in particular, JEDEC's JC-42 committee and JC-42.3 subcommittee – in developing JEDEC's existing standards for synchronous DRAMs (*i.e.*, the SDRAM and DDR SDRAM standards). *See* CCF 500-658. Record facts show, among other things, the nature of what JEDEC was seeking to accomplish in developing such standards, the specific process through which it developed standards, the range of alternative technologies that were considered, the diversity of views held by JEDEC participants, the compromises they made in reaching a consensus, and the commitment of JEDEC members to developing "open" standards that rely to the extent possible on non-proprietary technologies, and that are available to be licensed by anyone on reasonable terms, demonstrably free of unfair discrimination. *See* CCF 107-111, 123-124, 300-443, 500-658, 2101-2464.

Rambus and Its Licensing-Based Business Model (Complaint ¶¶ 4-6, 31-38). The record contains a large volume of documentary and testimonial proof concerning the formation of Rambus, the nature of Rambus's proprietary RDRAM technology (a "narrow-bus," "packetized" DRAM architecture that differed substantially from more conventional, "wide-bus" DRAM designs), Rambus's core business strategies relating to the licensing of RDRAM technology, the process through which Rambus sought to develop patent rights covering features of RDRAM, the development of Rambus's RDRAM licensing business over time, and the various competitive obstacles that Rambus confronted in attempting to secure licensees for its proprietary RDRAM technology, including the availability of JEDEC's open, seemingly non-

proprietary standards for synchronous DRAMs, which embodied a far more conventional, “wide-bus” architecture. *See* CCFF 700-66, 800-1357.

Rambus’s Scheme to Develop Patents Covering SDRAMs and “Future SDRAMs” (Complaint ¶¶ 39-55). The record likewise compellingly demonstrates that Rambus, starting in the early 1990’s, while a member of JEDEC, set out to amend and broaden⁵ its pending patent applications for the specific purpose of covering technological features that were adopted or being considered for adoption in JEDEC’s competing SDRAM standards – all the while deliberately keeping these activities secret from JEDEC. *See* CCFF 500-658, 800-1357. Explicit documentary proof and corroborative witness testimony reveal the precise nature of Rambus’s scheme, and the manner in which it was implemented. Such evidence clearly demonstrates, among other things, that Rambus knew or believed various technological features contained in JEDEC’s SDRAM standards, or considered for inclusion in future SDRAM standards, either were covered by pending Rambus patent applications or could be covered through amendments to such applications, without exceeding the scope of the inventions embodied in the original Rambus patent application filed in April 1990 – Application No. 07/510,898 (hereinafter, “the ‘898 application”). Rambus’s knowledge and beliefs as to the scope of its pending patents and their relation to JEDEC’s work clearly triggered a duty on Rambus’s part to make good-faith patent-related disclosures to JEDEC, a duty arising from well-established JEDEC policies, rules, and procedures. *See* CCFF 300-356, 700-766, 800-1357.

⁵ The term “broaden” is used here to refer to the fact that Rambus’s initial patent claims were drafted with the RDRAM architecture in mind. Hence, Rambus’s effort to obtain patent coverage over SDRAMs not only involved amending patent claims to specify, with particularity, certain technological features used in SDRAMs, but also generalizing such claims to extend to more conventional DRAM architectures. This was done, in part, by removing limitations in Rambus’s earlier patent claims that reflected peculiarities, or novelties, associated with the RDRAM design. *See* CCFF 700-766, 800-1357.

The Four “Rambus” Technologies (Complaint ¶¶ 56-69). The following four technologies were among the DRAM-related technologies considered or adopted by JEDEC while Rambus was a member of the organization that Rambus, during the same time period, specifically set out to cover through amended patent claims: (1) programmable CAS latency; (2) programmable burst length; (3) on-chip PLL/DLL; and (4) dual-edge clocking (collectively referred to hereinafter as “the ‘Rambus’ technologies”). Record evidence shows that JEDEC incorporated the first two of these technologies into its initial SDRAM standards, finalized in October 1993, more than two and a half years before Rambus withdrew from JEDEC; that JEDEC included all four technologies in JEDEC’s subsequently adopted DDR SDRAM standards; and that the work on what eventually became known as “DDR SDRAM” commenced (if not earlier) in late 1993, very shortly after JEDEC’s initial SDRAM standards were completed. *See* CCF 500-658. The evidence also shows that express claims in various Rambus patent applications filed with the U.S. Patent and Trademark Office (“PTO”) while Rambus was a member of JEDEC were arguably broad enough to cover use of these “Rambus” technologies in devices built in compliance with JEDEC’s SDRAM and DDR SDRAM standards. *See* CCF 500-658, 1122-1237. Finally, it is undisputed that Rambus, starting in or around early 2000, began to enforce various patents, all deriving from the ‘898 application, against JEDEC-compliant SDRAM and DDR SDRAM devices, specifically relating to the use of the aforementioned technologies in such devices. *See* CCF 1950-1974.

Rambus’s Failure to Make Required Patent-Related Disclosures to JEDEC (Complaint ¶¶ 70, 79-80). Despite clear evidence that Rambus, while a member of the organization, knew or believed that JEDEC’s standards would likely infringe upon its own patented or patent-pending technologies, and despite ongoing efforts by Rambus and its lawyers

to obtain ever-broader coverage over SDRAMs and “Future SDRAMs” (which came to be known as DDR SDRAMs) in the 1992-1996 time frame and beyond, Rambus never disclosed to JEDEC that it possessed patents or applications directly related to JEDEC’s work. *See* CCFF 800-1357. Indeed, the evidence shows that Rambus deliberately concealed such information from JEDEC participants throughout the time it participated in JEDEC (ending in June 1996), and that it continued to conceal such information for many years thereafter, even as it developed increasingly confident views that SDRAMs and DDR SDRAMs did (or would) infringe Rambus patents. *See* CCFF 1238-1357, 1676-1700. Rambus’s actions in this regard undermined and subverted JEDEC’s most basic purposes and principles and directly violated well-established JEDEC policies, rules, and procedures.

Rambus’s Limited and Misleading Disclosures (Complaint ¶¶ 71-88). The record evidence shows that Rambus did make limited patented-related disclosures to JEDEC. *See* CCFF 968-76, 1109-14. Importantly, however, these disclosures did not relate to Rambus’s efforts to cover SDRAMs and “Future SDRAMs” or to Rambus’s belief that it had succeeded in doing so. *See* CCFF 917-18, 926. Specifically, in September 1993 Rambus disclosed to JEDEC the issuance of its first RDRAM-related patent – U.S. Patent No. 5,423,703 (hereinafter, “the ‘703 patent”). When it withdrew from JEDEC in June 1996, Rambus also disclosed, with no explanation, the numbers of each of its then-issued patents, with one important exception: It is undisputed that Rambus omitted from its JEDEC withdrawal letter the only issued patent – U.S. Patent No. 5,513,327 (hereinafter, “the ‘327 patent”) – that Rambus then possessed containing claims arguably broad enough to cover technological features used in JEDEC’s far more conventional “wide-bus” SDRAM architecture. These limited disclosures, the record shows, were not sufficient to place JEDEC’s membership on notice that Rambus possessed patents or patent applications relevant to JEDEC’s work. Indeed, Rambus did more than withhold such

information from JEDEC. When, as occurred on several occasions, JEDEC members confronted Rambus about the possibility that Rambus might possess intellectual property relevant to JEDEC's work, the evidence shows that Rambus provided misleading responses calculated to quell any such fears or suspicions. *See* CCFF 902-09; *see also id.* 1260-65.

The Anticompetitive Nature of Rambus's Challenged Conduct (Complaint ¶¶ 1-3, 121-24). The record contains ample factual support to demonstrate that Rambus's challenged conduct was deceptive, and was undertaken in bad faith with the purpose of excluding competition. Among other evidence bearing on the exclusionary and anticompetitive nature of Rambus's challenged conduct, and Rambus's underlying intent, the record shows that:

- Rambus viewed JEDEC's SDRAM standards as a serious competitive threat to RDRAM, particularly given that many DRAM makers and users alike preferred SDRAM's more conventional design and the fact that SDRAM was an open standard, presumptively free of royalty-bearing patents (*see* CCFF 754-63, 1677, 1977-1980; *see also id.* 1683, 1814-37);
- Rambus recognized that securing patent rights over SDRAM could provide it with the ability to impose royalties on, and hence raise the price of, SDRAM devices, thereby restricting competition from SDRAM and making the RDRAM technology comparatively more attractive in the marketplace (*see* CCFF 800-12, 1711-12);
- Rambus understood that if JEDEC learned it possessed patents or patent applications relevant to SDRAM, JEDEC could have worked around Rambus's patented technologies, thereby preserving the openness of the SDRAM standards (*see* CCFF 734-35, 814, 1046);
- Rambus also understood that its ability to gain "leverage" over SDRAM, through the assertion of patent claims, would increase if it waited before disclosing its patents (*see* CCFF 1678);
- Rambus was advised by its lawyers, early on during its tenure in JEDEC, that participating in the organization, while at the same time seeking to obtain patent rights over features of the JEDEC standards – without disclosing to JEDEC that it was doing so – could result in serious legal repercussions, including injunctions against the enforcement of Rambus patents on either equitable estoppel or antitrust grounds (*see* CCFF 422, 821, 850-52, 889-91, 956-57);

- notwithstanding such known legal risks, Rambus continued to participate in JEDEC, without disclosing relevant patent information, through mid-1996, its decision to withdraw from JEDEC being heavily influenced by legal advice concerning the potential to be sued by the FTC for antitrust violations, as occurred in *Dell Computer Corp.*, a matter that became public for the first time in December 1995 (*see* CCF 422, 851, 1083-86, 1090, 1755);
- Rambus continued to conceal its JEDEC-related patents for several years after leaving JEDEC, viewing its “strategic,” JEDEC-related “patent portfolio” as an “intellectual property card” that it would “play” against DRAM makers if and when needed to better ensure the success of RDRAM, a scenario that Rambus envisioned occurring only if its coveted relationship with Intel (which by late 1996 was a strong proponent of RDRAM) were to “blow up” (*see* CCF 1676-1697, 1870-75, 1921, 3000);
- in gearing up for the potential of enforcing its JEDEC-related patents, Rambus launched a massive, company-wide document destruction campaign, which – it has been determined, for purposes of this litigation – was instituted “in part, for the purpose of getting rid of documents that might be harmful” in future anticipated patent infringement suits⁶ (*see* CCF 1718-58);
- Rambus’s relationship with Intel in fact did blow up, in October 1999, when Intel informed Rambus that “[i]ndustry acceptance of RDRAM was poor at best” and that Intel had “no choice” but to reassess its relationship with Rambus⁷ (CCF 1916-17; *see also id.* 1913-15, 1918-19);
- in the same month, October 1999, Rambus’s Board of Directors met to discuss “target selection” – *i.e.*, which companies to sue first on JEDEC-related patents – and Rambus proceeded to commence enforcement efforts against Hitachi (CCF 1920);
- Rambus’s policy, in terms of licensing its DDR SDRAM-related patents, is that the royalties should be set at levels higher than the RDRAM royalties, with the stated objective of preventing “a competitive device” (CCF 1712; *see also id.* 1977-80); and
- Rambus’s publicly stated licensing policy, both with respect to SDRAM and DDR SDRAM, is that companies that choose to litigate will pay more, whereas companies that litigate and lose may not be licensed at all (*see* CCF 1983, 1986, 1990-94, 2037, 2980-82).

⁶ Order Granting Complaint Counsel’s Motion for Collateral Estoppel at 5 (Feb. 26, 2003).

⁷ CX2541.

All of these facts and others support the conclusion that Rambus's challenged conduct was exclusionary in nature and was undertaken for anticompetitive purposes.

Alternatives to the "Rambus" Technologies (Complaint ¶¶ 62, 65, 69). The record of this case contains substantial evidence concerning various DRAM features, technologies, and designs that are capable of performing the same functions that are performed by the "Rambus" technologies, as incorporated into SDRAM and DDR SDRAM, including evidence relating both to the technical feasibility and commercial viability of such alternatives. *See* CCFF 507, 528-531, 539, 568-76, 601-13, 615-17, 625-28, 631, 638, 642, 644, 2100-07, 2130-14. Such evidence shows that JEDEC, had it known of Rambus's patented technologies at the time that the SDRAM and DDR SDRAM standards were being developed, could have selected from an array of viable options.

JEDEC's Likely Response to Rambus Patent Disclosures in a "But-For" World (Complaint ¶¶ 22, 24, 62, 65, 69). The evidentiary record not only reveals the variety of technological options that would have been open to JEDEC in a hypothetical (or "but-for") world in which Rambus had made proper patent-related disclosures concerning the four technologies in issue, but in addition shows that the most likely outcome in such a scenario is that JEDEC would have pursued alternative SDRAM and DDR SDRAM specifications, which avoided the Rambus patents and hence preserved the goal of creating open, non-proprietary standards. *See* CCFF 3021. It is also clear from the record that before JEDEC could even consider the possibility of incorporating Rambus's patented technology into its standards, JEDEC's rules would require that it receive from Rambus advance, written assurances that any Rambus patents implicated by the standards would be made available for licensing on reasonable and non-discriminatory (or so-called "RAND") terms. *See* CCFF 347-53. However, record evidence indicates that Rambus very likely would not have been willing to provide such

“RAND” assurances, as it would be inconsistent with Rambus’s licensing-based business model to agree to such limitations. *See* CCF 1091, 2418-32, 3024-25. Even in the event that Rambus, in the but-for world, would have provided RAND assurances to JEDEC, record evidence indicates that JEDEC members – in part owing to the availability of alternatives, and in part owing to Rambus’s positioning as a pure intellectual property company, and the promoter of a competing, proprietary standard (*i.e.*, RDRAM) – would not have been willing to support the use of Rambus technology in JEDEC’s standards absent Rambus’s agreement, in advance, to royalty rates considerably lower than the rates Rambus has charged in the real world. *See* CCF 2441-64, 3029-36. Taken as whole, the record evidence conclusively shows that proper patent-related disclosures by Rambus in the but-for world would have resulted in materially different circumstances: most likely, Rambus’s technologies would not have been used at all in JEDEC’s standards, and if they were used it would have been subject to Rambus’s agreement to materially different, and considerably more competitive, license terms. *See* CCF 347-53, 2433-64, 3021-36.

Industry Adoption of JEDEC Standards and “Lock-In” (Complaint ¶¶ 89-92).

Compelling record evidence shows that the SDRAM and DDR SDRAM standards ultimately adopted by JEDEC were in turn widely adopted and incorporated both by producers and users of DRAMs, as well as by producers of complementary products (such as microprocessors, chipsets, motherboards, and graphics cards), and that the same standards have, since the mid-1990’s, clearly been the dominant worldwide standards for commodity DRAM memory devices. *See* CCF 85-87, 234, 577, 2039, 2643-44, 2904. The evidence further shows that the industry’s broad commitment to the technology path reflected by SDRAM and DDR SDRAM makes it economically infeasible for the industry to shift to alternative standards, a condition that economists refer to as “lock-in.” *See* CCF 2659-2756. Yet, the record evidence shows, it was

only after the industry became “locked-in” to this technology path that Rambus – in early/mid 2000 – began to reveal the existence of its JEDEC-related patents to the outside world, and began to demand royalties from all major producers of JEDEC-compliant SDRAMs. *See* CCFF 1954-58, 1995-96.

Relevant Technology Markets (Complaint ¶¶ 110-18). The record evidence, including economic expert testimony, supports the conclusion (a conclusion apparently not contested by Rambus) that this case involves a total of five relevant technology markets – four of which correspond to the four “Rambus” technologies and all commercially viable alternatives to such technologies, and a fifth, “cluster” market aggregating these four markets into one. *See* CCFF 2763-87, 2885-86. Each of these five relevant markets, the record shows, is worldwide in geographic scope. *See* CCFF 2890-97.

Success of Rambus’s Monopolistic Scheme (Complaint ¶¶ 91-109). In each of the relevant technology markets at issue here, the record shows that Rambus has succeeded in acquiring monopoly power. The fact that the “Rambus” technologies – technologies that previously faced competition from a variety of alternatives – no longer face competition today demonstrates this power. *See* CCFF 2898-2913. That is, the various technological alternatives to the “Rambus” technologies that would have been commercially viable options for JEDEC had it learned of Rambus’s patent claims when developing the relevant standards have, in the aftermath of standardization, been rendered non-viable. Hence, they have been practically excluded from the marketplace, due to the fact that the industry has become locked-in to JEDEC’s existing SDRAM standards. *See* CCFF 2500-89, 2914-22. Rambus’s monopoly power is also evidenced, in part, by Rambus’s success in imposing upon many DRAM industry participants royalties that are plainly discriminatory in nature and could not have been sustained in a competitive market. *See* CCFF 2962-82. Finally, the record shows that Rambus acquired

this monopoly power, not through competition on the merits or through any inherent advantage in its patented technology, but rather through the very pattern of deceptive, exclusionary conduct challenged by this lawsuit. *See* CCFF 2986-3044.

Anticompetitive Effects of Rambus’s Conduct (Complaint ¶¶ 119-20). Rambus not only has acquired monopoly power through its exclusionary conduct, but in addition, the record shows, Rambus has exercised this monopoly power in a manner that has harmed – or threatens to harm – competition and consumers both within and also extending beyond the relevant technology markets. The evidence shows that, among other actual and threatened anticompetitive effects, Rambus’s conduct has imposed substantial costs on DRAM makers, including but not limited to the costs of the anticompetitive and discriminatory royalties that Rambus has charged in connection with use of the four “Rambus” technologies in SDRAM and DDR SDRAM devices and the costs of litigation. *See* CCFF 3050-60. Rambus’s conduct also threatens, absent appropriate relief, to:

- lead to increases in the price of SDRAM and DDR SDRAM devices (*see* CCFF 3050-51);
- disrupt JEDEC’s ability to develop timely DRAM industry standards, thereby slowing progress in the development and implementation of DRAM industry standards (*see* CCFF 3052-54);
- impose additional costs of DRAM makers, who may be forced to expend limited design resources in developing and implementing alternative standards that avoid Rambus patents (*see* CCFF 3058); and
- discourage industry participation not only in JEDEC, but also other “open” standards organizations, while at the same time discouraging reliance upon standards developed by such organizations, thereby causing substantial injury to the wide range of markets that traditionally have benefitted from the same types of collaborative standard setting processes that have been integral to the development of the DRAM marketplace (*see* CCFF 3053-54).

Remedy (Notice of Contemplated Relief ¶¶ 1-6).

The record compels imposition of the proposed remedy. In order to restore market conditions as closely as possible to those that would have prevailed in the absence of Rambus's conduct, to prevent future harm to the markets at issue and related markets, and to prevent harm to the standard setting process, Rambus should be prohibited from enforcing certain of its patents relating to JEDEC-compliant SDRAM and DDR SDRAM. This proposed order goes no further than reasonably necessary to correct the harm. It permits Rambus to enforce any of its patents against any products other than products that comply with or interface with the JEDEC SDRAM standards. It also permits Rambus to enforce all of its patents with a priority date after it withdrew from JEDEC against any and all products, including those that comply with or interface with the JEDEC SDRAM standards. Such an order is amply justified by the record evidence and falls well within the Commission's broad remedial power.

II. ELEMENTS AND BURDENS OF PROOF APPLICABLE TO THE COMMISSION'S COMPLAINT

Before turning to a discussion of the evidence bearing on liability and relief issues, this section summarizes the elements and burdens of proof applicable to each of the Commission's claims against Rambus.

A. Essential Elements of Proof

It is well settled that Section 5 of the FTC Act, 15 U.S.C. § 45(a)(1), which prohibits "unfair methods of competition," extends to "practices that violate the Sherman Act and the other antitrust laws," as well as to "practices that the Commission determines are against public policy for other reasons." *FTC v. Indiana Federation of Dentists*, 476 U.S. 447, 454 (1986). In this case, the Commission has asserted three separate counts of liability, two of which are based

on causes of action established by Section 2 of the Sherman Act, 15 U.S.C. § 2. Count I of the Commission’s Complaint sets forth a Sherman Act-based claim of monopolization. Count II sets forth a Sherman Act-based claim of attempted monopolization. And finally, Count III sets forth a claim of unfair methods of competition, which arises purely under Section 5 of the FTC Act. Although the essential elements of proof required to establish liability under these separate counts of the Complaint do differ, they differ only at the margins, and the record evidence strongly supports findings of liability under each count.

1. Monopolization (Count I)

Section 2 of the Sherman Act makes it unlawful for any person to “monopolize, or attempt to monopolize . . . any part of the trade or commerce among the several States, or with foreign nations.” 15 U.S.C. § 2. A Section 2 monopolization offense requires proof of only two elements: “(1) the possession of monopoly power in a relevant market, and (2) the willful acquisition, maintenance, or use of that power by anticompetitive or exclusionary means or for anticompetitive or exclusionary purposes.” *Aspen Skiing Co. v. Aspen Highlands Skiing Corp.*, 472 U.S. 585, 595-96 (1985) (citing *United States v. Grinnell Corp.*, 384 U.S. 563, 570-71 (1966)).

A plaintiff need not show, to prove monopolization, that the defendant specifically intended that result, but merely that the defendant had “an intent to bring about the forbidden act.” *United States v. Aluminum Co. of America*, 148 F.2d 416, 432 (2d Cir. 1945) (hereinafter “*Alcoa*”); *Aspen Skiing*, 472 U.S. at 602. That is, “the completed offense of monopolization under § 2 demands only a general intent to do the act, for no monopolist monopolizes unconscious of what he is doing.” *Times-Picayune Publ’g Co. v. United States*, 345 U.S. 594, 626 (1953) (internal quotations omitted).

2. Attempted Monopolization (Count II)

The separate offense of attempted monopolization under Section 2 of the Sherman Act requires proof of three elements: (1) exclusionary or anticompetitive conduct; (2) a specific intent to monopolize; and (3) a dangerous probability of achieving monopoly power. *Spectrum Sports, Inc. v. McQuillan*, 506 U.S. 447, 456 (1993). The conduct element of an attempted monopolization claim is no different than that of a monopolization claim. See ABA SECTION OF ANTITRUST LAW, ANTITRUST LAW DEVELOPMENTS at 299-300 (5th ed. 2002). The differences in the two types of Section 2 claims relate to the elements of intent and market or monopoly power.

The specific intent element requires showing “a ‘specific intent’ to accomplish the forbidden objectives.” *Aspen Skiing*, 472 U.S. at 602. It may be proved by direct evidence of intent, such as statements of the defendant or its agents or “inferred from the defendant’s anticompetitive practices.” *M&M Medical Supplies & Service, Inc. v. Pleasant Valley Hosp., Inc.*, 981 F.2d 160, 166 (4th Cir.) (*en banc*), *cert. denied*, 508 U.S. 972 (1993); *Volvo N. Am. v. Men’s Intern. Pro. Tennis Coun.*, 857 F.2d 55, 74 (2d Cir. 1988) (“Proof . . . anticompetitive or exclusionary conduct, may be used to infer the second element, specific intent to monopolize. . .”).

Actual monopoly power is not required to establish liability for attempted monopolization. The lesser required showing of a “dangerous probability of monopolization” can be demonstrated by “proof of the same character, but not the same quantum” as would be required to demonstrate monopolization – that is, proof that the challenged conduct could, in light of relevant market conditions, easily lead to the acquisition of a monopoly, even though that may not (or not yet) have occurred. *McGahee v. Northern Propane Gas Co.*, 858 F.2d 1487, 1505 (11th Cir. 1988), *cert. denied*, 490 U.S.1084 (1989).

3. Unfair Methods of Competition (Count III)

Section 5 of the FTC Act authorizes the Federal Trade Commission to define and proscribe “unfair methods of competition.” 15 U.S.C. § 45(a)(1). Accordingly, the Commission may proscribe “conduct which, although not a violation of the letter of the antitrust laws, is close to a violation or is contrary to their spirit.” *E.I. Du Pont de Nemours & Co. v. FTC*, 729 F.2d 128, 136-37 (2d Cir. 1984); *see also FTC v. Sperry & Hutchinson Co.*, 405 U.S. 233, 239 (1972); *Grand Union Co. v. FTC*, 300 F.2d 92, 98-99 (2d Cir. 1962). This statute empowers the Commission with broad authority to “declare trade practices unfair.” *FTC v. Brown Shoe Co.*, 384 U.S. 316, 321 (1966). Specifically, “Congress intentionally left development of the term ‘unfair’ to the Commission rather than attempting to define ‘the many and variable unfair practices which prevail in commerce.’” *Atlantic Refining Co. v. FTC*, 381 U.S. 357, 367 (1965) (citing S. Rep. No. 592, 63d Cong., 2d Sess., 13 (1914)). Indeed, the Commission has acted on this authority to attack “collusive, predatory, restrictive [and] deceitful conduct that substantially lessens competition,” *Du Pont*, 729 F.2d at 137, and “activities that violate the spirit of certain Sherman and Clayton Act sections that were clearly intended to promote competition and deter anticompetitive acts.” *In the Matter of General Motors Corp.*, 103 F.T.C. 641, 701 (1984).

Of particular relevance here, the Commission has determined that exclusionary conduct that results in anticompetitive effects, even if it fails to satisfy all the elements of a Section 2 offense, violates Section 5 of the FTC Act. *See In the Matter of Ethyl Corp.*, 101 F.T.C. 425, 597 (1983) (noting that “single-actor conduct which is unfair competitive behavior but which falls short of an attempt to monopolize under Section 2 of the Sherman Act” violates Section 5), *vacated sub nom. E.I. Du Pont de Nemours & Co. v. FTC*, 729 F.2d 128, 136-37 (2d Cir. 1984).

The Commission’s third claim against Rambus (Count III) alleges that Rambus has engaged in exclusionary, unfair methods of competition, which have resulted in material adverse

effects on competition. This claim differs from the monopolization claim (Count I) principally in that there is no need to demonstrate actual monopoly power – proof of market power and material adverse effects on competition will suffice. The unfair methods of competition claim differs from the attempted monopolization claim (Count II) in two respects: (1) it requires proof of actual (as opposed to probable) adverse effects on competition, albeit not necessarily rising to the level of monopolization; and (2) in order to establish liability for unfair methods of competition, specific intent need not be shown.⁸

B. Theory of Liability

Complaint Counsel has thoroughly briefed in prior submissions the theory of liability that serves as the basis for all three of the Commission’s claims. *See, e.g.*, Complaint Counsel’s Memorandum in Opposition to Respondent Rambus Inc.’s Motion for Summary Decision at 1-7, 29-44; Complaint Counsel’s Pretrial Brief at 138-46. As stated in the opening sentences of the Commission’s Complaint, “[t]hrough this action, the Commission challenges a pattern of anticompetitive acts and practices” by Rambus, including Rambus’s concealment of patent-related information “in violation of JEDEC’s own operating rules and procedures,” as well as “other bad-faith, deceptive conduct.” Complaint ¶¶ 1-2. The pattern of bad-faith, deceptive acts at issue here encompasses not only Rambus’s failures to disclose material patent-related information to JEDEC, but also affirmatively misleading statements and actions through which Rambus (before and after withdrawing from JEDEC) purposefully sought to – and did – convey to JEDEC’s members the false impression that it did not possess intellectual property rights that would, or might, be infringed by JEDEC’s SDRAM and DDR SDRAM standards. Likewise, the

⁸ A requirement that the Commission show anticompetitive effects fully satisfies the limitations various courts have placed on the FTC’s authority to proscribe unfair methods of competition. *See Du Pont*, 729 F.2d at 137. *See also Boise Cascade Corp. v. FTC*, 637 F.2d 573, 581-82 (9th Cir. 1980).

pattern of anticompetitive acts challenged in this case did more than violate JEDEC's patent disclosure rules. As the Complaint explains, through its challenged conduct, Rambus also violated, undermined, and subverted other JEDEC rules and policies, including

- (1) JEDEC's "'basic rule' that standardization programs conducted by the organization 'shall not be proposed for or indirectly result in ... restricting competition, giving a competitive advantage to any manufacturer, [or] excluding competitors from the market'" (Complaint ¶ 19); and
- (2) a variety of other policies, rules, and procedures through which JEDEC, at all relevant times, sought "to avoid, where possible, the incorporation of patented technologies into its published standards, or at a minimum to ensure that such technologies, if incorporated, will be available to be licensed on royalty-free or otherwise reasonable and non-discriminatory terms" (Complaint ¶ 20).

Of course, this case does not turn on the narrow question of whether Rambus's concealment of relevant patents and applications technically violated JEDEC's disclosure rules. Rambus, with the purpose of excluding competition, has engaged in a pattern of bad-faith, deceptive, and exclusionary acts. Through such acts, Rambus has caused substantial harm to several well-defined technology markets and ultimately threatens to cause hundreds of millions, if not billions, of dollars of harm to downstream consumers – *i.e.*, the businesses and individuals throughout this country and the world who buy DRAMs and products, such as personal computers and fax machines, that incorporate modern DRAM devices. Whatever else may be said of Rambus's challenged conduct, it is clear beyond any reasonable dispute that Rambus's actions were deceptive and undertaken in bad faith, and through such actions Rambus consciously subverted, undermined, and violated the integrity of JEDEC's policies and procedures.⁹

⁹ The majority decision in *Rambus Inc. v. Infineon Technologies AG*, 318 F.3d 1081 (Fed. Cir. 2003) (petition for *certiorari* pending), on which Rambus has placed considerable reliance, seems to reach this very conclusion. *See id.* at 1104 (noting that Rambus "wanted to obtain [patent] claims covering the SDRAM standard" and that it "tried to do so" while participating as

Although the evidentiary record contains overwhelming proof that Rambus engaged in various violations of JEDEC policies and rules, even assuming that the record demonstrated nothing more than that Rambus subverted JEDEC’s open standards process through bad faith and deceptive acts, such proof alone would be sufficient grounds for liability.

It does not matter whether Rambus’s actions violated JEDEC’s rules or reflected a conscious effort to subvert the spirit and purpose of JEDEC’s open standards process. When such conduct results in the acquisition of monopoly power, a dangerous probability of monopolization, or material adverse effects of competition in a well-defined market (here all three can be shown), liability attaches under Section 5 of the FTC Act. As addressed in earlier briefing, the basis for imposing antitrust liability in these circumstances is well-established. *See, e.g., Indian Head, Inc. v. Allied Tube & Conduit Corp.*, 817 F.2d 938, 941 (2d Cir. 1987) (where defendant, with the purpose “of achieving an anticompetitive result,” was found to have “subverted,” “undermined,” and “violated the integrity” of a standard setting association’s processes, the court held, “We refuse to permit a defendant to use its literal compliance with a standard-setting organization’s rules as a shield to protect such conduct from antitrust liability.”) (emphasis added), *aff’d*, 486 U.S. 492 (1988);¹⁰ *In the Matter of Dell Computer Corp.*, 121 F.T.C. 616, 626, 1996 FTC LEXIS 291 (1996) (citing *Allied Tube* in support of imposition of

a member JEDEC, “an open standards-setting committee”; and further concluding that “[s]uch actions” not only fail to “put Rambus in the best light,” but indeed “impeach Rambus’s business ethics”) (emphasis added).

¹⁰ *See also Allied Tube & Conduit Corp. v. Indian Head, Inc.*, 486 U.S. 492, 498, 509 (1988) (on appeal from Second Circuit, noting that petitioner “did not violate any rules of the Association” but “nonetheless did ‘subvert’ the consensus standard-making process of the Association,” “at least partially motivated by the desire to lessen competition,” and concluding that “[t]he antitrust validity of these efforts is not established, without more, by petitioner’s literal compliance with the rules”) (emphasis added).

antitrust liability where firm allegedly acquired market power by failing to disclose relevant patents to a standards-setting organization).¹¹

Another element of the legal theory relates to the concept of lock-in. That is, the theory of liability set forth in the Complaint is predicated in part on the allegation that Rambus's bad-faith, deceptive conduct permitted it to acquire monopoly power because by the time Rambus finally began to reveal, publicly, that it possessed patents covering JEDEC's SDRAM standards, the DRAM industry had become "locked-in" to the existing JEDEC standards and thus was unable to avoid Rambus's patents by switching to alternative, non-infringing standards. This aspect of the theory of liability here – which is rooted in basic economic theory – is well accepted. Rambus's own economic expert, Professor David Teece, recently wrote a recent article on standard setting:

The asymmetry between the low *ex ante* cost of choosing an alternative proposed standard and the higher *ex post* cost of abandoning an existing standard in favor of a new standard causes concerns about the prospect for 'lock-in'. . . . [O]nce the standard has been chosen and widely adopted, it may be much more difficult to avoid the patent. In other words, the adoption of the standard may increase the bargaining position of the IP holder. If so, the patent holder may be able to extract, not only the gains from using its patented technology vis-a-vis other alternatives, but also a portion of the gains from standardization generally.

David J. Teece and Edward F. Sherry, *Standard Setting and Antitrust*, 87 Minn. L. Rev. 1913, 1938 (2003).

In the same article, Professor Teece explains "three reasons" why, after the adoption of a standard, "once firms have committed to the standard and have made the requisite investment in

¹¹ See also Mark R. Patterson, *Antitrust Liability for Collective Speech: Medical Society Practice Standards*, 27 IND. L. REV. 51, 84 (1993) (interpreting *Allied Tube* as "show[ing] little tolerance for deception in the standard-setting process"); Mark A. Lemley, *Intellectual Property Rights and Standard-Setting Organizations*, 90 Cal. L. Rev. 1889, 1927-35 (2002) (discussing bases for imposing antitrust liability for abuse of a standard setting process).

complementary assets to manufacture and sell the standardized product, switching to an alternative may be much less feasible.” *Id.* at 1937. In doing so, he articulates the basic theory of lock-in as it pertains directly to this case:

First, the industry may have made investments in implementing the (patented) standard. Products may have been designed to meet the standard, and factories geared up to produce the patented standardized products. While from an economic standpoint those costs are often “sunk costs” (not recoverable), manufacturers clearly do not want to incur the additional costs associated with switching to another alternative.

Second, the need or desire for compatibility (especially backwards compatibility with the existing installed product base) may make it costly to switch to a different standard.

Third, and similarly, there is often a significant coordination problem in getting all interested parties to switch to an alternative. For example, computer manufacturers may already have designed their motherboards and computers to work with existing standardized chips, and switching to a different chip design would require changes, not only to the chips themselves, but also to the motherboards and computers. The difficulties associated with coordinating the necessary changes may make it impracticable to switch away from the patented standard.

Id. (emphasis added).

Given the firm theoretical foundation on which this case rests, the question before this Court is not whether the theory of the case is sound, but rather whether the facts of record prove that theory, and, as explained herein, they clearly do.

C. Burdens of Proof

This case is no different from any ordinary civil antitrust case brought under Section 5 of the FTC Act. Hence, Complaint Counsel’s evidence, as is customary in Section 5 administrative actions, should be weighed by reference to a preponderance-of-the-evidence standard. There is no support, either in law or public policy, for applying a heightened, clear-and-convincing-evidence standard.

1. The Preponderance-of-the-Evidence Standard Governs This Case

As Rambus itself has acknowledged,¹² the preponderance-of-the-evidence standard typically governs in FTC enforcement actions. See *In the Matter of Adventist Health System/West*, 117 F.T.C. 224, 297 (1994) (“Each element of the case must be established by a preponderance of the evidence”); *In the Matter of Washington Crab Assn.*, 66 F.T.C. 45, 55 (1964) (violation of Sherman Act, Section 2, and thus F.T.C Act, “by a preponderance of the reliable, probative and substantial evidence”) (Initial Decision, *aff’d* by Commission); *FTC v. Abbott Laboratories*, 853 F. Supp. 526, 535 (D.D.C. 1994) (holding that the government must show “by a preponderance of the evidence that [defendant’s] action was the result of collusion with its competitors”). See also Complaint Counsel’s Pretrial Brief at 128-130.

In fact, the preponderance standard typically governs civil actions brought by the government, regardless of the agency involved, and as the Supreme Court has noted, “[e]xceptions to this standard are uncommon.” *Price Waterhouse v. Hopkins*, 490 U.S. 228, 253 (1989). Moreover, the Supreme Court has pointed to civil antitrust suits as an example of a type of litigation in which “proof by a preponderance of the evidence suffices.” *Herman & MacLean v. Huddleston*, 459 U.S. 375, 390 (1983).

The two aspects of this case that Rambus in the past has suggested might warrant application of a heightened standard of proof – *i.e.*, the fact that the case involves patents and allegations of deception – plainly do not justify a departure from the customary, preponderance-of-the-evidence standard of proof.

¹² See Trial Brief of Respondent Rambus Inc. at 27.

Significantly, the Complaint, although it does allege deception, does not allege actionable fraud, nor must fraud be proven to establish antitrust liability in this case.¹³ Enforcement actions brought under Section 5 of the FTC Act often involve allegations of deception, sometimes even denominated as “fraud,” and yet in such cases courts nevertheless routinely apply a preponderance-of-the-evidence standard. *See, e.g., FTC v. Renaissance Fine Arts, Ltd.*, 1994 WL 543048, *8 (N.D. Ohio 1994) (finding, by preponderance of evidence, that defendants had violated Section 5 through “a lucrative scheme to defraud”); *In the Matter of Amrep Corp.*, 102 F.T.C 1362, *265 (1983) (applying preponderance standard to practices described by court as “land sale fraud”).

Moreover, the fact that this case involves patent-related issues is not grounds for applying a heightened standard of proof. *See, e.g., U.S. v. U.S. Gypsum Co.*, 333 U.S. 364, 388 (1948) (finding “the preponderance of evidence at the conclusion of the government’s case indicated a violation of the Sherman Act” through the use of industry-wide patent license agreements); *In the Matter of the Roberts Co.*, 56 F.T.C. 1569, *82 (1960) (finding proof of conspiracy through, *inter alia*, threatening patent infringement suits “sustained by reliable probative evidence.”). Indeed, as noted in the Antitrust Guidelines for the Licensing of Intellectual Property (“IP Guidelines”), “[t]he Agencies apply the same general antitrust principles to conduct involving intellectual property that they apply to conduct involving any other form of tangible or intangible property.” 1995 WL 229332 (D.O.J.), ¶ 2.1.

¹³ Your Honor has acknowledged as much in noting that Complaint Counsel’s proof “need not reach the level of fraud” to demonstrate that Rambus’s conduct was “illegal and intended to create a monopoly in one or more DRAM markets.” May 13, 2003, Order on Reconsideration of Complaint Counsel’s Motion to Compel Discovery Relating to Subject Matters for Which Respondent Asserts Privilege at 11.

2. This Is Not a *Walker Process* Case Meriting a Clear-and-Convincing Standard of Proof

There is one context in which courts have held that civil antitrust claims should be subjected to a heightened, clear-and-convincing standard of proof – namely, where the claimed misconduct involves alleged misconduct in procuring a patent from the PTO. *See Walker Process Equipment, Inc. v. Food Machinery & Chemical Corp.*, 382 U.S. 172 (1965). Courts have required a heightened burden of proof in so-called “*Walker Process*” cases due to concerns linked to: (1) the fact that the alleged misconduct occurred in connection with procuring a patent from the PTO, and (2) the nature of the remedies sought. *Id.* at 180. Of course, this is not a *Walker Process* case, nor can this case be likened to a *Walker Process* suit. The policy-related concerns that have caused courts to demand heightened levels of proof in the *Walker Process* context simply are inapposite here.

a. This Case Does Not Raise the Basic Policy Concerns Implicated by *Walker Process*

The heightened burden of proof applied in *Walker Process* cases flows directly from concerns about the patent procurement process, which are not present here. As explained by Justice Harlan’s concurrence in *Walker Process*:

[T]o hold, as we do not, that private antitrust suits might also reach monopolies practiced under patents that for one reason or another may turn out to be voidable under one or more of the numerous technicalities attending the issuance of a patent, might well chill the disclosure of inventions through the obtaining of a patent because of fear of the vexations or punitive consequences of treble-damage suits.

382 U.S. at 180 (Harlan, J., concurring) (emphasis added). As further explained by the administrative law judge in the Commission’s *VISX* case: “Practical policy considerations dictate that, given the complexity of the patent process, an applicant should not be exposed to treble damage liability for ‘honest mistakes’ or those mistakes described in the case law as

‘technical fraud’ which occur in the absence of a deliberate plan to deceive and mislead the PTO.” *In the Matter of VISX, Inc.*, Dkt. No. 9286, 1999 WL 33577396 (F.T.C.) (emphasis added). *See also Cataphote Corp. v. DeSoto Chemical Coatings, Inc.*, 450 F.2d 769, 772 (9th Cir. 1971), *cert. denied*, 408 U.S. 929 (1972) (“The road to the Patent Office is so tortuous and patent litigation is usually so complex, that ‘knowing and willful fraud’ as the term is used in Walker, can mean no less than clear, convincing proof of intentional fraud involving affirmative dishonesty”) (emphasis added).

The heightened burden in the specific context of patent procurement makes sense from a policy and efficiency perspective, not just because of the complex patent application process, but also because that process involves its own adjudicatory and review procedures. Establishing *Walker Process* claims in court after-the-fact necessarily requires second-guessing the outcome of the PTO’s internal processes, which merits heightened scrutiny. The misconduct at issue here – Rambus’s anticompetitive scheme to monopolize technology markets by subverting an open standards process – does not implicate the complex patent procurement process, nor does it require oversight of the PTO’s fact-finding and adjudicatory procedures. Accordingly, the policy rationales for employing special scrutiny in the *Walker Process* cases have no relevance here.

b. The Remedy Sought Does Not Merit Applying the Clear-and-Convincing Evidence Standard

The second reason courts have imposed a heightened standard in *Walker Process* cases is because of concern about the harshness of the applicable remedies: treble damages and invalidation of a patent. The Complaint in this cases does not, and legally cannot, propose either of these remedies.

Rather, the proposed remedy here is equivalent to the remedy obtained by proving equitable estoppel in an infringement action – non-enforcement of the patent against the entities affected by a patent holder’s misconduct. The Federal Circuit has expressly held that preponderance of the evidence suffices to prove equitable estoppel. *See, e.g., Gasser Chair Co. v. Infanti Chair Mfg Corp.*, 60 F.3d 770, 776 (Fed. Cir. 1995); *see also In the Matter of Dell Computer Corp.*, 121 F.T.C. 616, 624-625 (1996) (“Moreover, the remedy in this case is consistent with those cases, decided under the concept of equitable estoppel, in which courts precluded patent-holders from enforcing patents when they failed properly to disclose the existence of those patents.”).

Additionally, the Complaint does not seek treble damages, nor is such a remedy even permitted under the FTC Act. Thus, unlike in *Walker Process*, this case cannot possibly have any chilling effect of a treble damage remedy upon the disclosure of inventions through the patent process. *See, e.g.*, 382 U.S. at 180 (Harlan, J., concurring) (expressing concern that private antitrust suits “might well chill the disclosure of inventions through the obtaining of a patent because of fear of the vexations or punitive consequences of treble-damage suits”).

c. FTC *Walker Process* Cases Do Not Support Application of a Heightened Burden Here

Although there are two FTC cases involving *Walker Process* claims, *VISX* and *American Cyanamid*, neither supports the application of a heightened burden here. First and foremost, both cases, unlike this case, involved specific *Walker Process* claims, and thus are inapplicable here. Moreover, neither case reflects binding Commission precedent as to the applicability of a heightened standard of proof to demonstrate bad faith, even in a *Walker Process* context.

The ALJ’s decision in *VISX*, among other things, simply is not persuasive precedent for this matter for a number of reasons. First, as noted above, *VISX* involved clear *Walker Process*

claims; the administrative law judge applied a clear-and-convincing standard to allegations of fraud and inequitable conduct in connection with procuring a patent from the PTO. *In the Matter of VISX, Inc.*, Dkt. No. 9286, 1999 WL 33577396 (F.T.C.). Second, the ALJ in *VISX* did not have to expressly rule on the whether standard in private Walker Process cases should apply to those before the Commission, as Complaint Counsel had conceded that a clear-and-convincing standard applied. *See* Complaint Counsel’s Post-Hearing Brief, *In the Matter of Summit Technology, Inc. and VISX, Inc.*, Dkt. 9286, at 9 n.26 (“Materiality, intent and ‘but for’ all must be proved by clear and convincing evidence”). Third, the Commission never reviewed, let alone adopted the ALJ’s decision in *VISX* or the standard of proof it applied, and has since dismissed the complaint.¹⁴

In *American Cyanamid*, the Commission never expressly required the application of the heightened burden to prove the *Walker Process* claim. It referred to the clear-and-convincing standard to describe how other courts deal with allegations of “fraud in the procurement of a patent.” *In the Matter of American Cyanamid Co.*, 63 F.T.C. 1747, 1963 FTC Lexis 77 at *224-5. In this regard, the decision states:

In order for the government to prosecute successfully a suit for patent cancellation, common law fraud must be proven. . . . But we do not find such a holding necessary to our disposition of the case. Rather, we conclude that such conduct at the very least amount to ‘unclean hands,’ ‘inequitable conduct’ and ‘bad faith.’

Id. at 225 (emphasis in original). Upon remand from the Sixth Circuit, the Commission again highlighted this distinction between fraud and bad faith. With no reference to a heightened burden of proof, the Commission first stated, “we conclude that Pfizer failed to abide by the standards of candor and good faith in procuring its patent, and that this conduct together with the

¹⁴ *See* February 7, 2001, Order Reopening the Record and Dismissing the Complaint, <www.ftc.gov/os/2001/02/summitvisxorder.htm>.

subsequent exploitation of the [relevant] patent constituted a violation of section 5 of the FTC Act.” *In the Matter of American Cyanamid Co.*, 72 F.T.C. 623, 684-85 (1967), *aff’d*, *Charles Pfizer & Co. v. FTC*, 401 F.2d 574 (6th Cir. 1968). The Commission went on to state, “We further find, as an alternative ground, that the evidence is clear and convincing that Pfizer committed fraud upon the Patent Office in procuring its patent.” *Id.* (emphasis added). Thus, the Commission – without applying a heightened standard – found that Pfizer’s bad-faith conduct violated the FTC Act. Moreover, the only reference to “clear-and-convincing” is the Commission’s acknowledgment that the record contained that quantum of evidence proving the existence of fraud. The case does not hold that the clear-and-convincing standard is the applicable standard in a *Walker Process* suit brought under Section 5, much less a Section 5 suit, like this one, in which no *Walker Process* claim is asserted.

D. Adverse Inferences Against Rambus

The record compels findings in favor of Complaint Counsel on both liability and relief without regard to whether the record supports adverse inferences or presumptions against Rambus. Nonetheless, the record clearly does support adverse inferences against Rambus, and hence in weighing the evidence – or scrutinizing Rambus’s challenges to the sufficiency of the evidence – it is appropriate for Your Honor to take account of such adverse inferences or presumptions. The following discussion addresses two categories of adverse inferences: (1) inferences stemming from Rambus’s intentional spoliation of evidence, a matter that has already been partially adjudicated during the pretrial phase of this case; and (2) inferences stemming from Rambus’s strategic choice not to call as witnesses any of the company’s most senior representatives – the CEO, Geoffrey Tate; the President, David Mooring; or the Board Chairman, William Davidow.

1. Inferences Against Rambus for Its Intentional Spoliation of Evidence

This Court has determined that “[w]hen Rambus instituted its document retention policy in 1998, it did so, in part, for the purpose of getting of documents that might be harmful” in future anticipated litigation involving “its JEDEC-related patents.” February 26, 2003, Order Granting Complaint Counsel’s Motion for Collateral Estoppel at 5 (internal quotation marks omitted). This Court has also determined that “Rambus’s intentional destruction of documents” constituted “spoliation of evidence,” and that – as a sanction against such misconduct – “for the remainder of the administrative proceedings of this matter” the following rebuttable adverse presumptions shall apply:

1. Rambus knew or should have known from its pre-1996 participation in JEDEC that developing JEDEC standards would require the use of patents held or applied for by Rambus;¹⁵
2. Rambus never disclosed to other JEDEC participants the existence of these patents;
3. Rambus knew that its failure to disclose the existence of these patents to other JEDEC participants could serve to equitably estop Rambus from enforcing its patents as to other JEDEC participants;
4. Rambus knew or should have known from its participation in JEDEC that litigation over the enforcement of its patents was reasonably foreseeable;
5. Rambus provided inadequate guidance to its employees as to what documents should be retained and which documents could be purged as part of its corporate document retention program;

¹⁵ On February 27, 2003, Complaint Counsel filed a Motion to clarify this inference by modifying it to read: “While participating in JEDEC’s development of RAM standards, Rambus knew or should have known that JEDEC RAM standards being developed at that time (*i.e.*, prior to mid-1996) would require the use of patents held or applied for by Rambus.” *See* Complaint Counsel’s Request for Immediate Clarification of February 26, 2003 Order on Complaint Counsel’s Motions for Default Judgment and for Oral Argument. Complaint Counsel also asked that references to patents in the adverse inferences be broadened to cover patents applied for by Rambus. Judge Timony denied Complaint Counsel’s motion, but in doing so noted that the requested modifications “would only add self-evident detail to the order.” Order Denying Request for Clarification, February 27, 2003.

6. Rambus's corporate document retention program specifically failed to direct its employees to retain documents that could be relevant to any foreseeable litigation; and
7. Rambus's corporate document retention program specifically failed to require employees to create and maintain a log of the documents purged pursuant to the program.

February 26, 2003, Order on Complaint Counsel's Motions for Default Judgment and for Oral Argument at 4, 8-9.¹⁶

Moreover, this Court has expressed "significant and ongoing concerns about the Respondent directing its employees to conduct a wholesale destruction of documents and failing to create an inventory of what was destroyed." April 15, 2003, Order Denying Complaint Counsel's Motion for Additional Adverse Inferences and Other Appropriate Relief at 4. Your Honor also has acknowledged "that Respondent's spoliation places Complaint Counsel in a most difficult situation," and has suggested that the spoliation issue is not "closed to future reconsideration after trial." *Id.* at 4 n.2 (emphasis in original).

Although the record more than suffices to support Complaint Counsel's proposed findings both as to liability and remedy, the document destruction issue warrants the Court's continued attention, for two reasons. First, Rambus's actions in destroying documents relevant to anticipated litigation are part of the broader pattern of conduct at issue in this case. This conduct is relevant to Rambus's business strategies, its intent, and the extent to which Rambus

¹⁶ As Your Honor has acknowledged, Rambus now bears the burden of rebutting each of these presumptions. April 15, 2003, Order Denying Complaint Counsel's Motion for Additional Adverse Inferences and Other Appropriate Relief at 5. *See also Welsh v. United States*, 844 F.2d 1239, 1248 (6th Cir. 1988) ("The burden thus shifts to the defendant-spoliator to rebut the presumption and disprove the inferred element of plaintiff's prima facie case."); *Nation-Wide Check Corp., v. Forest Hills Distributors, Inc.*, 692 F.2d 214, 216-20 (1st Cir. 1982) (adverse inference from document destruction is sufficient to shift to the spoliator the burden of tracing proceeds of money order sales).

understood the potential that its deceptive behavior could render unenforceable its JEDEC-related patents on equitable estoppel or antitrust grounds. *See* CCF 1718-1758. Second, as a matter of public policy, it is important to draw attention to impropriety of destroying documents that are known to be relevant to anticipated future litigation to send a clear message that this agency will not tolerate spoliation efforts affecting its administrative proceedings.

Finally, we note that Your Honor has not yet ruled on two issues relevant to spoliation – (1) whether Rambus has rebutted the adverse inferences imposed by Judge Timony, and (2) whether, in assessing that issue, it is appropriate to apply a heightened standard of proof. *See* April 15, 2003, Order Denying Complaint Counsel’s Motion for Additional Adverse Inferences and Other Appropriate Relief at 5 (denying “as premature” Complaint Counsel’s request for a “clear-and-convincing” evidence standard of proof in assessing whether Rambus has rebutted the adverse presumptions). Because Rambus bears the burden of proof as to whether it has rebutted the adverse inferences, Complaint Counsel will defer to the rebuttal brief further comments on this issue.¹⁷

2. Rambus’s Decision Not to Call Its Senior Executives Warrants a “Missing Witness” Inference

Despite introducing him in the courtroom on the opening day of trial, and despite the fact that he more than any other person has directed Rambus’s actions and business strategies throughout the relevant time period, Rambus, by its own admission, strategically chose not to call its CEO, Geoffrey Tate, as a witness at trial.¹⁸ Similarly, Rambus chose not to call as witnesses either the company’s President, David Mooring, or its Chairman of the Board, William

¹⁷ For reasons that have been briefed previously, however, Complaint Counsel submits that it is fully appropriate to apply a heightened standard of proof in these circumstances. *See* Complaint Counsel’s Motion for Additional Adverse Inferences and Other Appropriate Relief at 29-31.

¹⁸ *See* Stone, Tr. 10921-22.

Davidow. Rambus made this choice even though both gentlemen, like Mr. Tate, played central roles in influencing Rambus's business strategy and decisions in matters directly at issue in this case, and even though (again as is true with Mr. Tate) they both authored or received many of the documents that were admitted in evidence, per stipulation of counsel, in the earliest stages of the trial.

Under these circumstances it is appropriate to infer that, had these Messrs. Tate, Mooring, and Davidow been called to testify, their testimony would have been unfavorable to Rambus's case. As one court has stated:

It is generally agreed that when a potential witness is available, and appears to have special information relevant to the case, so that his testimony would not merely be cumulative, and where his relationship with one of the parties is such that the witness would ordinarily be expected to favor him, then if such party does not produce his testimony, the inference arises that it would have been unfavorable.

Kean v. Commissioner of Internal Revenue, 469 F.2d 1183, 1187 (9th Cir. 1972) (internal punctuation omitted) (quoting McCormick, Evidence § 249, p. 543 (1954)). The rule's applicability to administrative proceedings is well established. *See, e.g., Golden State Bottling Co. v. NLRB*, 414 U.S. 168, 174 (1973).

The circumstances presented here easily satisfy the two basic criteria that trigger the missing witness inference: (1) Messrs. Tate, Mooring, and Davidow are each "peculiarly available" to Rambus, as that term is construed by the relevant case law; and (2) each has superior knowledge of key facts at the heart of this case, such that their testimony would not have been inferior or cumulative. *See Kean*, 469 F.2d at 1187-88.

a. Messrs. Tate, Mooring, and Davidow Are Peculiarly Available to Rambus

Witnesses are deemed “peculiarly available” to one party if they are biased in favor of that party, even if they may be available to the other party through compulsory process or their presence at trial. *See, e.g., Kean*, 469 F.2d at 1188 (availability for purposes of the missing witness rule “depends upon all the facts and circumstances bearing upon the witness’s relation to the parties and not merely upon his physical presence at trial or accessibility for service of a subpoena”); *Tyler v. White*, 811 F.2d 1204, 1207 (8th Cir. 1987) (reasoning that a witness “presumptively interested in the outcome” is not of “equal avail to both parties ” even if subject to compulsory process). *See also Welsh v. United States*, 844 F.2d 1239, 1245, n.1 (6th Cir. 1988); *U.S. v. Hoenscheidt*, 7 F.3d 1528, 1531 (10th Cir. 1993). Specifically, courts view the basic employer-employee relationship as implicating the type of bias that renders a witness not truly available to the other side. *See, e.g., U.S. v. Beekman*, 155 F.2d 580, 584 (2d Cir. 1946); *Jones v. Otis Elevator Co.*, 861 F.2d 655 (11th Cir. 1988) (“Because of an employee’s economic interests, the employer-employee relationship is recognized as one creating practical unavailability.”).

In *Kean v. Commission of Internal Revenue*, the missing witness was present in the courtroom and accessible for service of a subpoena, but was determined to be not equally available to both parties. 469 F.2d at 1187-88. The court reasoned that because petitioner had employed the witness for 22 years and had a better understanding of his testimony, the witness not equally available, and failure to call him warranted an adverse inference. *Id.*

As applied in the present case, this same reasoning leads to the conclusion that Messrs. Tate, Mooring, and Davidow, despite being subject to compulsory process, were nonetheless “peculiarly available” to Rambus for purposes of the missing witness rule. As Rambus’s senior-

most corporate representatives, their bias runs even deeper than that of the uncalled witnesses in *Kean* and various other cases in which courts have found that employees were practically unavailable to their employer's litigation adversaries. The proclivity of such high-ranking corporate officials to testify in a manner favorable to Rambus trumps any possible argument that these uncalled witnesses were practically available to be called by Complaint Counsel.

Moreover, with respect to Mr. Tate in particular, counsel for Rambus has demonstrated that it wields an even more tangible control over the uncalled witness. In a letter dated July 17, 2003, Rambus's lead trial attorney, Gregory Stone, informed Complaint Counsel that Mr. Tate was unavailable to appear in Complaint Counsel's rebuttal case, explaining that counsel for Rambus had "advised Tate that he could begin a sabbatical," for roughly two months – out of the country. *See* July 17, 2003, Letter from Gregory P. Stone to M. Sean Royall [**Tab 1**]. The fact that Rambus's counsel was consulted about, and subsequently authorized, Mr. Tate's extended absence from the country during trial provides yet additional proof that Mr. Tate is peculiarly within Rambus's control.

b. Messrs. Tate, Mooring, and Davidow Would Have Provided Superior, Non-Cumulative Testimony

The circumstances here also satisfy the second criterion for the missing witness doctrine, that "the testimony of the uncalled witness must not be cumulative or inferior to the testimony already presented." *Kean*, 469 F.2d at 1188. Even if another witness has testified regarding an issue, the missing witness's testimony as to that issue is not viewed as cumulative if it could have corroborated the testimony already introduced. *See, e.g., Frierdich v. Commissioner*, 925 F.2d 180 (7th Cir. 1991) (court upheld adverse inference against defendant for failure to call widow to corroborate testimony explaining that an unusually structured transaction was indeed a bona fide loan to her lawyer). For example, in *Gaw v. Commissioner*, 1995 WL 664592, 1995

Tax Ct. Memo. LEXIS 530, *81-82 (U.S. Tax Ct.), the court drew an adverse inference for failure to call the owner of certain entities, even though the managing director and chairman of those entities had testified as to the relevant issues. *Id.* The court reasoned that because the uncalled witness's testimony would have corroborated the testimony already introduced it would not have been merely cumulative. *Id.*

As a general matter, the thoughts, strategies, and knowledge of Rambus's three most senior corporate representatives are highly relevant to multiple issues in this case, including Rambus's exclusionary conduct and anticompetitive intent. Moreover, each of these individuals played a central role in connection with events and transactions that go to the heart of this case. Indeed, the list of admitted trial exhibits, which includes literally hundreds of documents that were authored by, received by, or that otherwise relate to these three uncalled witnesses.¹⁹

Documents and other testimony identify Mr. Tate as a driving force behind, among other things, Rambus's efforts to make RDRAM a dominant industry standard (*see* CCFF 732-33, 868, 911-12); to broaden its patent applications to cover features of SDRAM and DDR SDRAM (*see* CCFF 911-13, 981, 993, 1003, 1054, 1057-58); to conceal its intellectual property from JEDEC and its members (*see* CCFF 926, 1098-99, 1676-78, 1682-84, 1686, 1696-97); to develop and implement a strategy to enforce its previously undisclosed JEDEC-related patents, in a way that reduced the attractiveness of SDRAM and DDR SDRAM and favored RDRAM (*see* CCFF 917, 1691-93, 1711, 1870-71, 1920, 1977, 1994); and to systematically destroy documents that could potentially harm Rambus in future anticipated litigation (*see* CCFF 1720, 1722, 1726). Plainly, as the company's CEO and the architect of Rambus's strategies in these other respects, Mr. Tate's testimony – had he been called to testify live at trial – would have provided superior, non-

¹⁹ For instance, at least 407 of the admitted exhibits directly relate to Mr. Tate, many if not most of which could not have been used with any other witness.

cumulative evidence. The same can be said for Mr. Mooring and Mr. Davidow, both of whom played central roles with respect to key issues, such as Rambus’s understanding of JEDEC’s patent policy and its patent enforcement strategy, respectively. *See* CCF 926, 938, 987, 1682, 1692, 1720, 1751, 1978, 1064, 1098-99 (Mooring). *See also id.* 1676, 1682, 1706, 1720, 1871, 1875, 1992, 1994, 1977, 2029 (Davidow).

Complaint Counsel submits that Your Honor should consider Rambus’s strategic decision not to call its most senior executives in assessing both Rambus’s challenges to the sufficiency of the evidence, and what weight to give documents which Complaint Counsel was unable to use at trial because Rambus’s most senior corporate representative were unavailable for cross-examination.

III. THE RECORD EVIDENCE REQUIRES THAT RAMBUS BE FOUND LIABLE ON ALL THREE COUNTS OF THE COMMISSION’S COMPLAINT

Independent of what this Court may conclude as to the imposition of adverse inferences, the record evidence overwhelmingly proves each essential element of all three counts of liability contained in the Commission’s Complaint. This section provides an overview of the record evidence bearing on the subject of liability, which of course is presented in far greater detail in Complaint Counsel’s proposed findings of fact.

A. JEDEC’s Policies, Rules, and Procedures Required Good-Faith Disclosure of Relevant Patents and Patent Applications

Rambus voluntarily joined JEDEC and, in doing so, became subject to JEDEC’s rules and procedures. *See* CCF 209 (Rambus “agree[d] to participate in the activities of” JEDEC as part of its membership application).²⁰ It is through violating and subverting these rules and

²⁰ As one commentator recently noted, “the case law strongly suggests that merely joining an SSO is sufficient to constitute consent to be governed by the SSO’s bylaws.” Mark A. Lemley,

procedures, and the core purposes of JEDEC’s open standards process, that Rambus acquired its monopoly in the relevant technology markets. Hence, the necessary starting point for any analysis of liability is the purposes of JEDEC as well as its policies, rules, and procedures. The evidence pertaining to these issues is summarized below but is addressed in far greater detail in Complaint Counsel’s proposed findings of fact. *See* CCFF 300-443.

1. JEDEC Was Committed to Developing “Open” Standards and Avoiding Patented Technology When Possible

The rules and obligations incumbent on JEDEC members were critical to ensuring that JEDEC could pursue its key objectives in standard setting. JEDEC identified these objectives as:

- “setting open standards”;
- being “especially careful not to unintentionally standardize patented technology”;
- “prohibiting the incorporation of patented technology into a standard unless the patent owner is willing to grant a license on reasonable terms”;
- requiring “JEDEC committee members to disclose, as early in the standard development process as possible”; and
- preventing “a single entity from stifling competition.”

Amicus Curiae Brief of JEDEC Solid State Technology Association in Support of Defendants-Appellees’ Petition for Rehearing and Rehearing En Banc CX3089, at 2-3. CCFF 300-02.

JEDEC participants agree that these principles reflect JEDEC purposes. Indeed, the evidence presented at trial demonstrates, unequivocally, that JEDEC fundamentally strived to create consensus-based, “open” standards, free to be used by anyone, and unencumbered – whenever possible – by private patent rights. CCFF 300-01, 304. Even Richard Crisp,

Intellectual Property Rights and Standard-Setting Organizations, 90 Cal. L. Rev. 1889, 1191 & n.69 (2002) (citing cases).

Rambus’s primary JEDEC representative, agreed that JEDEC’s goal was “to create standards which steer[ed] clear of patents which must be used to be in compliance with the standard whenever possible.” CX0903 at 2; CCFF 301.

JEDEC advanced these principles through a rubric of rules and procedures. At the most fundamental level, these included (1) JEDEC’s patent disclosure policy,²¹ and (2) “basic rules” set out in the EIA Legal Guides for its standardization programs,²² which required that the programs:

- “be carried on in good faith under policies and procedures which will assure fairness and unrestricted participation”; and
- “not be proposed for or indirectly result in . . . restricting competition, giving a competitive advantage to any manufacturer, excluding competitors from the market.”

EIA Legal Guides (3/14/83), CX0202 at 6 (emphasis added); *see also* CCFF 307, 310 (discussing good faith); 302, 304, 315 (discussing competition concerns). As set forth below, the evidence presented at trial amply demonstrates that JEDEC participants clearly understood – and relied on their fellow members to act in accordance with – these obligations.

2. JEDEC’s Rules Required the Early Disclosure of Relevant Patents and Patent Applications

JEDEC’s patent disclosure policy is set forth in the relevant JEDEC and EIA manuals, which provide in relevant part as follows:

- JEDEC standards “that require the use of patented items should be considered with great care.” CX0208, § 9.3, at 19.

²¹ The purpose of JEDEC’s patent policy was to enable the development of open standards, free from patent encumbrances that could conflict with future use. CCFF 316.

²² JEDEC was part of EIA and subject to the EIA Legal Guides during the 1991-1996 timeframe. CCFF 202-305.

- “[C]ommittees should ensure that no program of standardization shall refer to a product on which there is a known patent unless all the relevant technical information covered by the patent is known to the formulating committee, subcommittee, or working group.” *Id.*
- “If the committee determines that the standard requires the use of patented items, then the committee chairperson must receive a written assurance from the organization holding rights to such patents that a license will be made available without compensation to applicants desiring to implement the standard, or written assurance that a license will be made available to all applicants under reasonable terms and conditions that are demonstrably free of any unfair discrimination.” *Id.* (emphasis added); EIA Style Manual for Standards and Publications of EIA, TIA, and JEDEC, EP-7-A, § 3.4 (8/00/90), JX0054 at 9. CCFF 400.
- “The Chairperson of any JEDEC committee, subcommittee, or working group must . . . call attention to the obligation of all participants to inform the meeting of any knowledge they may have of any patents, or pending patents, that might be involved in the work they are undertaking.” JEDEC Manual, § 9.3.1 CX0208 at 19 (emphasis added).

The relationship among these provisions is significant. Without compliance with the disclosure obligation, enforcement of the prior three provisions is impossible.

Viewed at the highest level, the JEDEC patent policy imposed two basic duties. First, it imposed on JEDEC participants a duty to disclose any relevant patents or patent applications of which they are aware that might involve work of a JEDEC committee. Second, it imposed on the chairperson of any JEDEC committee a duty to ensure that no known patented or patent-pending technology was included in a JEDEC standard unless the committee had received advance, written assurance from the intellectual property owner that it agreed to license either on royalty-free or reasonable and non-discriminatory (“RAND”) terms. CCFF 318. These duties were in place and mandatory throughout the time Rambus participated in JEDEC (CCFF 324, 330, 347, 349), and were disclosed clearly and routinely to all JEDEC participants. CCFF 357-418.

a. The Scope of the Patent Disclosure Requirement Was Clear and Was Well Understood by JEDEC Members

Many witnesses at trial testified as to their understanding of JEDEC's patent disclosure policies. *See* CCF 316-356. A portion of that evidence is summarized here.

i. Disclosure Was Mandatory

JEDEC members understood that the patent disclosure policy was mandatory. CCF 324, 330. Indeed, numerous JEDEC participants emphatically testified at trial as to the obligatory nature of the policy. (CX0208 at 19 (“the obligation of all participants to inform the meeting of any knowledge they may have of any patents, or pending patents that might be involved in the work they are undertaking”); J. Kelly, Tr. 1979 (“any time a participant has knowledge of relevant intellectual property, patent or patent application, that is or may be required to comply with the work underway, then that participant has an absolute duty to disclose it.”); Lee, Tr. 6595-96 (“there was a requirement to disclose patents or patent applications in progress to the committee if the work that they were doing may relate or if the patent may relate to the work the committee was doing.”); Rhoden, Tr. 319, 615 (disclosure is an obligation); Sussman, Tr. 1346 (“Q. Again, based on your experience, did you view this patent disclosure policy we have been discussing as a voluntary option or was it a mandatory requirement on JEDEC members? A. It's required.”); CX2057 at 200 (Meyer 12/13/00 Dep.) (disclosure is an obligation); *see also* CX0711 at 188 (Richard Crisp notes, in describing the patent policy, “The things we should not do are to not speak up when we know that there is a patent issue.”)).

ii. Disclosure Duty Applied to Patent Applications and Anything in the Patent Process

The JEDEC patent disclosure rule applied not only to issued patents, but also to patent applications. CCF 320. Witness after witness at trial corroborated this point. *See, e.g.,*

Landgraf, Tr. 1693-94 (“As soon as a member knew that they had – either they had a patent of their own or applications or even a third party’s patent or application, if you knew that and it was touching on some element of the standard or proposed standard, you were supposed to disclose that to the committee.”); G. Kelley, Tr. 2689 (“that new member would understand that it included patent applications from the beginning because we were dealing with patent applications from that new member’s beginning and was clearly an issue at my meetings.”); CX2057 at 211 (Meyer 12/13/00 Dep.) (understood that “patents” included patent applications); Calvin, Tr. 1006-07 (clear about fact that patent applications were required to be disclosed); Kellogg, Tr. 5024; 1886-88 (term “patent” included patent applications); Sussman, Tr. 1342 (understood in 1981 or 1982 that patent policy required disclosure of patent applications), cited in CCF 320.

Witnesses also established clearly that the disclosure policy extended to anything in the patent process, meaning patentable items or items for which a patent application was in progress. *See, e.g.*, Lee, Tr. 6595-96 (“the patent policy had a few aspects to it. First of all, there was a requirement to disclose patents or patent applications in progress to the committee if the work that they were doing may relate or if the patent may relate to the work the committee was doing.”); Rhoden, Tr. 307, 317-21 (“patent” has always been applied to anything in the patent process); Sussman, Tr. 1333-34 (“issued patents, patent applications . . . if you were about to apply for a patent”); G. Kelley, Tr. 2406-07 (“patent” as used by Mr. Townsend meant an “issued patent that was available from the patent office, patent applications that were being worked on with the patent office, and items that were probably going to become patents”); M. Kellogg, Tr. 5024 (Gordon Kelley made it clear that “any company was obligated to disclose patent activity”); M. Kellogg, Tr. 5032 (“Patent activity to me is intent to file, file, the actual filing itself or the issuance of a patent, so I use the general term”); CX0306 (sign-in sheet

“patentable or patented item”); CX0042A at 7 (Townsend memorandum: noting “existing rules of the EIA governing patentable matters” and reminding participants of their obligation to indicate “the intent of your company to patent or not patent the subject matter”). *See also* McGrath, Tr. 9272-9273 (“Judge McGuire: But also this obligation to act in good faith, did that incorporate the idea of disclosing patent applications as they were being developed? The Witness: Yes, it would.”); CCF 320.

If the disclosure policy did not cover patent applications, the purpose behind the policy could not be vindicated.²³ As John Kelly – JEDEC’s President and the EIA/JEDEC General Counsel – explained at trial:

[I]f the work of the committee was held up, in effect, by the condition that only issued patents needed to be disclosed, then the standard development process could reach a very late stage or, in fact, already be concluded by the time a patent finally issued and there was disclosure that the patent was required to comply with the work by the committee on the standard under development, and that would produce exactly the same kind of anti-competitive result that we’re trying to prevent by the disclosure.

J. Kelly, Tr. 1896-97, cited in CCF 320.

As discussed in more detail below, during the time Rambus participated in JEDEC, JEDEC’s practices and procedures provided all participants with ample notice that the patent disclosure policy included a requirement to disclose patent applications. As an initial matter, the JEDEC Manual of Organization and Procedure, which was revised in 1993, made explicit reference to the requirement to disclose pending patents. (CX0208 at 19). In addition, both

²³ JEDEC’s requirement to disclose relevant patent applications is consistent with the patent policy guidelines of the American National Standards Institute (“ANSI”). Although ANSI does not create standards, it does accredit standard setting organizations, provided the organizations’ procedures, including patent disclosure procedures, are consistent with ANSI’s policy guidelines. ANSI’s guidelines specifically contemplate that ANSI-accredited standard setting organizations may choose to require the disclosure of patent applications. *See also* CCF 443 patent policy regarding ANSI.

patents and patent applications appeared on tracking lists distributed to members. CCFF 367-69; *see also* CX0042A at 7 (requesting members to research company position on “patents held or applied for”). Further, the patent reminder notice on the sign-in sheet that participants had to sign at each meeting included the term “patentable.” CCFF 320, 370. JEDEC participants testified that they understood this term to refer to anything over which an individual company claimed ownership or anything that they claimed could be patentable. *See* CCFF 320; Rhoden, Tr. 336.

iii. Disclosure Duty Applied to Patents and Applications That “Might” Be Involved in Standards “Under Development”

JEDEC representatives and participants specifically reject the idea that the disclosure obligation is not triggered until a standard has been finalized, or a patent is known to be required. CCFF 335-38. First, EIA/JEDEC patent policy required disclosure of patents and patent applications that “might be involved” in the standards under development. CCFF 335 (*e.g.*, G. Kelley, Tr. 2705 (“any claim that might apply to the work of the committee it was required to disclose”); Landgraf, Tr. 1693-94 (disclose patents or applications “that would potentially be impacting the standard or proposed standard.”); Sussman, Tr. 1346 (must disclose where there is a “gray” area); CX2057 at 203-04 (Meyer 12/13/00 Dep.) (disclosed patent when “sufficiently close” to work of JEDEC.); Williams, Tr. 909-11 (must disclose if “there would be a reasonable possibility that the patent was going to be associated with the work of JEDEC)). *See also* CCFF 337 (citing CX0353 at 1 (Letter from John Kelly stating that “assurances must be provided by the patent holder when it appears to the committee that the candidate standard may require the use of a patented invention”) (emphasis in original)).

Moreover, the obligation to disclose was triggered as soon as a participant becomes aware that a relevant patent or pending patent might cover a technology incorporated in a

standard. CCFF 339, 345. Although the duty to disclose was not tied to any procedural formality in the JEDEC process, JEDEC participants generally understood that intellectual property should be disclosed as early as possible in the process. CCFF 340-41. Early disclosure promotes efficiency in the development of standards (CCFF 342) and allows JEDEC participants to design around potentially patented technology, to develop equally acceptable but unencumbered standards (CCFF 317).

Moreover, JEDEC's rules required that participants do more than merely provide a patent number without any context for how the patent might involve the prospective standard. CCFF 331-32 (Kellogg, Tr. 5060 (“JUDGE McGUIRE: Well, then let me ask a question. Under your understanding of the patent policy, when one discloses a patent, are you saying then that if they haven't also disclosed the implications of the patent, have they I guess adequately then disclosed the patent under the patent policy? THE WITNESS: No. That's kind of my point, and I appreciate the clarification. . . . Within the context of the patent policy at JEDEC, disclosure of a number I don't believe meets the patent policy. If the number is disclosed not in any context of anything else.”)). JEDEC participants understood that the patent policy required that a participant disclose sufficient information to put the committee on notice as to the nature of the relationship between the proposed standard and the intellectual property that might relate to the proposed standard. CCFF 331-32.

iv. Disclosure Duty Was Not Limited to Presenters

The JEDEC disclosure policy imposed an obligation on “all participants to inform the meeting of any knowledge they may have of any patents, or pending patents, that might be involved in the work they are undertaking.” CX0208 at 19 (emphasis added); CCFF 330. This obligation was not restricted to presenters, members, or intellectual property owners. CCFF 330. As Desi Rhoden, Chairman of the JEDEC Board of Directors, explained at trial, the requirement

extended to “everyone who is a member either in attendance or not in attendance, a guest, a – whoever is either in the room at the time discussions are held or has access to any of the JEDEC information outside of the meetings themselves.” Rhoden, Tr. 319-20 (cited in CCFF 330).

v. Disclosure Duty Was A Continuing One

The EIA/JEDEC duty to disclose was a continuing one. CCFF 346. As John Kelly explained at trial, “once a standard has been finalized and adopted, members [had] a continuing duty to disclose patents or patent applications relevant to the final standards.” J. Kelly, Tr. 1985; CCFF 346. Indeed, even resigning from JEDEC did not relieve a company of the duty to disclose relevant intellectual property that might relate to JEDEC work conducted while the company was a member. CCFF 344.

vi. Patent Policy Included Licensing Requirements

JEDEC prohibited the inclusion of patented or patentable material in JEDEC standards absent JEDEC’s receipt of advance, written assurances from the owner of the intellectual property that it would grant licenses on royalty-free or on reasonable and non-discriminatory terms. CCFF 347. RAND licensing helps to ensure open standards 348. Accordingly, the RAND requirements were specific: The assurances had to be provided in writing. CCFF 349. The wording on the written assurance letter had to be consistent with the language found in Section 3.4 of EP-7-A, the EIA Style Manual, with no substantial modifications or additions. CCFF 350. The JEDEC/EIA general counsel was responsible for determining whether a written assurance complied with JEDEC/EIA policy. CCFF 351. Assurances were to be requested as soon as it appeared that the technology was or may have been required to comply with the standard. CCFF 352.

A patent owner could, if it so chose, refuse to provide RAND licensing assurances. (J. Kelly 1885-86 (“a patent owner is always free to refuse to give the licensing or to give the

licensing. . . That's their choice'')). However, in the event that the owner of the relevant intellectual property did refuse to provide acceptable assurances of RAND license terms, JEDEC's rules did not permit it to use such intellectual property in its standards. CCFF 347. Determination of a reasonable royalty rate was not the responsibility of JEDEC, but rather was left to negotiation and market forces, or the courts. CCFF 354-55.

b. JEDEC Undertook Extensive and Effective Measures to Inform Members of the Applicable Disclosure Rules

JEDEC has had patent disclosure policies for many years, long predating Rambus's involvement in the organization. However, the early 1990's marked a new era of increased efforts by JEDEC leadership – especially the leadership of the JC-42.3 subcommittee – to heighten the level of awareness among members of their obligations to disclose relevant patents and patent applications.

Between December 1991 and June 1996, the period Rambus was a member of JEDEC, JEDEC leadership and members took a series of steps to ensure that all participants understood these obligations. JEDEC staff and leadership conveyed the existence and scope of the patent policy and rules to members during new member orientations, orally at every meeting, in every set of minutes, in JEDEC and EIA Manuals, at the top of ballots for standards, and through the application of the policy to the real-life disclosure (and in some cases non-disclosure) of patents and patent applications. CCFF 357-434. Every step of the JEDEC process contained some statement – either oral or written – that informed members of their obligations as a voluntary member of an organization, the primary purpose of which was to develop standards that were free of cumbersome intellectual property claims. *Id.* Through presentations, documents, and actual practice, all JEDEC members became aware of their obligations under the patent policy. *Id.*

New JEDEC members first became aware of the patent policies when they received copies of the JEDEC Manual of Organization and Procedure (CCFF 374), discussed above, and at new member orientations that included discussion of the patent policy when new members had questions (CCFF 373). This marks just the beginning, though, of the consistent information and reminders members received about the policy during their course of participation in JEDEC.

The person largely responsible for spearheading JEDEC's efforts to routinely remind JEDEC members of their disclosure obligations was Jim Townsend. He represented Toshiba at JEDEC and served as the chairman of the JC-42.3 subcommittee while Rambus was a JEDEC member. CCFF 359. Townsend's views on patent disclosure were well known to anyone who attended JEDEC meetings in the early through mid-1990's. CCFF 360. As JEDEC participants testified at trial, Townsend was committed to do everything possible to draw attention to, and highlight the importance of, JEDEC's patent disclosure policy. CCFF 359-60, 362-72.

The *Wang* litigation, which commenced in or around 1991, and which involved allegations that Wang deceived JEDEC by not disclosing relevant patent rights, stiffened the JC-42 committee's commitment to zealously enforcing the organization's patent disclosure policies. CCFF 362 (citing, *e.g.*, Landgraf, Tr. 1698-99 (*Wang* "served to reinforce the seriousness of the policy . . . if you are going to participate in an open standard formulation body, you need to disclose everything that is applicable or potentially impacting the standards that you're going to adopt."); Williams, Tr. 786-87 (Chairman Townsend and the rest of the board wanted to ensure [that *Wang*] never happened again, and so that's why there was so much emphasis placed upon why the policy was where it was and why there was discussion upon it and why it was at length discussed that this was so important"))).

Beginning in mid-1991, Townsend routinely summarized JEDEC's patent disclosure policies at the beginning of every meeting of the JC-42.3 subcommittee. CCFF 360, 363.

JEDEC participants uniformly remember the Townsend presentations as one of the most important sources of information about the JEDEC disclosure policy. *See, e.g.*, CCF 360, Williams, Tr. 771 (“Q. Between late 1991 through 1993, how did you learn about JEDEC’s patent policy? A. Mainly by the presentations that were given at every meeting by Mr. Townsend.”); G. Kelley, Tr. 2399 (“Jim Townsend made it a very big issue that the committee needed to deal with patents and what he called patent applications.”); Lee, Tr. 6598 (Townsend “was pretty vocal at the beginning of meetings to state the policy and to clarify if any question came up.”). Townsend’s presentations made it clear that “members are cautioned to disclose their relevant patent applications.” RX0356 at 2 (notes of Brett Williams from December 1992 JC-42.3 meeting).

The patent presentations were just one way Townsend kept JEDEC members apprised of their obligations under the patent policy. Mr. Townsend also kept a patent tracking list, which reflected patent-related information he had learned of through his work inside JEDEC. CCF 367. The list served as a reminder to members and an educational tool for newcomers about the patent disclosure policy. CCF 368.

A memorandum sometimes was shown and circulated with the patent tracking list. CCF 370. The memo referred participants to the “existing rules of the EIA governing patentable matters,” requested members to “report your company’s position on patents held or applied for,” and reminded participants of their obligation to indicate “the intent of your company to patent or not patent the subject matter.” CX0042A at 7 (emphasis added); CCF 370.

JEDEC ensured members were aware of the patent tracking list and the patent memo by including them with the minutes sent out after each meeting. CCF 372. Significantly, the minutes also contained Townsend’s patent presentation materials, the terms of the patent policy,

and discussions of terms of the patent policy, as well as a description of the disclosure of patents and patent applications that took place during the meeting. CCFF 363, 372. Indeed, Rambus received copies of this information with the minutes of meetings throughout the time it was a JEDEC member. CCFF 371 (citing CX0042A).

But that was not all JEDEC did to ensure its members understood and complied with the disclosure policy. In response to Wang's allegations that it did not understand that the patent policy applied with equal force to patent applications, JEDEC modified its "Meeting Attendance Roster" or sign-in sheet, which each participant in a JEDEC meeting was required to sign. CCFF 375-80. Beginning during the time that Rambus was a JEDEC member, the sign-in sheet contained a patent policy reminder stating that: "Subjects involving patentable or patented items shall conform to EIA Policy." CCFF 377-78 (citing CX0306 at 1). The sign-in sheet also referred participants to EIA's general counsel – at that time, John Kelly – who was responsible for interpreting the patent policy, concerning any questions. CCFF 380-81.

JEDEC also used the ballots as yet another mechanism to remind JEDEC members about their disclosure obligations. Every JEDEC ballot required that participants who had not yet alerted the committee but were "aware of patents involving this ballot, [to] please alert the Committee accordingly during your voting response." CCFF 383-85 (quoting JX0059 at 2).

Members also learned of the patent policy through various JEDEC and EIA publications. The JEDEC Manual of Organization and Procedure was the document according to which all JEDEC activities were conducted. CCFF 404. It set forth in the most specific terms members' obligations under the JEDEC disclosure rule. In October 1993, the Manual was revised to

emphasize to members that the disclosure rule was obligatory, that it applied to all participants, and that it applied with equal force to patent applications:²⁴

9.3.1 Committee Responsibility Concerning Intellectual

Property The Chairperson of any JEDEC committee, subcommittee, or working group must . . . call attention to the obligation of all participants to inform the meeting of any knowledge they may have of any patents, or pending patents, that might be involved in the work they are undertaking.

JEDEC Manual of Organization and Procedure, JEP 21-I (10/00/93) CX0208 at 19. JEDEC also added a footnote to Section 9.3 of the JEDEC Manual, which clarified:

**For the purpose of this policy, the word “patented” also includes items and processes for which a patent has been applied and may be pending.

Id., § 9.3 at 19. In addition to the operative language contained in the body of the Manual, Appendix E to the 21-I Manual contained the following summary of the EIA/JEDEC patent policy:

Standards that call for the use of a patented item or process may not be considered by a JEDEC committee unless all of the relevant technical information covered by the patent or pending patent is known to the committee, subcommittee, or working group.

Id., Appendix E, JEDEC009349. JEP21-I was made available to all JEDEC participants. CCF 418.

Discussion and debate at the meetings served as another mechanism by which members were reminded of their disclosure obligations. On certain occasions, JEDEC participants had failed to comply with JEDEC’s disclosure policy and later attempted to enforce patent rights related to the relevant standard. CCF 423. These incidents and the discussions they spawned

²⁴ The 1993 revision did not entail a change in the patent policy; rather, it was a mere clarification of what the members and the JEDEC staff previously understood. CCF 416.

served to further solidify JEDEC members' understanding of their disclosure obligations. One particularly memorable event was the controversy involving the alleged failure of Texas Instruments to disclose properly its patent relating to Quad CAS technology and its subsequent efforts to assert its patent rights. Participants discussed the issue at JC-42.3 subcommittee meetings in 1993, and essentially accused Texas Instruments of having failed to comply with the JEDEC disclosure policy. CCF 424-432. The minutes from the subcommittee's March 1994 meeting document some of the ensuing discussions:

Applicability of patents to use of JEDEC standards was discussed. The issue is warning, IBM noted. Failure to disclose a patent prevents the Committee from considering the standard.

The Committee was asked if the patent policy is clear. The Committee felt it was clear.

JC-42.3 Committee on RAM Memories, Minutes of Meeting 70 (3/9/94) JX0019 at 4-5. In a memorandum forwarded to all JEDEC members, EIA legal counsel further clarified, "[w]ritten assurance must be provided by the patent holder when it appears to the committee that the candidate standard may require the use of a patented invention." CX0353 at 1 (emphasis in original); CCF 337-429. Richard Crisp was present to witness the whole episode, and reported the details back to others at Rambus: "TI was chastized for not informing JEDEC that it had a 1987 patent on quad CAS devices. . . . The bottom line is that all quad CAS devices will be removed from standard 21C." Crisp E-Mail (10/5/93), CX0710 at 1. Soon after, the JC-42.3 subcommittee rescinded the Quad CAS standard. CCF 431.

In another instance of non-compliance, a company named SEEQ proposed a JEDEC standard called silicon signature. SEEQ owned two patents relating to the technology, but disclosed and offered to license only one. Upon learning of SEEQ's second patent, JEDEC chose to standardize on a different technology. CCF 433.

Discussions of revisions to the JEDEC manual as early as 1992 served as yet additional reinforcement of members' disclosure obligations. CCF 410-13. In particular, one of the revisions provided additional clarity that the patent policy required disclosure of patent applications. Although the wording of the manual was revised in 1993, making the patent policy's application to patent applications more explicit, the changes that were made at that time did not reflect a substantive change in the policy. CCF 416 (*citing, e.g., G. Kelley, Tr. 2415-16* ("Q. Based on your understanding of the JEDEC policy in the early 1990's, and based on your understanding as one of the individuals involved in working on the addition to the JEDEC manual, did you understand that the work that you were doing in the manual would change in any way the substance of the JEDEC disclosure policy? A. No."); J. Kelly, Tr. 1927 ("this was a restatement of the patent policy, and it in no way varied the policy itself. It changed some of the verbiage."); CX2057 at 177-78 (Meyer 12/13/00 Dep.) ("A. We changed it. JEDEC council changed the wording. Q. Did that in your mind change the policy? A. No, it did not change the policy.")).

JEDEC's multiple efforts to inform members of the requirements of its disclosure policy were, in total, very effective. The combination of the new member orientation, sign-in sheet, the JEP 21-I Manual, the ballot forms, oral presentations at each meeting, follow-up memoranda, and discussion and debate within JEDEC (both written and oral) amply ensured that each and every member of JEDEC was fully aware of their obligations under the JEDEC rules.

3. JEDEC's Rules Required Members to Participate in Good Faith

In addition to requiring literal compliance with the patent disclosure policy, the "basic rules" of EIA legal guides required JEDEC participants to act in good faith. CCF 310.²⁵ The

²⁵ JEDEC specifically provided that all of its meetings were to "be conducted within the current edition of EIA legal guides . . . incorporated herein by reference." JEDEC Manual of

good-faith rule imposed a duty on JEDEC participants to become familiar with and abide by the letter and the spirit of the patent policy. CCFF 311.

Indeed, JEDEC members were keenly aware of this rule and relied on it. They testified that they understand the rule as requiring fair dealing, trust, and honesty. CCFF 312. As expressed in the words of one participant: “Good faith, we’re all competitors, we’re all about to ready to dice each other in the marketplace, but seeing we’re talking about or about to talk on intellectual property, I trust you to do something, and I expect that same set of trust back.” Sussman, Tr. 1330; CCFF 312. Without participation in good faith, it is not possible to advance the objectives of an open standardization process.²⁶ See CCFF 313-14.

B. Rambus Understood JEDEC’s Basic Policies

Rambus, like all participants in the JC-42.3 subcommittee, was deluged with information about JEDEC’s patent policy. Rambus became aware, and was routinely reminded, of its obligation under JEDEC’s patent policy to disclose relevant patents and patent applications through JEDEC procedures, documents, and participation at the meetings. CCFF 357-418; *see also* CCFF 840-42. Indeed, at the very first JC-42.3 meeting Rambus attended, not only did Jim Townsend make a presentation on JEDEC’s patent policy and show the patent tracking list, but at least eight different companies made patent-related disclosures or raised patent-related concerns during the course of the meeting. CCFF 363 (citing JX0010 at 11), 872. Throughout

Organization and Procedure, JEP 21-I, § 9.1 (“JEDEC Manual” or “JEP 21-I”) (10/00/93), CX0208.

²⁶ The good-faith rule was particularly important given the voluntary nature of JEDEC. CCFF 314, 419-21. JEDEC was strictly limited in its ability to punish or exclude members based on violation of JEDEC rules. CCFF 419-21. This limitation stemmed from a recognition by courts that, because of the influential nature of standards, such organizations often wield “great power in the Nation’s economy.” *American Soc’y of Mech. Eng’rs, Inc. v. Hydrolevel Corp.*, 456 U.S. 556, 570 (1982). Accordingly, JEDEC and its participants depended on good-faith, voluntary compliance with the mandatory rules. CCFF 314.

its membership at JEDEC, Rambus was present at numerous meetings where Mr. Townsend and others explained the policy and reiterated its importance. CCFF 360-61, 363. With every set of minutes Rambus received, it also received summaries of Mr. Townsend's patent policy presentations and of member discussions about the patent policy, as well as patent memoranda and patent tracking lists. CCFF 372. JEDEC sign-in sheets, ballots, and manuals further reminded Rambus of its obligation to comply with the patent policy. CCFF 375-81, 383-85. Rambus representatives also witnessed first hand the patent policy in action, including incidents of disclosure and the consequences of non-disclosure. CCFF 423-34, 842, 871-75, 880-81, 902, 921, 929, 941-43, 950-51, 959, 968-69, 978-79, 983-85, 996, 1009, 1026, 1041, 1062, 1078. Indeed, Richard Crisp was present at the March 1994 JC-42.3 meeting when, at the conclusion of the QUAD CAS debate, those present were asked to indicate, by hand vote, whether the JEDEC patent policy was clear. By unanimous vote, members of the committee confirmed that the policy was clear. *See Kellogg*, Tr. 5028-30, JX00019 at 4-5 ("the committee was asked if the policy is clear. The committee felt it was clear."); CCFF 985. From all these sources, Rambus learned of JEDEC's disclosure rules, and rather than comply with the rules, Rambus knowingly chose to conceal its JEDEC-related intellectual property.

Moreover, the evidence demonstrates that Rambus not only understood the specific terms of the patent policy and discussed it internally, but also was well aware of the fundamental purpose of JEDEC. Rambus knew that the fundamental purpose of JEDEC was to develop open standards. (CCFF 300-04; *see also* CX0903 at 2 (Crisp e-mail: "The job of JEDEC is to create standards which steer clear of patents which must be used in compliance with the standard whenever possible.")). CCFF 301, 838. Rambus also plainly knew that JEDEC and its members were concerned about a company enforcing patents against companies practicing a JEDEC standard. *See, e.g.*, CCFF 424-34; 839.

Beginning in May 1992, Richard Crisp was Rambus's primary representative to JEDEC. CCFF 823. Between 1992 and 1996, Crisp gained a clear understanding of how the EIA/JEDEC open standards process worked. During his time as JEDEC representative for Rambus, Mr. Crisp learned that meetings of JEDEC committees and subcommittees were conducted in accordance with the EIA Legal Guides. (Crisp, Tr. 2945; *see also* CCFF 835). Mr. Crisp also understood that the EIA Legal Guides provided that all EIA standardization programs shall be conducted in good faith. (Crisp, Tr. 2946-47; *see also* CCFF 836). In addition, Mr. Crisp was aware that the EIA rules stated that standards that required the use of patented items should be avoided and that EIA rules provided that no program of standardization should refer to a product on which there is a known patent unless all the technical information covered by the patent was known to the standards committee. (Crisp, Tr. 2948; *see also* CCFF 837).

Mr. Crisp, through attendance at JEDEC meetings and review of the JEDEC Manual of Organization and Procedure, learned of the specific requirements of the JEDEC patent policy. Mr. Crisp, during the time he was the primary JEDEC representative for Rambus, understood that there was a patent policy at JEDEC. (Crisp, Tr. 2949; *see also* CCFF 840). One of the ways that Mr. Crisp learned of the patent policy was through the presentations and discussions that Jim Townsend lead concerning the patent policy at every meeting of the JC-42.3 subcommittee. (Crisp, Tr. 2949; *see also* CCFF 360, 363, 840, 844). Mr. Crisp witnessed Mr. Townsend's presentations discussing the patent tracking lists, which included both patents and patent applications. (Crisp, Tr. 2950). Mr. Crisp also received minutes from JEDEC meetings, which included the slides from Mr. Townsend's presentations concerning the patent policy. (Crisp, Tr. 2951; *see also* CCFF 844).

Mr. Crisp was present at JEDEC meetings during discussions of revising the JEDEC Manual of Organization and Procedure to make it even clearer that the JEDEC disclosure duty

applied to patent applications as well as patents, as discussed above. Both Mr. Crisp and Mr. Mooring attended the JC-42.3 committee meeting in December 1992 at which this clarification was discussed. CCF 410, 413. Mr. Crisp also attended the September 1993 meeting at which Mr. Townsend put on the overhead projector portions of the revised manual, including language referring to “pending or existing patents.” (JX2092 at 63-4 (Crisp, Infineon Trial Tr.); CCF 968). Mr. Crisp himself has admitted that by mid-1995, Mr. Crisp had received the JEDEC 21-I Manual and understood that it called for the disclosure of patent applications. CCF 845. (Crisp, Tr., 2977 (“QUESTION: And what they gave you was the 21-I Manual, right? THE WITNESS: I seem to remember that’s which – that’s one of the two manuals I was given”)); CCF 418. *See also* Crisp Tr, 2982; CX2092 at 60-61 (Crisp, Infineon Trial Tr.) (admitting that he understood the policy to apply to patent applications).

Mr. Crisp’s understanding of the patent policy was reinforced through discussions with other JEDEC participants, including Desi Rhoden. At one point during his participation in JEDEC, Mr. Crisp spoke with Mr. Rhoden, a long-time member of JEDEC and later Chairman of JEDEC (Rhoden, Tr. 283, 284-85), to inquire about the JEDEC patent disclosure policy. (Rhoden, Tr. 518-19). Mr. Crisp inquired specifically about the application of the policy to patent applications, and Mr. Rhoden informed Mr. Crisp that in the patent disclosure policy, the word “patent” applied to everything that was in the patent process, and necessarily included patents and patent applications. (Rhoden, Tr. 519). Mr. Rhoden even went so far as to inform Mr. Crisp that if he would like to have a legal opinion, he could contact John Kelly (Rhoden, Tr. 519); however, Rambus never contacted John Kelly, the legal counsel for JEDEC, with any questions about EIA’s or JEDEC’s rules. (J. Kelly, Tr. 2057).

In addition to awareness of the patent policy gained from the Townsend presentations and review of the EIA and JEDEC manuals, Mr. Crisp and others at Rambus were aware that

JEDEC members were disclosing patent applications that pertained to the work at JEDEC. (CX2092 at 63-64 (Crisp, Infineon Trial Tr.); CX672 [Garrett Feb. 1992 e-mail]; Crisp Dec. 1995 e-mails: CX0711 at 187-199; *see also* CCF 842). Throughout the period when Rambus participated in JEDEC, Mr. Garrett and Mr. Crisp informed executives and others at Rambus that JEDEC members disclosed pending patent applications that pertained to the work at JEDEC (*e.g.*, CX0672 at 1 (Garrett email reporting February 1992 disclosure of Fujitsu patent application); CX0711 at 169 (Crisp September 1995 email: “Fujitsu stated yesterday that they have patents pending on SSTL”); CX0711 at 192 (Crisp December 1995 email: “MOSAID has a pending patent application for PLL/DLL on SDRAMs . . . they will be in compliance with the JEDEC patent policy.”); *see also* CX0685 at 1 (Mooring December 1992 email noting IBM comment that some “JEDEC attendees have patents pending on SDRAMs”); CCF 843).

In 1993, Mr. Crisp sent an email to high-ranking Rambus executives, including Rambus president Geoff Tate, discussing the JEDEC debate concerning Texas Instruments’ failure to disclose Quad CAS technology reported discussions of the disclosure rules. CCF 430, 839. JEDEC subsequently distributed a meeting report relaying the substance of EIA General Counsel John Kelly’s response to Texas Instruments’ request for clarification of the patent policy, which rejected the narrowed interpretation of disclosure duty. CCF 336-37, 994-95.

The facts summarized above and additional facts summarized in Complaint Counsel’s proposed findings, *see* CCF 818-21, 823, 837-48, plainly demonstrate that, during the period of its membership in JEDEC, Rambus was well informed of its duty to disclose relevant patents and patent applications.

C. By Concealing Relevant Patent Information and Engaging in Other Misleading Conduct, Rambus Violated and Subverted JEDEC's Policies and Underlying Purposes

As summarized above, the record evidence establishes that, under the JEDEC policies, rules, and procedures in effect throughout the time that Rambus was a JEDEC member, JEDEC participants with knowledge of patents or patent applications that might be involved in JEDEC's work were obligated to disclose in good faith the existence of such patents or applications, and the aspect of JEDEC's work (or finalized JEDEC standards) to which they related. The evidence also establishes that the purpose of such disclosure obligations was to advance JEDEC's most fundamental purpose – the goal of developing “open” industry standards that incorporated patented or patent-pending technologies only where justified, and even then, only upon receipt of express written assurances, from the intellectual property owner, that such technologies would be licensed on royalty-free or RAND terms.

Nothing could be more at odds with JEDEC's rules, or its underlying purposes, than for a member company to participate in JEDEC meetings while at the same time secretly working to develop proprietary patent claims designed to cover technological features incorporated in the organization's standards or being considered for inclusion in future standards. Yet, the record shows, that is precisely what Rambus did, starting in early 1992 and continuing for the duration of its JEDEC membership, ending in June 1996. Moreover, the record shows that Rambus had every intent to subsequently enforce and collect royalties on its growing portfolio of JEDEC-related patents. *See* CCFF 803, 805-06, 809-12, 815, 817.

Without question, Rambus's pattern of conduct throughout this period – including targeted effort to secure patent rights over JEDEC's standards, failures to disclose relevant patents or patent applications, and misleading statements designed to quell suspicions that it might possess relevant intellectual property – violated the policies, rules, and procedures of

JEDEC and subverted JEDEC's core principles. This section summarizes the record evidence relating to Rambus's challenged conduct. The evidence showing that Rambus engaged in such conduct with anticompetitive and exclusionary intent is discussed in Section III below.

1. Almost From the Outset of Its Participation in JEDEC, Rambus Believed It Possessed Patent Applications That Covered or Could Be Amended to Cover Features of JEDEC's SDRAM Standards

At least as of early March 1992, only a few months after it began attending JEDEC meetings,²⁷ Rambus was keenly aware that its already pending patent applications were broad enough to cover features of SDRAMs, and could be amended, without adding new substance to the underlying inventions, in a manner designed to better secure such patent coverage. The record evidence, only a portion of which is summarized here, shows that Rambus continued throughout the duration of its JEDEC membership to work with its outside patent attorney, Lester Vincent, on efforts to amend its patent claims with the precise objective of securing broad patent rights over SDRAMs and "Future SDRAMs." *See* CCFF 885-1114.

Rambus's efforts to cover specific features discussed within JEDEC for inclusion in the SDRAM standards began just three months after attending its first JEDEC meeting. In March 1992, Rambus began to consider whether its patent applications covered the use of "low swing signals" on DRAMs. CCFF 888. By June 1992, Rambus's business plan – a document drafted by the CEO, Geoffrey Tate, and discussed with the Board of Directors – refers to the company's belief that SDRAMs would infringe Rambus patents, and to its efforts to file amended patent claims to broaden its coverage of SDRAMs, with the goal of later enforcing such patents and

²⁷ Rambus first attended a JEDEC meeting, represented by William Garrett, in December 1991. CCFF 867. Rambus was not at the time a member, CCFF 871, but shortly thereafter applied for membership, CCFF 878. Richard Crisp replaced Garrett as Rambus's principal JEDEC representative, starting in May 1992, and he remained as Rambus's principal JEDEC representative until Rambus's withdrawal from JEDEC in June 1996. CCFF 867.

collecting royalties. CCFF 911-917. Later that year, in August, just weeks after a JEDEC meeting, Rambus again discussed with its patent counsel amending its patent claims to cover features being discussed for inclusion in the SDRAM standards. CCFF 928; *see also id.* 922 (discussion of CAS latency at July meeting). Rambus closed out its first year as a member of JEDEC by again discussing with its patent counsel adding claims to its patent applications. CCFF 939 Topics discussed at the meeting were broad enough to cover DRAM features discussed at previous JEDEC meetings. CCFF 939. Again, after the December 1992 JC-42.3 meeting, Rambus internally planned to compare the draft SDRAM specification to its patent applications to “check it for feature [it] needs to cover.” CCFF 945.

Rambus continued to amend its patent applications in 1993, with the aim of securing patent rights over features under consideration for inclusion in the SDRAM specifications. In February, Richard Crisp, working with Lester Vincent, identified several technologies, including CAS latency and on-chip PLL, as well as external reference voltage, as potentially claimable by Rambus’s patents. CCFF 948. Rambus followed up this work in April and May 1993 by finalizing its amendments to its patent application to cover programmable CAS latency. CCFF 958. In June 1993, Fred Ware, a Rambus engineer, confirmed that Rambus had filed these amendments, with claims that were “directed against SDRAMs.” CCFF 962.²⁸ Later that same month, Rambus filed further amendments claiming external reference voltage, a technology discussed at JEDEC earlier in 1993. CCFF 965. It also filed amended claims to cover the use of PLL circuitry, which were targeted at “Future SDRAMs.” CCFF 966.

Rambus continued to pursue this strategy of amending its patents to claim technologies proposed for inclusion in the JEDEC standards in 1994. Rambus requested that Mr. Vincent

²⁸ Rambus failed to call Mr. Ware, or any other witness, who could explain this admission.

assess whether its patent applications and amendments had sufficiently covered technologies discussed at JEDEC. CCFF 989. Specifically, Rambus sought to enhance its patent applications by claiming use of control registers in conjunction with programming CAS latency, a technology discussed several times at JEDEC committee meetings. CCFF 991. Rambus also requested that Vincent ensure that the applications covered two-bank design, another feature proposed at JEDEC. CCFF 990. Finally, Rambus sought to enhance its claims to ensure coverage of dual-edge clocking. CCFF 992.²⁹ By 1995, Rambus had sought patent claims to cover many of the technologies discussed at JEDEC. Nevertheless, it maintained its efforts to maximize its coverage. Vincent, at Rambus's request, filed new patent amendments on behalf of Rambus in October 1995 designed to broaden the company's claims over on-chip PLL technology. CCFF 1075.

The foregoing discussion merely highlights a few illustrative examples of a much broader body of record evidence showing that Rambus believed, throughout its JEDEC membership, that the company possessed patent applications that covered or could easily be amended to cover JEDEC's SDRAM standards. (For a more complete overview of the relevant evidence, *see* CCFF 867-1114.) This evidence, combined with the evidence discussed above concerning JEDEC's patent policy plainly demonstrates that Rambus – based on its own belief as to the scope of its intellectual property – had a duty to disclose patent-related information to JEDEC.

²⁹ Rambus planned even more efforts at covering technologies proposed for inclusion in JEDEC standards: it contemplated seeking claims on an auto-precharge feature, which had been discussed by JEDEC, given that patent rights over this feature would have “high harassment value.” CCFF 1002; *see id.* 1001 (noting prior discussion of auto-precharge).

2. While a JEDEC Member, Rambus Possessed Multiple Patent Applications, and at Least One Patent, Containing Claims That “Read On” Features of JEDEC’s Standards

As summarized above, JEDEC’s disclosure obligation is triggered by the member’s subjective belief that the patent or application is relevant to JEDEC’s work. It is not excused if the claim does not cover the technology as a matter of objective patent analysis at the time of discussion at JEDEC. Nor is it excused if the claim contained in the relevant patent or application is not actually infringed. Nonetheless, the record demonstrates that Rambus’s patent applications that were pending in the December 1991-June 1996 time period were in fact broad enough to literally “cover” or “read on” specific features that were considered by JEDEC during the same time period and ultimately incorporated in the final SDRAM and DDR SDRAM standards. Again, only a portion of the relevant evidence is summarized here. (For a more complete summary of the record evidence, *see* CCFF 1122-1237.)

a. Claims Covering SDRAM-Related Technologies

Rambus, while a member of JEDEC, submitted at least two amendments to pending patent applications containing claims that could be interpreted as covering the programmable burst length and programmable CAS latency features, both of which were incorporated in the final SDRAM standards and later carried forward in the DDR SDRAM standards. CCFF 1125-1182. Rambus’s amendment to its patent application no. 07/847,961 (“the ‘961 application”), filed on January 6, 1995, is one example. CCFF1125. The amendment to the ‘961 application contains 18 claims, several of which are of critical importance to Rambus’s present claims that it holds patents covering JEDEC-compliant SDRAM. Claim 160 of the ‘961 application, as amended, relates to both programmable CAS latency and programmable burst length. CCFF 1128. Claim 160 could be construed by a reasonable engineer to cover both of those features of

an SDRAM. Jacob, Tr. 5507-17. CCFF 1130; *see also* CCFF 1128-1129, 1131-1139 (elements of claim 160). Claim 164 of the '961 application also could be construed to cover programmable CAS latency. Jacob, Tr. 5523-25. CCFF 1142; *see also* 1140-1141, 1143-1147 (elements of claim 164).

The claims in the '961 application, as amended, also could be construed to cover the methods by which a computer using a JEDEC compliant SDRAM programs the memory chip for operation with the computer. Specifically, claim 165 potentially covers the method of storing CAS latency information in the mode register of an SDRAM, as described in the JEDEC SDRAM standard. CCFF 1159. That claim also could be interpreted to cover the method used to program burst length. CCFF 1161; *see also* CCFF 1158-1160 (claim 165). Claim 168 of the '961 application, as amended, also could reasonably be interpreted to cover the method of programming the CAS latency value, as specified in the JEDEC SDRAM standard. CCFF 1163; *see also* CCFF 1162 (claim 168).

The claims of the '961 application, as amended, extend beyond the features of a JEDEC-complaint SDRAM and potentially cover a computer's use of that SDRAM. Claim 151 of the '961 application, as amended, could reasonably be construed to cover a computer system that incorporates a JEDEC-compliant SDRAM. CCFF 1149; *see also* CCFF 1148, 1150-1153 (description of claim). Similarly, Claim 159 of the '961 application could reasonably be construed to cover a JEDEC-compliant SDRAM used in that computer system. *See* CCFF 1154-1157.

Rambus's '490 application, as amended, also contains several claims that could reasonably be interpreted as covering JEDEC-compliant SDRAM, the use of that SDRAM, and a computer system incorporating that SDRAM. CCFF 1164. The '490 application was a continuation of the '961 application. CCFF 1165. Claim 184 of the '490 application, as

amended, could reasonably be construed to cover the programmable CAS latency feature of JEDEC-compliant SDRAM. CCFF 1174; *see also* CCFF 1173, 1175-1179 (elements of claim). Claim 185 could be construed by a reasonable engineer to cover the method of programming CAS latency used in a JEDEC-compliant SDRAMs. CCFF 1181; *see also* CCFF 1180, 1182 (elements of claim). Finally, claim 183 of the '490 application, as amended, could be interpreted to cover a computer system using a JEDEC-compliant SDRAM. CCFF 1167; *see also* CCFF 1166, 1168, 1172 (elements of claim).

b. Claims Covering DDR-Related Technologies

In addition, Rambus, while a member of JEDEC, also amended pending patent applications (one of which ripened into an issued patent, in April 1996) that could be construed to cover other features of what ultimately became known as DDR SDRAM discussed within JEDEC during the period of Rambus's membership – namely, phase-lock loops (“PLLs”) on the SDRAM chip and use of a dual-edge clock. CCFF 1183-1237.

First, Rambus amended patent application 07/847,692 (“the ‘692 application”) on June 28, 1993. CCFF 1184. That application could be interpreted as covering a PLL incorporated into a JEDEC-compliant SDRAM. CCFF 1183; *see also* CCFF 1185, 1188-1191 (elements of claim 151). Claims 166 and 167 of the application could be construed to cover a computer system using a JEDEC-compliant SDRAM containing a PLL. CCFF 1198; *see also* CCFF 1196-1197 (describing claims).

Second, Rambus's patent application 08/222,646 (“the ‘646 application”) could be interpreted to cover a DDR SDRAM using a dual-edge clock. CCFF 1199. Rambus filed the '646 application on March 31, 1994, and filed a preliminary amendment to the application on September 6, 1994. CCFF 1008, 1204-1205, 1633. Claim 151 of the '646 application could be interpreted to cover dual-edge clocking as used in a JEDEC-compliant DDR SDRAM. CCFF

1008, 1077, 1207; *see also* CCFE 1206, 1208-1211 (describing elements of claim).³⁰ In October 1995, the patent office sent Rambus a Notice of Allowance, which is notification that the patent office believes the claim should issue. CCFE 1076, 1213. The '646 application subsequently issued to Rambus as patent 5,513,327 ("the '327 patent") on April 30, 1996. CCFE 1214, 1634. As with the application, a reasonable engineer could construe the '327 patent to cover dual-edge clocking as used in DDR SDRAM. CCFE 1217, 1224, 1234. This is true both for the first claim of the '327 patent, CCFE 1219, 1224; *see also* CCFE 1077, 1218, 1220-1223, 1225-1228 (analyzing elements of claim), and for the seventh claim of the patent, CCFE 1230, 1234; *see also* CCFE 1229, 1231-1233, 1235-1237.

3. Despite Having a Duty to Disclose, Rambus Concealed Its Patents and Patent Applications from JEDEC

Despite understanding the policies, rules, and procedures of JEDEC, and despite knowing that it possessed patent applications relevant to the standards developed or under consideration at JEDEC while it was a member, the record shows that Rambus repeatedly failed to disclose the existence of such patent applications to JEDEC. We summarize below only a portion of the abundant record evidence showing specific instances in which Rambus, despite having a clear duty to disclose patent-related information to JEDEC, violated that duty by concealing the fact that it believed a number of technologies being considered by JEDEC for inclusion in its standards would be subject to Rambus's patents. (For a more complete summary of the record, *see* CCFE 1238-1259.)

At a May 1992 JEDEC meeting, for example, Rambus failed to disclose anything, despite being expressly asked by JC-42.3 committee chair Gordon Kelly to comment on whether

³⁰ Rambus amended claims 151 and 152 on April 21, 1995, such that ultimately claim 152 incorporated the elements of claim 151, which was allowed by the patent examiner on October 6, 1995. CCFE 1213.

Rambus had anything of relevance to disclose. Richard Crisp, who was present representing Rambus at the meeting, declined to make an oral statement, and instead just shook his head indicating “no.” CCF 550, 904; *see also id.* 905 (Crisp notes indicate refusal to comment).

At the same May 1992 meeting, JEDEC circulated a ballot proposing inclusion of a mode register to program CAS latency, as well as three other technologies. CCF 922. The ballots were tabulated and discussed at the July 1992 meeting of the JEDEC JC-42.3 meeting. CCF 542. The proposal to include the mode register passed (as did the other proposals). CCF 542. Nevertheless, neither Richard Crisp nor David Mooring, both of whom were attending the meeting on Rambus’s behalf, disclosed the fact that Rambus then possessed patent applications that it was in the process of amending to cover use of a mode register to program CAS latency. CCF 925, 927. Rambus failed to disclose this information despite an admonition on the ballot to alert JEDEC if anyone “is aware of patents involving this ballot.” CCF 919, 925. Moreover, Rambus (Richard Crisp) actually commented on the proposals, yet failed to indicate that it had any intellectual property that could involve the proposals. CCF 927.

Rambus failed again to mention its patent applications at the September 1992 JEDEC JC-42.3 meeting. At that meeting, at which Richard Crisp and Billy Garrett were in attendance for Rambus, both programmable CAS latency and programmable burst length were discussed for possible inclusion in the SDRAM standard. CCF 929-30. Despite these discussions, Rambus’s representatives made no mention of Rambus’s patent position and the possibility that these proposals, if adopted, could infringe on Rambus patents. CCF 931.

CAS latency, as a feature of JEDEC SDRAM, continued to be at issue well past the initial adoption of the SDRAM standard. In October 1995, JEDEC considered whether to expand the use of this feature in the next generation of SDRAM, and circulated a ballot to members. CCF 1070-1073. When the results of this ballot were discussed at the December

1995 JEDEC meeting, Richard Crisp made no mention that its patent claims might cover a new iteration of CAS latency, let alone the CAS latency already incorporated in the SDRAM standard. CCFF 1082.

As explained above, Rambus's '692 application contains claims that could be construed to cover a PLL on an SDRAM chip. Rambus filed this application in March 1992. It amended the application in June 1993 in order to cover the PLL feature. CCFF 1075. In September 1994, NEC Corporation proposed to the JEDEC 42.3 committee that the SDRAM standard incorporate on-chip PLL. CCFF 1010 (Crisp observed presentation). In fact, after the first presentation on on-chip PLL, Mr. Crisp informed everyone at Rambus by email that "***** They plan on putting a PLL on board their SDRAMs . . . *****I believe that we have now seen that others are seriously planning inclusion of PLLs on board SDRAMs. . . . What is the exact status of the patent with the PLL claim? *****." CX0711 at 36 (emphasis, *i.e.*, the multiple asterisks, in original). CCFF 605, 1012-1013. That proposal, if incorporated into the JEDEC SDRAM standard, could have been construed by a reasonable engineer to be covered by claim 151 of Rambus's '692 application. CCFF 1187.³¹ Rambus subsequently amended its patent application to add two claims – claims 166 and 167 – that could be read to cover a computer system that uses a JEDEC-compliant SDRAM incorporating a PLL as proposed by NEC. CCFF 1196; *see also id.* 1197-98 (describing claims). Despite this amendment, made after Rambus observed the NEC proposal, Rambus made no disclosures to JEDEC to indicate that its '692 application, as amended, could cover both a PLL on an SDRAM or the use of an SDRAM with PLL in a computer system. CCFF 909.

³¹ Furthermore, after Rambus amended the claims in the application, in June 1993, claim 152 of the '692 application could be construed to cover an SDRAM incorporating NEC's PLL proposal. CCFF 1195.

JEDEC placed the issue of whether to use the on-chip PLL/DLL feature on a survey ballot in October 1995 to determine its suitability for inclusion in the next generation of the SDRAM standard. CCFF 1072. The results of this ballot were discussed at the December 1995 meeting, which Richard Crisp attended on Rambus's behalf. CCFF 1078-79. Rambus nevertheless made no mention of its potential patent claims over this technology. CCFF 1082. This failure to disclose was particularly grievous in light of the fact that Mosaid did mention at the same meeting that it had potential patent claims over a related technology, even though those claims likely did not apply to the proposed JEDEC implementation. CCFF 1082.

Rambus recognized the possibility of amending its patent applications to cover use of dual-edge clocking in an SDRAM at least as early as mid-1994. As explained above, Rambus's '327 patent, which stemmed from the '646 application, contains claims that could be construed to cover dual-edge clocking. Rambus filed the '646 application in March 1994. CCFF 1204. In August 1994, Lester Vincent transmitted to Rambus a draft amendment to this pending patent application that would claim dual-edge clocking. CCFF 1004; *see also id.* 1008 (filing of amendment in September 1994). Proposals were made at JEDEC to include dual-edge clocking both before and after this application was made, all while Rambus was a member. Proposals to incorporate dual-edge clocking, any of which could be construed to be covered by the '646 application, were made in May 1992, December 1995, and March 1996. CCFF 1200-02, 1207; *see also id.* 1206, 1208-09 (elements of 151 claim could cover dual-edge clock proposals).³² Yet

³² Likewise, the patent as issued could be construed to cover a JEDEC-compliant SDRAM incorporating dual-edge clocking as proposed in May 1992 and March 1996, or as placed on the survey ballot in December 1995. CCFF 1219, 1230; *see also id.* CCFF 1218, 1220-23 (elements of claim 1 of '327 patent); CCFF 1229, 1230-33 (elements of claim 7 of '327 patent). Finally, an SDRAM complying with JEDEC specification JESD 79 could be construed to infringe the '327 patent. CCFF 1224, 1234; *see also id.* 1225-128 (elements of claims); 1234-37 (elements of claims).

Rambus never disclosed at any JEDEC meeting that Rambus had claims that could cover dual-edge clocking.

In May 1995, several proposals relating to technology under development by the SyncLink consortium were presented at a JEDEC JC-42.3 meeting with Richard Crisp in attendance. CCFF 1043. The proposals involved using both the rising and falling edges of the clock for data input, among other technologies. CCFF 1043. Rambus was aware of the technology and had determined that Rambus could potentially assert patent claims over it. CCFF 988, 992, 1004, 1008, 1037, 1043. Crisp was specifically asked whether Rambus had any patent claims that could cover the SyncLink proposal, but he failed to respond to the inquiry or to make any specific disclosure. CCFF 1044-48. Three months later, in September 1995, Rambus reaffirmed its refusal to respond, stating that it would not “make a specific comment” as to whether the SyncLink proposal conflicted with Rambus’s intellectual property. CCFF 1063.

JEDEC also issued a survey ballot regarding dual-edge clocking in October 1995. CCFF 1071-72. Nevertheless, as it failed to do for the ballot questions on CAS latency modifications and the inclusion of on-chip PLL/DLL, Rambus failed to disclose that the dual-edge clock proposal could infringe its patent claims. CCFF 1082.

Rambus withdrew from JEDEC on June 17, 1996, by letter to JEDEC secretary Ken McGhee. CCFF 1109. That letter, consistent with Rambus’s previous participation in JEDEC, contained no disclosure of any patent or patent application relevant to the technologies discussed during the previous four years of JEDEC meetings attended by Rambus. CCFF 1110-12.³³ Thus,

³³ As described below, Rambus’s withdrawal letter contained a list of issued patents. Yet none of the patents listed in fact related to JEDEC’s work. CCFF 1114. Moreover, the ‘327 patent, which did relate to that work, was omitted from the list. CCFF 1114. On the very day it withdrew from JEDEC – June 17, 1996 – Rambus requested its outside patent counsel, Vincent, to provide an opinion on the enforcement readiness of its ‘327 patent, which had issued several months earlier. CCFF 1100.

Rambus left JEDEC having never cured the numerous instances in which, despite a clear duty to disclose, Rambus concealed relevant patents and patent application from JEDEC.

4. Rambus Made Deceptive Statements to Allay Concerns About Possible Patent Coverage

Rambus's misconduct extends beyond its simple failure to disclose its patents and patent applications as required by the Rules. In addition, Rambus made affirmatively misleading statements calculated to quell any concerns or suspicions of JEDEC members as to the possibility that Rambus had patents or patent applications relevant to JEDEC's work.

For instance, Rambus specifically sought to allay concerns about possible Rambus patent claims on the SyncLink presentation at JEDEC which included dual-edge clocking. Rambus declined to comment when requested specifically to state whether its patents could apply to SyncLink. CCFF 1044, 1048, 1522-1523. Yet Rambus went beyond merely stating that it had no "specific comment" with respect to the SyncLink proposal containing dual-edge clocking. Richard Crisp specifically reminded JEDEC that Rambus had in the past disclosed a patent (referring to the '703 patent).³⁴ CCFF 1066. By doing so, Rambus conveyed the message that it had in the past complied with JEDEC's disclosure rules and could be expected to do so at that time and in the future.

Rambus also made deceptive partial disclosures, implicating in particular dual edge clocking, upon its withdrawal from JEDEC. Rambus's withdrawal letter attached a list of patents for JEDEC to consider "[t]o the extent that anyone is interested." CCFF 1109-13. Yet none of the patents listed in fact related to JEDEC's work. CCFF 1114. Moreover, Rambus omitted the '327 patent, which did relate to JEDEC's work on dual-edge clocking. CCFF 1111-

³⁴ As explained below, the '703 patent did not in fact relate to JEDEC's work on SDRAM standards and hence the disclosure of this patent did nothing to alert JEDEC's members to the fact that Rambus possessed relevant intellectual property.

12. Rambus's withdrawal letter, therefore, not only failed to make meaningful patent-related disclosures to JEDEC, but reinforced the misleading message that Rambus possessed no relevant intellectual property.

Although certain JEDEC members at times had suspicions that Rambus potentially might possess relevant intellectual property, Rambus actively provided false or misleading information to allay such suspicions. Plainly, Rambus's repeated failures to disclose relevant patents or patent applications are not excused by the existence of random, non-specific rumors or suspicions, particularly in light of Rambus's affirmative efforts to put an end to such suspicions through affirmatively misleading conduct.³⁵

5. Rambus Continued to Conceal Its SDRAM-Related Patents After Withdrawing from JEDEC

After it withdrew from JEDEC in June 1996, Rambus continued to broaden its patent coverage over SDRAMs and DDR SDRAMs, and began to prepare for enforcing its SDRAM-related patents. All the while it concealed from DRAM makers that efforts to implement SDRAM technology would lead them into Rambus's patent "minefield." CCFF 1691. (For a more complete summary of the evidence relating to Rambus's continued concealment of its JEDEC-related patents post-June 1996, *see* CCFF1676-1687, 1696-97.)³⁶

³⁵ Not only did Rambus engage in misrepresentations with respect to JEDEC members, it also affirmatively misled companies outside the context of JEDEC. Rambus witnesses at trial and in depositions have admitted that Rambus made no effort to inform Rambus RDRAM "partners" and potential licensees about the possibility that Rambus might one day claim IP outside of the unique RDRAM architecture. *See* CCFF 1238-43, 1259; *see also* CX2112 at 180 (Mooring, Dep.) (slides used by Rambus in presentations to Rambus customers would "definitely not have put anybody on notice" of the coverage of patents); CX2070 at 47 (Harmon, Dep.) ("I don't believe we ever specifically stated that we had intellectual property that applied to – outside of the Rambus-compatible area.").

³⁶ Likewise, Rambus's withdrawal from JEDEC did not bring to an end Rambus's efforts to carefully track the development of JEDEC's SDRAM standards. Rambus continued to closely follow JEDEC's activities after its withdrawal. CCFF 1625. Moreover, Rambus had several

Rambus's actions continued its ongoing strategy to "avoid[] discussing" its intellectual property with its "partners." CCFF 1676. For instance, while negotiating with Micron in early 1997, Rambus never disclosed that its patent rights could extend to SDRAM. CCFF 1679-80. Similarly, while negotiating with Siemens in 1997, Rambus made no mention of its potential patent claims over DDR SDRAM. CCFF 1682. Even more glaringly, Rambus said nothing to Lucky Goldstar ("LG") during negotiations, even though LG specifically explained that it favored DDR over RDRAM because it would be a "royalty-free . . . open JEDEC standard." CCFF 1683.

Rambus's CEO specifically instructed Rambus employees not to reveal that Rambus believed it had patents that might be infringed by DDR SDRAM. CCFF 1678 ("do *NOT* tell customers/partners that we feel DDR may infringe – our leverage is better to wait"). Mr. Tate repeated this admonition later that year. CCFF 1686. Rambus went so far as to create a "party line" that professed ignorance as to whether DDR SDRAMs would infringe Rambus's patents. CCFF 1687. Rambus continued this course until late 1999, as Mr. Tate continued to remind Rambus employees "not to indicate/hint/wink/etc. what [Rambus] expects the results of [its infringement] analysis to be." CCFF 1697.

During this same time period, Rambus sought to ready itself for future efforts to enforce its "strategic patent portfolio" against non-RDRAM technologies, principally including SDRAM and DDR SDRAM. CCFF 1714-17. Rambus hired Joel Karp in October 1997 for the express purpose of coordinating this effort. CCFF 1701-06. As part of Karp's strategy, he

sources supplying information about JEDEC's continuing activities. CCFF 1626 (describing receipt of information from "deep throat," "Mixmaster," and "Secret Squirrel"). This information was passed around Rambus and used to amend further Rambus's patent claims. CCFF 1627-28.

recommended that Rambus continue to conceal its patents and, when it did begin to enforce them, that Rambus approach companies one-by-one. CCF 1713.

6. The Limited Information About Rambus's Patents That Was Publicly Available Was Insufficient to Put JEDEC Members on Notice That Rambus Possessed Relevant Intellectual Property

As explained above, Rambus engaged in a pattern of deceptive and misleading conduct to conceal its JEDEC-related patents throughout the duration of its membership in JEDEC and several years thereafter. It did not go public with its JEDEC-related patents until it began demanding royalties from all major DRAM makers in 2000. Yet, because Rambus had a proprietary DRAM architecture, RDRAM, Rambus did not seek to – nor did the success of its scheme require that it – block from public dissemination any information about its patent portfolio whatsoever. Thus, it was known within the DRAM industry, as of roughly 1993, that Rambus had obtained a patent and was in the process of applying for more patents in connection with RDRAM, an architecture substantially different from SDRAM and other more conventional DRAM designs. *See* CCF 1238-1265.

Such information provided a useful cover for Rambus's secretive efforts to secure a patent monopoly over features being incorporated into JEDEC's SDRAM standards. The fact that publicly available information about Rambus's patents did not seem to implicate JEDEC's work on SDRAM standards served to assuage potential concerns that Rambus might possess relevant intellectual property. Indeed, as discussed above, this is something that Richard Crisp exploited in an effort to deflect questions about the scope of Rambus's patents and their potential relevance to JEDEC's work on SDRAM.

In attempting to transform public knowledge about its patents or patent applications into a defense to liability, Rambus has drawn particular attention to two items: (1) the international patent application Rambus submitted in April 1991 under the Patent Cooperation Treaty (the

“PCT application”),³⁷ which later became available for public review, CCFF 1267; and (2) Rambus’s ‘703 patent, which issued on September 7, 1993, and which Rambus disclosed as a September 1993 JEDEC meeting, CCFF 971. Both the PCT application and the ‘703 patent derive from Rambus’s original patent application – the ‘898 application, filed in April 1990 – and contain substantially the same specification and drawings as that original application, as is true of all of the patents that Rambus to date has sought to enforce against SDRAMs and DDR SDRAMs. CCFF 1267-1269. Yet nothing contained in either the PCT application or the ‘703 patent would have alerted a reasonable engineer that Rambus might possess or have the ability to obtain patent rights over features of JEDEC’s SDRAM or DDR SDRAM standards. CCFF 972, 1268, 1270, 1341-1355. For instance, the ‘898 specification describes a bus that is significantly different from the bus used with a JEDEC-compliant SDRAM. *See* CCFF 1284-1340.

Furthermore, the system specified in the ‘898 application would not be read by an engineer to allow Rambus to obtain patent rights over programmable burst length. CCFF 1318. Similarly, the ‘898 application’s specification contains an implementation of CAS latency that is tied specifically to the narrow bus specified in the application, CCFF 1322, but that specification is sufficiently different from the programmable CAS latency used in the JEDEC SDRAM standard such that no engineer would have read the ‘898 application to allow Rambus to obtain patent rights over the JEDEC implementation. CCFF 1326.

Likewise, the clocking scheme specified in the ‘898 application differs significantly from that implemented by the JEDEC DDR standard. *See* CCFF 1327-1334. As a result, an engineer reviewing the ‘898 application would not have concluded that Rambus could obtain patent rights over dual-edge clocking as proposed for the JEDEC standard. CCFF 1334. Finally, the ‘898

³⁷ Rambus has referred to this previously as the World Intellectual Property Organization, or “WIPO” patent application.

application makes no mention at all of a PLL (or a DLL). CCFF 1337-1339. Accordingly, an engineer reading the '898 application would not conclude that Rambus could obtain patent rights over the PLL feature used in JEDEC-compliant DDR SDRAM. CCFF 1340.

For these and other reasons summarized in Complaint Counsel's proposed findings of fact, *see* CCFF 1238-1357, public knowledge about the existence of Rambus's '703 patent and its PCT application did not provide JEDEC's members with any basis to discern the scope of Rambus's patent applications, or even the fact that Rambus might possess intellectual property bearing on JEDEC's SDRAM standardization efforts.

7. Rambus's Deceptive Conduct Has Not Been Excused by the Federal Circuit's *Infineon* Ruling

Your Honor has asked the parties to address what bearing, if any, the Federal Circuit's decision in the *Infineon* case³⁸ should have on the outcome of this case.

Rambus initially sued Infineon for patent infringement and Infineon counterclaimed for fraud. A jury found, by clear and convincing evidence, that Rambus was subject to a duty to disclose patents and patent applications relating to JEDEC work, that Rambus intentionally violated that duty, and that JEDEC relied to their detriment on this violation. Accordingly, the jury found that Rambus had committed fraud on JEDEC with respect to both SDRAM and DDR SDRAM under Virginia's state law on fraud. On appeal, Judge Payne, of the U.S. District Court for the Eastern District of Virginia, affirmed the jury verdict with respect to SDRAM, but found that Infineon, by a close margin, had failed to establish by clear and convincing evidence that Rambus was subject to a duty to disclose with respect to the DDR SDRAM standard.

Rambus Inc. v. Infineon Technologies AG, 164 F. Supp. 2d 743 (E.D.Va. 2002).

³⁸ *Rambus Inc. v. Infineon Technologies AG*, 318 F.3d 1081 (Fed. Cir. 2003), *petition for cert. filed*, 72 U.S.L.W. 3092 (U.S. Jul. 03, 2003)(No. 03-37).

On appeal to the Federal Circuit, all three judges on the panel agreed with the jury and Judge Payne that JEDEC imposed a disclosure obligation requiring disclosure by all members of patents and patent applications. *Rambus Inc. v. Infineon Technologies AG*, 318 F.3d 1081 (Fed. Cir. 2003), *petition for cert. filed*, 72 U.S.L.W. 3092 (U.S. Jul. 03, 2003)(No. 03-37). A two-member majority found that patents or patent applications needed to be disclosed only if “a license under its claims reasonably might be required to practice the [JEDEC] standard.” *Id.* at 1100. The dissenting judge opined that substantial evidence on the record supported the jury verdict and trial court judgment that Rambus committed fraud, based on substantial evidence that the JEDEC disclosure obligation applied to patents and patent applications that “might be involved in” JEDEC work, as found by the jury and Judge Payne. *Id.* at 1115. All three members of the panel affirmed Judge Payne’s ruling that Infineon had failed to present clear and convincing evidence of a duty to disclose with respect to the DDR SDRAM standard. Infineon has filed a petition for writ of certiorari with the Supreme Court. As discussed in more detail below, five amicus curiae briefs have been filed in support of Infineon’s petition.

a. The *Infineon* Ruling Should Have No Preclusive or Even Persuasive Effect with Respect to Complaint Counsel

First and foremost, it is beyond dispute that the Federal Circuit majority’s decision in *Infineon* – in particular, its interpretation of JEDEC’s rules and its conclusions as to whether Rambus’s conduct violated such rules – in no way binds Complaint Counsel in this case, considering that Complaint Counsel was not a party to that proceeding. See *Parklane Hosiery Co., Inc. v. Shore*, 439 U.S. 322 (1979) (neither *res judicata* nor collateral estoppel binds a person who was not a party to the proceeding in which the ruling was rendered), and more generally that “collateral estoppel . . . simply does not apply against the government.” *United*

States v. Mendoza, 464 U.S. 154, 162 (1984). The law thus completely forecloses the potential of applying collateral estoppel against Complaint Counsel.

Moreover, these same principles counsel against looking to the record or the decisions in the *Infineon* case even as persuasive authority against Complaint Counsel, for the following five reasons:

First, this is an antitrust case, arising under Section 5 of the FTC Act. The Federal Circuit's *Infineon* decision, by contrast, involved review of a jury verdict against Rambus, applying Virginia's state law on fraud.

Second, in the instant action Complaint Counsel has developed a factual record far more substantial than that presented by Infineon. The record in this matter was developed through months of detailed discovery and a three-month evidentiary hearing, involving 44 live witnesses and roughly 1770 admitted exhibits. This record has brought to light many facts not previously uncovered through prior Rambus litigation. The far more limited record in the *Infineon* suit, on the other hand, was developed by private parties, with their own particular interests, as part of a patent infringement lawsuit, through an expedited discovery process customarily followed in Virginia's "Rocket Docket" and a 10-day jury trial.

In particular, given the potentially dire consequences to Infineon of losing to Rambus on the issue of patent infringement, Infineon had incentives to limit evidence regarding the scope of coverage of the Rambus patent applications pending at the time it was a JEDEC member. Complaint Counsel, by contrast, was not burdened with concerns about being subject to Rambus's patents and thus could present evidence demonstrating that Rambus did possess, while it was a JEDEC member, multiple patent applications and at least one issued patent containing claims that arguably "read on" JEDEC's work, such that "a license under its claims reasonably might [have been] required to practice the [JEDEC] standard."

Third, this case, as outlined above, is subject to the same preponderance-of-the-evidence standard that ordinarily governs civil antitrust suits and FTC enforcement actions. In the *Infineon* suit, however, a heightened clear-and-convincing-evidence standard was applied, pursuant to Virginia law.

Fourth, in the present case – again, as has been discussed above – JEDEC’s rules and procedures, while relevant, are not dispositive. Here, because Rambus subverted and undermined JEDEC’s open standards process, “literal compliance,” even if it could be demonstrated, would not be a defense. In the *Infineon* suit, by contrast, the court viewed violation of express JEDEC rules as a necessary predicate to liability and did not even consider the potential of resting liability on evidence of Rambus’s subversive, bad-faith conduct.³⁹

Fifth, yet another difference in this case and *Infineon* is that in this case the full range of relevant JEDEC rules is properly under consideration – including the “basic rule” of good-faith participation – whereas in *Infineon* the court was narrowly focused solely on JEDEC’s disclosure rules.

The *Infineon* majority’s decision contains two conclusions which are directly at odds with the record of this case, and should have no preclusive or even persuasive effect here, in light of the dispositive differences outlined above.

First, the *Infineon* majority concluded that a disclosure obligation under JEDEC rules would arise only in instances in which “a license under [the] claims” of an issued patent or pending patent application “reasonably might be required to practice the [JEDEC] standard.” See *Infineon*, 318 F.3d at 1100. As already explained above, this conclusion is completely at odds with the substantial body of record evidence developed through this case. Even on the

³⁹ On the other hand, the *Infineon* majority did, as noted above, comment upon the unethical and bad-faith appearance of Rambus’s actions.

more narrow record in the *Infineon* case, the conclusion of the *Infineon* court’s two-member majority in this regard has been subject to challenge. *See generally* Judge Prost’s dissent, 318 F.3d at 1107. Indeed, a number of amicus briefs supporting Infineon’s pending petition for certiorari review by the Supreme Court have been filed, including briefs on behalf of JEDEC;⁴⁰ various companies active in standard setting activities, only some of whom are members of JEDEC;⁴¹ various independent standard-setting organizations;⁴² and a total of fifteen states, plus the Commonwealth of Puerto Rico.⁴³ The grant of a writ of certiorari is by no means assured even in a case generating this much attention from third parties. Nevertheless, the views and concerns expressed in these amicus briefs should give this Court, and ultimately the Commission, considerable pause before attributing any significant credence to the Federal Circuit majority’s controversial conclusions.

Furthermore, as pointed out above, even under the artificially narrow standard applied by the Federal Circuit majority, the record in this matter (which was not presented in *Infineon*)

⁴⁰ *See Amicus Curiae* Brief of JEDEC Solid State Technology Association in Support of Petitioners at 7 [Tab 2] (“JEDEC’s patent policy requires members and participants to disclose to JEDEC committees any known patents or patent applications related to standardization work being undertaken by JEDEC committees.”).

⁴¹ *See* Brief of Advanced Micro Devices, Inc., et al., as *Amici Curiae* in Support of the Petitioners at 3 [Tab 3] (“The most fundamental flaw in the decision below lies in the Federal Circuit’s substitution of its own, arbitrary view of what the JEDEC patent disclosure duty ought to have been for the duty that was actually adopted by JEDEC’s members.”).

⁴² *See* Brief of *Amici Curiae*, Consumer Electronics Association, et al., in Support of Petition for Writ of *Certiorari* at 1 [Tab 4] (“*Amici curiae* represent a broad range of participants in the standard-setting process, and each is greatly concerned by the adverse effects that it anticipates will result from the application of the Federal Circuit Court’s decision . . . in markets that extend far beyond memory chips.”).

⁴³ *See* Brief of the Commonwealth of Virginia, et al., as *Amici Curiae* in Support of Petitioners at 3 [Tab 5] (“The Amici States . . . protest the Federal Circuit’s substitution of its own view of the facts for that of a jury, thereby reversing the jury’s determination of a state common law fraud claim.”).

contains substantial evidence that claims contained in Rambus's '327 patent and '692, '646, '961 and '490 patent applications satisfied that standard.

The second area in which the Federal Circuit's conclusions depart dramatically from the evidence relates to the issue of when JEDEC commenced work on what ultimately came to be known as the DDR SDRAM standard. The Federal Circuit concluded that "JEDEC did not begin formal work on the DDR SDRAM standard until December 1996," roughly six months after Rambus formally withdrew from JEDEC. *Infineon*, 318 F.3d at 1105. As explained below, this conclusion finds no support in the record in this matter and is directly at odds with a substantial body of evidence in this case.

b. The *Infineon* Ruling Does Have Preclusive Effect on Rambus

By contrast, Rambus, because it had a full and fair opportunity to litigate these issues as a party in the *Infineon* matter, should be bound by the rulings of that case. As set forth in more detail in Complaint Counsel's March 26, 2003, Memorandum in Support of Motion *in Limine* to Bar Presentation, on Collateral-Estoppel Grounds, of Testimony and Arguments Regarding Issues That Rambus Has Previously Litigated and Lost ("Collateral Estoppel Mem."), the principles of collateral estoppel compel that several determinations established by the *Infineon* decision be given preclusive effect here. *See In re Microsoft Corp. Antitrust Litigation*, 232 F. Supp. 2d 534, 535 (D. Md. 2002). Over the course of the *Infineon* proceedings, the jury, Judge Payne, and Federal Circuit majority and the Federal Circuit minority have all agreed on certain determinations, which also enjoy overwhelming support by the record in this case: that JEDEC's rules imposed a mandatory patent disclosure duty and JEDEC's members understood this to be the case; that JEDEC's disclosure duty extended to patent applications as well as issued patents; that JEDEC's rules required disclosure of all patents and applications that "relate to" JEDEC's

work; and that JEDEC's disclosure rules applied to all members, including Rambus, and not just presenters. *See* Collateral Estoppel Mem.

Even if Your Honor were not inclined to deem these determinations as preclusive against Rambus, in light of their unanimous backing in the *Infineon* matter, and in light of the overwhelming evidence on this record that substantiates each one, Complaint Counsel submits that they should be persuasive in the matter.

8. JEDEC's Work on "Future SDRAMs," Culminating in the Adoption of the DDR SDRAM Standard, Started Long Before Rambus Withdrew from JEDEC in June 1996

JEDEC's work on what ultimately became labeled as DDR SDRAM began long before Rambus left the organization in June of 1996. Indeed, DDR SDRAM, as an evolutionary technology, was built upon earlier generations of DRAM technologies standardized by JEDEC over the prior decades. CCF 653, 2572. For example, DDR incorporated the same programmable CAS latency and programmable burst length features that had been first adopted in SDRAM. CCF 657. Moreover, JEDEC began to work on the next generation of SDRAM – which would later be termed "DDR" – in 1993, once it published the final SDRAM standard. CCF 579-580. At that point, JEDEC continued its discussion of features that had long been under consideration at JEDEC, such as dual-edge clock and on-chip PLL/DLL.⁴⁴ Although JEDEC only later applied the term "DDR" to these technologies, JEDEC began considering them at least two years prior to Rambus's departure from JEDEC. CCF 581-584.

a. Discussion of DDR Generally

The evidence amply establishes that JEDEC began to discuss the features that would be included in the next SDRAM generation – DDR SDRAM – as soon as it published the final

⁴⁴ As noted elsewhere and as Rambus has admitted, the concepts "on-chip DLL" and "on-chip PLL" are essentially synonymous. CCF 595-597.

SDRAM standard in 1993, over two years before Rambus left JEDEC. *See, e.g.*, CCF 578-644. Indeed, Rambus has offered no evidence to suggest otherwise.

At least three individuals with leadership positions within JEDEC testified that JEDEC's work on the DDR standard – which was then called “next generation” SDRAM, “SDRAM-II” or “future SDRAM” – began shortly after JEDEC issued the formal publication of the SDRAM standard in 1993. CCF 579-580. First, Howard Sussman, a JEDEC committee chair, testified that, once the SDRAM standard was completed, JEDEC began work on the “next evolutionary part.” Sussman, Tr. 1402, CCF 594. Similarly, Gordon Kelley of IBM, the JC-42.3 Chair, explained that after adopting the SDRAM ballots, the JC-42.3 subcommittee “pursued . . . the next generation of synchronous DRAM.” (G. Kelley, Tr. 2566-67). Moreover, Desi Rhoden, now Chairman of the JEDEC Board of Directors, testified that the DRAM committee's work between May of 1993 and June of 1996 led to “the DDR standard that actually came out later.” (Rhoden, Tr. 460-61.)⁴⁵ *See also* Williams, Tr. 820 (“Q: . . . after JEDEC published [the SDRAM standard], what work did it move on to next? A: It took up several different options, mainly looking at the next standard, the next generation of memory.”).

In fact, Rambus itself was well aware that JEDEC was working on the next generation DRAM standard while it was at JEDEC. Fred Ware, a Rambus engineer, wrote in June of 1993 (before the initial JEDEC SDRAM standard had been finalized) about the need to obtain patent coverage, including a claim for “DRAM with PLL clock generation” that was “directed against future SDRAMs.” CX1959 at 1, 963.⁴⁶

⁴⁵ As Mr. Rhoden testified elsewhere, “it wasn't until Fujitsu actually coined the term DDR that we came up with a different name, called it DDR as opposed to SDR II or something like that.” (Rhoden, Tr. 408-09).

⁴⁶ In March 1995, Mr. Crisp forwarded an email quoting Hans Wiggers as saying that JEDEC had been working on a new standard for over two years. CX0711 at 52, 54.

Rambus President David Mooring, who received Crisp's report, also understood that JEDEC had begun to develop the next generation DRAM while Rambus was still a member. CX2112 at 249 (Mooring, FTC Dep.). Indeed, Mr. Mooring has testified that Rambus left JEDEC in part because Rambus believed the features being discussed there, including dual-edge clock, looked more and more like Rambus products. CX2112 at 202 (Mooring, FTC Dep.); CX2112 at 205, CX2056 at 190 (Mooring, Dep.)). In September of 1995, Rambus' CEO, Geoff Tate, acknowledged his awareness that a next generation SDRAM was coming when he wrote "SDRAM – now –next" in handwritten notes from a meeting with recently-hired intellectual property manager and in-house patent attorney Anthony Diepenbrock. CX1730 at 1, 830. Significantly, Messrs. Tate, Mooring and Ware (all of whom were on Rambus' final witness list) were not called by Rambus to testify at trial.

b. Discussion of Dual-Edge Clock

Discussion of the dual-edge clocking feature later incorporated in the DDR SDRAM standard predates even the 1993 start of JEDEC's express work on the follow-on to SDRAM. *See, e.g.*, CCF 623-632. As Mr. Kelly explained at trial, "consideration of using a double-edged clock actually began when I made the first presentation in 1988 and IBM reproposed in 1990 and 1991 and several other companies picked up in that – on that concept in 1991." G. Kelley, Tr. 2584-85; CCF 578, 623. Indeed the feature was discussed at two of the first three JEDEC meetings Rambus attended. The minutes from the April 1992 DRAM task force meeting, which Richard Crisp attended, specifically refer to the "dual clock edge" feature. CCF 522, 629. *See also* CCF 631-32. The concept of using dual-edge clocking "had generated quite a bit of interest" at JEDEC during the early 1990's (Rhoden, Tr. 462-63; CCF 524), even though it was not adopted in the first generation SDRAM standard. Accordingly, it was no surprise that JEDEC continued its consideration of dual-edge clocking once JEDEC

turned its attention to the next-generation SDRAM in the 1994-96 time frame. *See* CCFF 581, 631-32. Among the various discussions of dual-edge clock witnessed by Rambus during this period were the multiple presentations on Synlink architecture, which included a dual-edge clocking feature. CCFF 633-34, 1043. Again, Rambus, having claims in a pending patent application covering this technology, revealed nothing – even when asked. CCFF 1044, 1063-65, 1067.

c. Discussion of On-Chip PLL/DLL

The work begun by JEDEC after adoption of the SDRAM standard also included discussion of adding on-chip PLLs. CCFF 582, 594; *see, e.g.*, CCFF 600-616. During the course of 1994, Mr. Crisp observed discussions at JEDEC regarding using PLLs on memory modules to remove clock skew from the module. CCFF 602. In fact, after the first presentation on on-chip PLL, Mr. Crisp informed everyone at Rambus by email that “***** They plan on putting a PLL on board their SDRAMs . . . *****I believe that we have now seen that others are seriously planning inclusion of PLLs on board SDRAMs. . . . What is the exact status of the patent with the PLL claim? *****” CX0711 at 36 (emphasis, *i.e.*, the multiple asterisks, in original). CCFF 605, 1012-1013. Other documents demonstrate that, in the late 1994 to early 1995 time frame, Rambus was actively tracking the PLL/DLL activity with an eye to perfecting its patent rights over the technology. *See* CCFF 1014-15, 1021-25, 1029. All the while, Rambus kept silent about the extent of its IP coverage although it knew JEDEC was considering on-chip PLLs and DLLs as one feature in the next generation DRAM standard. *See, e.g.*, 1238-65, 1676-1700.

d. Inclusion of All Four Technologies in “Next Generation” SDRAM Survey

The survey ballot distributed to JEDEC members in the fall of 1995 relating to “next generation” SDRAMs further establishes that JEDEC’s work on DDR SDRAM – including consideration of dual-edge clocking and on-chip PLL – commenced prior to Rambus’s departure. (CX0260). *See also* Lee, Tr. 6636 (indicating that features in the future SDRAM survey ballot later became known as DDR); CCFF 580. This survey ballot, which Rambus received and distributed internally, included questions relating to each of the four technologies at issue in this case: on-chip PLLs and DLLs, dual-edge clocking, programmable CAS latency, and programmable burst length. *See* 588-89, 609-12, 1072-73. These features were discussed again when JEDEC reported the survey results in December 1995. (JX0028 at 6, 36-48). At that point, Mosaid disclosed it had a pending patent relating to on-chip PLL. CCFF 612, 1086. By contrast, Rambus, which also had relevant intellectual property, again strategically remained silent. CCFF 1082. In the first half of 1996, these features were included in various presentations, copies of which were included in the minutes sent to Rambus. CCFF 575, 580, 590-91, 613-14, 616, 639, 641. Again, Rambus disclosed nothing relevant to these technologies at the time it left JEDEC.

Thus, although JEDEC may not have applied the label “DDR” until late 1996, the evidence demonstrates that the on-going JEDEC work and the concepts that were incorporated in DDR had been under consideration for several years prior to Rambus’s June 1996 withdrawal from JEDEC.⁴⁷

⁴⁷ Pete McWilliams of Intel testified that he was aware of DDR in 1995. (McWilliams, Tr. 4815 (“... we first heard about DDR in '95 when we went out to ask for options, which was one of the options we considered, the higher-speed SDRAM. One of the options was DDR.”)).

D. Rambus's Challenged Conduct Was "Exclusionary"

As the foregoing discussion demonstrates, JEDEC's open standards process and the rules developed by JEDEC to facilitate that process imposed mandatory obligations on JEDEC members to disclose relevant patents and patent applications. Throughout the four-plus year duration of Rambus's participation in JEDEC, Rambus possessed patent applications that it believed covered or could be amended to cover technological features included in JEDEC's SDRAM standards or otherwise being considered for future SDRAM standards. Careful analysis of various Rambus patent claims shows that Rambus, while participating as a JEDEC member, did possess patent applications, and at least one issued patent, containing claims that read on aspects of JEDEC's work. Nonetheless, Rambus never disclosed to JEDEC that it possessed intellectual property that might bear on the SDRAM standards. Indeed, Rambus affirmatively sought to mislead JEDEC to dispel any possible suspicion that it might possess intellectual property relevant to SDRAM or its future iterations. Even as the size of Rambus's portfolio of JEDEC-related patents began to increase in the years after it withdrew from JEDEC, Rambus continued to conceal from DRAM makers the fact that it possessed such patents – that is, until it began enforcing such patents in late 1999 or early 2000.

As will be discussed below, record evidence shows that through the pattern of bad-faith, deceptive conduct just outlined Rambus succeeded in developing monopoly power in several well-defined technology markets. Rambus also succeeded in vastly increasing the value of its JEDEC-related patents, compared to the value (if any) such patents would have had if Rambus had made good-faith patent disclosures to JEDEC.

The acquisition of monopoly power through "predatory" or "exclusionary" conduct violates Section 2 of the Sherman Act. *See, e.g.*, ABA SECTION OF ANTITRUST LAW, ANTITRUST LAW DEVELOPMENTS at 246-47 (5th ed. 2002). Similarly, such conduct violates Section 2 when it

is accompanied by exclusionary intent and gives rise to a dangerous probability of monopolization, or (under Section 5 of the FTC Act) when it results in material harm to competition.

One noted antitrust treatise summarizes the case law relating to “predatory” or “exclusionary” conduct as follows:

First, courts have held conduct to be predatory where it would be economically irrational for the monopolist but for the conduct’s adverse effect on competition. . . . Second, where conduct contributes to establishing or maintaining monopoly power, a court will be especially likely to find that conduct predatory or anticompetitive if it is also improper for reasons extrinsic to the antitrust laws [listing “false advertising” and “product disparagement” as two examples].

ABA SECTION OF ANTITRUST LAW, ANTITRUST LAW DEVELOPMENTS at 247-49 (5th ed. 2002). The same treatise (*id.* at 250) goes on to summarize the Supreme Court’s holding in *Aspen Skiing Co.*, to the effect that conduct that represents an attempt “to exclude rivals on some basis other than efficiency” can fairly be “characterize[d] . . . as predatory.” 472 U.S. 585, 605 (1985) (quoting ROBERT H. BORK, THE ANTITRUST PARADOX 138 (1978)). Under any theory, the evidence demonstrates that Rambus engaged in exclusionary conduct.

As the record evidence demonstrates, Rambus’s concealment of material information from JEDEC, coupled with affirmatively misleading acts and statements, had the effect of subverting an openly competitive process and excluding alternative DRAM technologies from the marketplace. CCF 2992, 2997-3003. Additionally, Rambus engaged in such conduct despite repeated warnings from its lawyers that failures to comply with JEDEC disclosure obligations, or efforts to otherwise mislead JEDEC, could jeopardize the enforceability of Rambus patents, which, as even Rambus’s Chairman William Davidow recognizes, constitute the company’s principal asset and sole source of revenue. CCF 889-91. It would be irrational

for a company like Rambus to engage in such conduct – that is, absent the expectation of longer-term benefits through the exclusion of competition. CCFF 3006-11.

This evidence leaves no room to conclude that Rambus’s conduct was anything other than exclusionary. Although Rambus sought to establish, through the expert testimony of Dr. Richard Rapp, that its conduct was justified pursuant to legitimate business interests, Dr. Rapp admitted on cross-examination that his testimony in this regard was theoretical in nature and not rooted in the actual facts. *See* CCFF 2694-2702. A review of the actual facts shows that Rambus could have no possible legitimate business justification for the pattern of deceptive conduct challenged by this case.

Finally, in evaluating the issue of exclusionary conduct, this Court should again be mindful of the holding in *Allied Tube*, which, as discussed above, establishes that conduct of precisely the sort challenged here – that is, deliberate efforts to subvert an open standard-setting process – constitutes exclusionary, anticompetitive conduct and will give rise to an antitrust violation when the remaining elements of liability are satisfied. *See also Stearns Airport Equip. Co. v. FMC Corp.*, 170 F.3d 518, 526 (5th Cir. 1999) (applying *Allied Tube* in the context of claims of unilateral monopolization, and noting that the Second Circuit in *Allied Tube* found that the behavior at issue “constituted exclusionary conduct”); HERBERT HOVENKAMP, FEDERAL ANTITRUST POLICY: THE LAW OF COMPETITION AND ITS PRACTICE 23 (2d ed. 1999) (discussing *Allied Tube* as an example of the sort of “exclusionary conduct” that, when used as a means to achieve monopoly, can impose a substantial “social cost”).

E. Rambus Acted with an Intent to Monopolize

As described above, only Count II of the Commission’s Complaint – the attempted monopolization claim – requires a showing of specific intent to monopolize, and such intent can be inferred from anticompetitive conduct. *M&M Medical Supplies & Service, Inc. v. Pleasant*

Valley Hosp., 981 F.2d 160, 166 (4th Cir.) (*en banc*). By contrast, Count I – monopolization – requires merely that the defendant had “an intent to bring about the forbidden act.” *United States v. Aluminum Co. of America*, 148 F.2d 416, 432. Similarly, for proof of Count III – unfair competition under Section 5 – the Commission is not limited by having to prove elements such as specific intent. *See In the Matter of Ethyl Corp.*, 101 F.T.C. 425, 597 (1983) (noting that “single-actor conduct which is unfair competitive behavior but which falls short of an attempt to monopolize under Section 2 of the Sherman Act” violates Section 5), *vacated sub nom. E.I. Du Pont de Nemours & Co. v. FTC*, 729 F.2d 128, 136-37 (2d Cir. 1984). The record contains voluminous evidence of Rambus’s intent to engage in deceptive and anticompetitive conduct for the express purpose of excluding competition and obtaining monopoly power. Such evidence more than adequately satisfies this element of liability.

Rambus’s own business plans show that from the outset Rambus intended to obtain monopoly power in the DRAM market. CCFF 708-09, 732-35, 800. Rambus originally planned to obtain monopoly power lawfully by persuading the market to adopt and license RDRAM technology. CCFF 736-45, 801. Beginning in 1992, however, Rambus developed a backup plan that did not depend on the market adopting RDRAM. That plan entailed obtaining and later enforcing patents covering technologies used in JEDEC’s SDRAM standards and its future iterations of those standards. CCFF 757-66, 803, 911-18, 937-38.

Rambus intentionally joined JEDEC and followed JEDEC proceedings to pursue both these ends. CCFF 807-08. Unlike other JEDEC members, Rambus never had any plans to manufacture, use, or support products that conformed to JEDEC SDRAM or DDR SDRAM standards. CCFF 825-33. Instead, Rambus hoped that through its participation in JEDEC it could weaken competition faced by RDRAM. CCFF 826-27. Additionally, Rambus intentionally took specific action to obtain patents with claims covering SDRAMs, including

SDRAMs that complied with the SDRAM and DDR SDRAM standards being developed by JEDEC. CCF 809, 1029; CX1949 at 1; CX0702 at 1 (Ware e-mail: “This claim has been written up and filed. This is directed against SDRAMs.”); CX0745 at 1; CX2092 at 192 (Crisp, Infineon Trial Tr.); CX0831 (Tate e-mail: “tony’s #1 objective right now is to . . . determine what should proactively be done to strengthen our IP position relative to competition” and requesting staff to forward e-mail talking about “competitive technology developments/directions (e.g. JEDEC meeting reports, etc.)”). Indeed, as Mr. Crisp explained, the most valuable patents are ones that must be used in compliance with the standard because such patents cannot be avoided. CCF 27.

Moreover, as demonstrated above, Rambus understood the rules and obligations incumbent on it as a member of JEDEC. For example, the record shows that Rambus knew that: (1) the purpose of JEDEC was to develop open standards; (2) JEDEC and its members were concerned about a company enforcing patents against companies practicing a JEDEC standard; (3) JEDEC had a disclosure policy requiring disclosure of patents, and (4) certain JEDEC members disclosed patent applications at JEDEC. CCF 818-20, 840-43. Further, the record shows that, as of mid-1995, Rambus’s designated JEDEC representative, Richard Crisp, knew that JEDEC’s rules called for the disclosure of patent applications. CCF 841, 844-47. Nevertheless, Rambus consciously engaged in a pattern of conduct that plainly violated and subverted these rules.

All the while, Rambus understood that its misleading participation in JEDEC could jeopardize the enforceability of its patents. CCF 849-50. On at least seven separate occasions, Rambus in-house or outside legal counsel informed Rambus representatives, including Rambus CEO Geoffrey Tate, Rambus Vice President Allen Roberts, and Rambus’s primary JEDEC representative Richard Crisp, that Rambus’s continued participation in JEDEC posed legal risks,

under the doctrine of equitable estoppel, that could result in Rambus patent being held unenforceable. CCFF 851. The fact that Rambus would risk its intellectual property, its only source of revenue, demonstrates that it hoped to attain something even more valuable – the ability to charge supracompetitive prices by excluding competition. CCFF 3006-11.

Rambus’s anticompetitive intent is further demonstrated by the substantial amount of record evidence showing that Rambus continued to conceal its patent claims long after it withdrew from JEDEC, in an effort to gain further “leverage” over DRAM makers. CCFF 815-16. Likewise the timing of Rambus’s decision to begin enforcing its JEDEC-related patents – a decision reached in October 1999, the same month in which Rambus’s relationship with Intel reached rock bottom, posing a serious threat to Rambus’s RDRAM-based business model – is further evidence of anticompetitive intent. *See* CCFF 817, 1950-2032. Indeed, Rambus co-founder Mike Farmwald acknowledged through his trial testimony that the decision of Rambus’s Board of Directors to begin enforcing the company’s JEDEC-related patents in this time period related to concerns about DRAM makers not being committed to RDRAM. Farmwald, Tr. 8405-06. This is a direct admission that Rambus intended, through enforcement of JEDEC-related patents, to reduce competition from SDRAM and DDR SDRAM, to the benefit of RDRAM. Substantial additional evidence confirms that this is precisely what Rambus intended, including but not limited to evidence showing that Rambus insisted upon licensing its DDR-related patents at royalty rates exceeding the rates applicable to RDRAM. CCFF 1975-94.

All of the above evidence, and other evidence detailed in Complaint Counsel’s proposed findings of fact (*see* CCFF 800-66), not only proves that Rambus acted with the requisite level of anticompetitive intent, but also further corroborates the conclusion that Rambus’s challenged conduct was by nature exclusionary.

F. Through Its Challenged Conduct, Rambus Has Succeeded in Acquiring Monopoly Power in Several Relevant Technology Markets

Through the conduct challenged in this case, Rambus succeeded in distorting the outcome of JEDEC's SDRAM standardization process and thereby acquiring a patent position over technological features specified in JEDEC's SDRAM and DDR SDRAM standards. Before the DRAM industry became aware of Rambus's JEDEC-related patents it had become locked in to the relevant JEDEC standards, such that it is now unable to avoid Rambus's patent claims. Consequently, the pattern of deception and concealment challenged by Complaint Counsel is a material cause of Rambus's monopoly power. Specifically, Rambus possesses monopoly power in five relevant technology markets corresponding with the same technological features of the JEDEC SDRAM standards over which Rambus has asserted patent claims.

1. There Are Five Relevant Technology Markets

There are five relevant product markets at issue in this case – four of which correspond to the four “Rambus” technologies at issue here, and fifth “cluster” market that aggregate these four markets into one. The geographic scope of each of these markets is worldwide. These market definitions are supported both by the relevant law and the facts of this case. Moreover, Rambus's economic experts have not contested any of the following market definitions. CCF 2788-89.

a. Relevant Product Markets

A product “market is composed of products that have reasonable interchangeability” in the eyes of consumers. *United States v. E.I. du Pont de Nemours & Co.*, 351 U.S. 377, 404 (1956); *see also Eastman Kodak Co. v. Image Technical Services*, 504 U.S. 451, 482 (1992). Identifying substitutes requires consideration of the factors that influence consumer choices, including product function, price, and quality. *See du Pont*, 351 U.S. at 404; *see also CCF*

2762, 2766-68 (McAfee testifying that considering likely buyer behavior appropriate method to determine relevant market); *id.* 2769-71 (consumers at issue are JEDEC participants). For a potential substitute product to be in the same market as the product at issue, the potential substitute product must be a sufficiently close substitute that if the seller sought to raise the price of the product at issue, it would drive away not just some consumers but a large enough number of customers to make a price increase unprofitable. *See du Pont*, 351 U.S. at 394-95; *Rothery*, 792 F.2d at 218; *see also* CCFF 2758 (relevant product market is collection of products without price-constraining alternatives).⁴⁸

When the product at issue involves intellectual property, the core antitrust principles apply and the market is referred to as a “technology market.” *See* CCFF 2763. A technology market includes those technologies “that are close enough substitutes significantly to constrain the exercise of market power with respect to the intellectual property that is licensed.” (*IP Guidelines* § 3.2.2). A technology market therefore consists of “the smallest group of technologies and goods over which a hypothetical monopolist of those technologies and goods likely would exercise market power – for example, by imposing a small but significant and nontransitory price increase.” *Id.*; *see also* 2766-84 (describing analysis). The market thus includes all commercially viable alternative products. CCFF 2766.

The relevant product markets at issue here involve technologies that are incorporated in DRAM for use in current and recent-generation personal computers and other electronics equipment. Each market consists of a type of technology that addresses a specific aspect of memory design and operation. The four markets, described more fully below, are the latency

⁴⁸ *See also* U.S. Department of Justice and Federal Trade Commission, *Horizontal Merger Guidelines* § 1.11 (revised Apr. 8, 1997) (“*Merger Guidelines*”). *See generally* CCFF 2759-61 (McAfee describing methodology).

technology market, the burst length technology market, the data acceleration technology market, and the clock synchronization technology market. CCFF 2787. In addition, there is a cluster market of next-generation DRAM technologies. CCFF 2885-89.

Latency Technology Market. There were at least five commercially viable alternatives in the latency technology market in 1992.⁴⁹ In addition to programmable CAS latency, fixed CAS latency, pin strapping, programming by READ command, and setting by fuses were commercially viable. CCFF 2793-96; *see id.* 2791-2792 (each alternative was technically feasible and considered by JEDEC); Section IV.F.2 (describing alternatives more fully), *infra*. As commercially viable alternatives, these other technologies constrained the price of Rambus's patented technology. CCFF 2797. Accordingly, the latency technology market included all five of these technologies at the time JEDEC was considering which one to include in the SDRAM standard.

Burst Length Technology Market. There were at least five commercially feasible alternatives in the burst length technology market in 1992.⁵⁰ In addition to programmable burst length, fixed burst length, programming with pins, programming with a read command, and using burst interrupt were all commercially viable alternatives. CCFF 2801-04; *see id.* 2799-2800 (each alternative was technically feasible and considered by JEDEC); Section IV.F.2 (describing alternatives more fully), *infra*. As commercially viable alternatives, these other technologies constrained the price of Rambus's patented technology. CCFF 2805. Accordingly,

⁴⁹ The relevant time to determine commercially viable alternatives is prior to the issuance of the applicable standard. CCFF 2786. The relevant time for defining the latency technology market is 1992. CCFF 2790.

⁵⁰ The relevant time to determine commercially viable alternatives is prior to the issuance of the applicable standard. CCFF 2786. The relevant time for defining the burst length technology market is 1992. CCFF 2790.

the burst length technology market included all five of these technologies at the time JEDEC was considering which one to include in the SDRAM standard.

Clock Synchronization Technology Market. There were at least five commercially viable alternatives for clock synchronization in 1995.⁵¹ In addition to use of on-chip PLL/DLL, putting DLL on the memory controller, putting the DLL on the module, using a Vernier technique, and using no DLL were all commercially viable alternatives. CCFF 2816-20; *see id.* 2815-16 (each alternative was technically feasible and considered by JEDEC); Section III.G.2 (describing alternatives more fully), *infra.* As commercially viable alternatives, these other technologies constrained the price of Rambus's patented technology. CCFF 2821. Accordingly, the clock synchronization technology market included all five of these technologies at the time JEDEC was considering which one to include in the DDR standard.

Data Acceleration Technology Market. There were at least four commercially viable alternatives for data acceleration in 1995.⁵² In addition to use of dual-edge clocking, interleaving banks on the module, doubling the clock frequency, and using toggle mode were commercially viable alternatives. CCFF 2810-2812; *see id.* 2808-09 (each alternative was technically feasible and considered by JEDEC); Section IV.G.2 (describing alternatives more fully), *infra.* As commercially viable alternatives, these other technologies constrained the price of Rambus's patented technology. CCFF 2813. Accordingly, the data acceleration technology

⁵¹ The relevant time to determine commercially viable alternatives is prior to the issuance of the applicable standard. CCFF 2786. The relevant time for defining the clock synchronization technology market is 1995. CCFF 2807.

⁵² The relevant time to determine commercially viable alternatives is prior to the issuance of the applicable standard. CCFF 2786. The relevant time for defining the data acceleration technology market is 1995. CCFF 2807.

market included all four of these technologies at the time JEDEC was considering which one to include in the DDR standard.

Synchronous DRAM Technology Market. The four relevant technology markets discussed above together can be aggregated into a fifth, “cluster” market of synchronous DRAM technology. Thus, a cluster market is established if (1) there is only one real source of market power in each of the individual markets, or (2) the defendant has the same market share, competitors, and barriers to entry in each market. HERBERT HOVENKAMP, FEDERAL ANTITRUST POLICY 102 (2d ed. 1999); *see United States v. Philadelphia National Bank*, 374 U.S. 321 (1963) (cluster of banking services constituted relevant market); *United States v. Central State Bank*, 817 F.2d 22, 23-24 (6th Cir. 1987) (same); *United States v. AT&T*, 524 F. Supp. 1336, 1375-76 (D.D.C. 1981). A cluster market including Rambus’s patented technology used in next-generation RAM is appropriate in this case considering, among other things, that Rambus licenses the four relevant technologies as a package, and each technology is required by JEDEC’s SDRAM standards – the programmability features being specified in the SDRAM standards, and all four features being specified in the DDR SDRAM standards. CCF 2885-89.

b. Relevant Geographic Market

Antitrust market definition also requires the specification of a relevant geographic market. The relevant geographic market is the geographic area to which consumers seeking a substitute product could practicably turn to acquire substitutes. *See, e.g., Tampa Elec. Co. v. Nashville Coal Co.*, 365 U.S. 320, 327 (1961). To define the geographic market requires a determination of whether customers could readily purchase substitutes from another geographic area than the one in which they are currently purchasing the defendant’s product at a total cost that would render unprofitable any non-transitory supracompetitive pricing by the defendant. *See, e.g., SBC Communications, Inc. v. FCC*, 56 F.3d 1484, 1493-94 (D.C. Cir. 1995); *Rothery*,

792 F.2d at 218; *Rebel Oil Co. v. Atlantic Richfield Co.*, 51 F.3d 1421, 1436 (9th Cir. 1995); *United States v. AT&T*, 524 F. Supp. 1336, 1375-76 n.163 (D.D.C. 1981). If purchasers can defeat a price increase by purchasing from another geographic area, then both areas are within the same relevant geographic market. Moreover, commentators agree that the geographic scope of technology or innovation markets “is assumed to be worldwide” in the absence of trade or regulatory barriers.⁵³

The technologies at issue here are sold and licensed in a world-wide market. Transportation costs around the world are essentially zero, so it is costless to turn to an area outside the United States for potential alternatives. CCFF 2895. Rambus’s technology is, in fact, used and marketed worldwide by memory makers with fabrication plants in, for example, the United States, Asia, and Europe. CCFF 2894. Likewise, the licenses to use such technology typically are worldwide. CCFF 2892. End-use products incorporating such technologies – *e.g.*, memory chips and other devices – also trade on a world-wide market. CCFF 2897. The relevant geographic market is therefore world-wide for each of the relevant technology product markets. CCFF 2890.

2. Rambus Possesses Monopoly Power in Each Relevant Technology Market

Rambus possesses monopoly power in each of the five specified relevant technology markets.⁵⁴ Monopoly power constitutes “the power to control prices or exclude competition.”

⁵³ See Richard T. Rapp, *The Misapplication of the Innovation Market to Merger Analysis*, 64 ANTITRUST L.J. 19, 23 n.19 (1995); see also Thomas N. Dahdouh, *The Shape of Things To Come: Innovation Market Analysis in Merger Cases*, 64 ANTITRUST L.J. 405, 422 (1996); Richard T. Gilbert and Steven C. Sunshine, *Incorporating Dynamic Efficiency Concerns in the Merger Analysis: The Use of Innovation Markets*, 63 ANTITRUST L.J. 569, 594-95 (1995).

⁵⁴ Assuming arguendo the Court concluded Rambus did not possess monopoly power in such markets, at a minimum Rambus has possessed and continues to possess a dangerous probability of monopolization.

Du Pont, 351 U.S. at 391; *see* CCF 2898 (monopoly power allows company to maintain prices substantially above competitive levels). The offense of monopolization is complete with the acquisition of monopoly power, even if that power is not yet exercised. *Berkey Photo v. Eastman Kodak Co.*, 603 F.2d 263, 275 (2d Cir. 1979) (“Unlawfully acquired power remains anathema even when kept dormant.”), *cert. denied*, 444 U.S. 1093 (1980). Proof of a change in price or output in the marketplace is not required so long as the conduct in question has resulted in the power to affect the market. *See Eastman Kodak*, 504 U.S. at 464; *American Tobacco Co. v. United States*, 328 U.S. 781, 811 (1946) (“the material consideration in determining whether a monopoly exists is not that prices are raised and that competition actually is excluded but that power exists to raise prices or to exclude competition when it is desired to do so”). In this case, Rambus not only possesses monopoly power, but has exercised such power, causing significant and far-reaching anticompetitive effects.

Through its exclusionary conduct, Rambus has succeeded in acquiring over 90 percent market share in each of the five relevant markets set out above. CCF 2913. Rambus’s market share alone demonstrates monopoly power, at least where, as here, there are significant barriers to entry in the relevant markets. *See Grinnell*, 384 U.S. at 571 (“[T]he existence of [monopoly] power ordinarily may be inferred from the predominant share of the market.”); *United States v. Paramount Pictures, Inc.*, 334 U.S. 131, 167-72 (1948) (suggesting that a 70 percent market share is sufficient to support a finding of monopoly power).

Rambus’s monopoly power also is demonstrated by a wide range of record evidence, including but not limited to the following. First, JEDEC’s SDRAM and DDR SDRAM standards are the dominant standards for commodity DRAM. Second, Rambus holds patents that cover it asserts the JEDEC SDRAM and DDR SDRAM standards. That patent claims create market power through the erection of barriers to entry is well recognized in the law. *See IP*

Guidelines § 2.2; *Mozart Co. v. Mercedes-Benz of N. Am.*, 833 F.2d 1342, 1346 (9th Cir. 1987); *see also* CCFF 2960-61.⁵⁵ Third, the DRAM manufacturing industry has become locked in to the use of those patents as a result of, among other things, the high cost switching to alternative standards not covered by Rambus patents.

a. JEDEC’s Standards Are the Dominant Standards for Commodity DRAMs

JEDEC’s SDRAM and DDR SDRAM standards are the dominant worldwide standards for commodity DRAMs. CCFF 259, 263, 267, 2904. Indeed, over 90 percent of worldwide DRAM output complies with the JEDEC specifications. *See* CCFF 259, 267; *see also* CCFF 87. This percentage of the market has remained stable in recent years, and is projected to remain at this level, if not higher, in future years. CCFF 2904; *see* DX0141.

b. Rambus’s Patented Technologies Are Included in JEDEC’s SDRAM and DDR SDRAM Standards

Rambus now holds patents, and continues to pursue patent applications, covering features specified in JEDEC’s SDRAM and DDR SDRAM standards, including the four “Rambus” technologies. *See* CCFF 2905-2911. Indeed, Rambus has obtained license agreements from numerous manufacturers of SDRAM and DDR SDRAM, accounting collectively for over half of the DRAM market. *See* CCFF 2012.

c. The DRAM Industry Is “Locked-In” to JEDEC’s Standards

The DRAM industry is locked in to using Rambus’s patented technologies and cannot feasibly switch to alternative technologies. Once JEDEC adopted its standards, and the industry

⁵⁵ Indeed, the assertion of patents alone (even if not ultimately found valid and infringed) is sufficient to create market power. *See Blonder-Tongue Laboratories, Inc. v. University of Illinois Foundation*, 402 U.S. 313, 346-47 (1971) (mere threat of a patent infringement lawsuit “permit[s] invalid patents to serve almost as effectively as would valid patents as barriers to the entry of new firms”).

began to develop memory chips and other components to work with DRAMs meeting that standard, the industry became locked in to the use of those standards, and thus to Rambus's patented technology.

Record evidence shows that the DRAM industry, including customers and suppliers of complementary components, are committed to both the SDRAM and DDR SDRAM standards, and have been for quite some time. CCF 2501-26. DRAM manufacturers and other firms have been preparing to manufacture and use DDR SDRAM since at least 1997. CCF 2509; *see also* CCF 2510-11, 2513, 2515, 2517-20, 2523-24.

DRAM manufacturers expend significant resources to develop and manufacture DRAMs, and changing the designs for SDRAM and DDR SDRAM products would have been prohibitively expensive and disruptive. CCF 2528-40. Any attempt to change SDRAM and DDR SDRAM products in 2000 to work around Rambus's patents would have required changes to the product designs, followed by layout, tape out, simulation and verification, the creation of a new mask set, manufacture of initial silicon, validation and qualification, and ramp up to full production. CCF 46-77.

In addition to the costs of the redesign itself, manufacturers would have to incur out-of-pocket costs, inventory costs, and opportunity costs in order to switch to a new standard. CCF 2530-31. Out-of-pocket costs of a revision design involve the actual expenditures that a DRAM manufacturer must make in order to accomplish a revision design, particularly the costs of additional mask sets.

Then-current inventory that cannot be sold due to a change in DRAM design also presents substantial costs to DRAM manufacturers. CCF 2534.

Redesigning the DRAM standard would have entailed massive opportunity costs by requiring the dedication of substantial resources away from other productive projects. CCF 2536-37. In one case at Micron, the opportunity costs alone of a revision design were in the neighborhood of .

All members of the DRAM industry, including manufacturers of complementary components and consumers of DRAM, may have to incur switching costs. Cisco Systems estimated that it would have cost the company approximately \$1 billion had the DRAM manufacturers chosen to redesign SDRAM in response to the Rambus lawsuits, and it would have taken Cisco at least a year to make the transition to the new DRAM standards once those

standards had been established. CCFF 2505. Likewise, firms such as Intel and AMD dedicate substantial resources to ensuring that DRAM and the other components develop such that compatible components are available when the PC-OEMs are assembling their computers and it can take a number of years and substantial expense to support the development of complementary components. CCFF 2556.

The need for compatibility between the DRAM and other components also prevents the industry from switching. DRAM has value only if it is compatible with the other components in the products that include the DRAM. CCFF 25-28, 2541. Systems manufacturers were concerned that changes the existing SDRAM and DDR SDRAM standards would result in new standards that were incompatible with the systems sold by those system manufacturers. CCFF 2542. In fact, the record evidence is clear that changing the SDRAM standard now to avoid the Rambus patents would lead to DRAM chips that are incompatible with some systems using the existing DRAM infrastructure. CCFF 2543. Changing the DDR SDRAM standard now to avoid all of Rambus's patents on the standard would lead to a DRAM that would not be compatible with any JEDEC-compliant systems. CCFF 2544-46.

Additionally, when transitioning to a new standard or generation of memory, the industry prefers evolutionary rather than revolutionary change. *See* CCFF 127, 2569-70. JEDEC tries to change as little as possible between standards, while obtaining the needed performance increase for the new standard. *See* CCFF 2569. Evolutionary change eases the introduction of the new DRAM standard and also reduces risk during the introduction of the new standard. *See* CCFF 128, 2570. *See also* CCFF 2571-73 (discussing evolutionary nature of SDRAM, DDR SDRAM, and DDR-2 SDRAM features).

Finally, the need for industry coordination also contributes to lock-in. Even if a group of manufacturers were able to design and build a new DRAM that avoided Rambus's patents, they

would not be able to sell those DRAMs unless they were supported by other components. CCFF 2547-49. Industry acceptance of a new DRAM standard requires the existence of compatible components, including particularly memory controllers. CCFF 2550. Likewise, sales of a memory controller depend on the existence of compatible DRAMs. In both cases, unless one is available, the firms making the other will be hesitant to produce their component. CCFF 2551. Changing either the SDRAM standard or the DDR SDRAM standard in 2000 would have required manufacturers of components such as controllers, motherboards and modules to redesign, test and reissue their products. CCFF 2552. By 2000, the entire industry had implemented the JEDEC standards to such a degree that it would have been extremely difficult and costly for all industry members to change their respective designs to avoid Rambus's patents. CCFF 2553. *See also* CCFF 2558 (it took AMD approximately two years to develop the infrastructure or "virtual system" to support the K-7 microprocessor.).

Before manufacturers could even begin the redesign or coordination process, the industry would have to agree on a new standard, which implicates both the factors of time expenditures and industry coordination. The industry would need to agree on a single standard, given the preference for a multiple supply base (CCFF 116-118, 2547-49), the need for interoperability and compatibility (CCFF 25-28, 2541), and the economies of scale, which provide strong incentives for a single standard (CCFF 2608-09).

History suggests that it is unlikely that the new DRAM standard could be created outside of JEDEC. Each new generation of commodity DRAM, from page mode through fast page mode, EDO, SDRAM and DDR SDRAM, has been a JEDEC standard. CCFF 2563. Reaching consensus within JEDEC as to how to change the standards would have been extremely difficult and time-consuming. CCFF 2576-78; *see also* CCFF 2576 (*citing* Peisl, Tr. 4453 ("JEDEC is traditionally a very slowly moving consortium, and there's a reason for that, because there's so

many companies involved, it's basically the whole industry that produces parts for the PC and the laptop and the server business, so to try to reach consensus at JEDEC, based on my experience, have been incredibly hard and tough.”)). The standard-setting process alone can take two to three years. CCFF 2565-68. Reaching consensus to change the standard would have been more difficult in 2000 or later than it was in 1993, because the interests of the members of JEDEC are not as well aligned now as they were *ex ante*. CCFF 2744. Given that certain JEDEC members have licenses from Rambus and others do not, they have different incentives. CCFF 2745-46.

There is little incentive to embark on a change to the JEDEC DRAM standard, given that there is no guarantee that the new standard would be able to displace the current standard. Changing the standard to avoid Rambus's intellectual property would not necessarily result in new standard with cost or performance advantages. Without those advantages, DRAM customers would not likely support the change. CCFF 2575. Likewise, suppliers of components that constitute the DRAM infrastructure are willing to develop products compatible with a new standard only if they are able to obtain an economic benefit from that change. *Id.* Indeed, attempts by DRAM manufacturers to consider changing the standards were rejected by the industry. CCFF 2579-84.

In short, the industry was locked in to JEDEC's standards in 2000 when it first became aware that Rambus's patents covered the SDRAM and DDR SDRAM technologies, and it remains locked in today.

d. Alternatives to Rambus's Patented Technologies That Were Previously Available Are No Longer Commercially Viable

At the time that the relevant standards were being developed, there were a variety of commercially available alternatives to the “Rambus” technologies. CCFF 2792-96, 2801-04,

2809-12, 2817-20. Yet the technologies that in the past were commercially viable alternatives to Rambus's technology, are no longer commercially viable as a result of the lock-in effects described above, which preclude the DRAM industry from shifting to alternatives to the existing SDRAM standards, and hence preclude substitution away from use of the "Rambus" technologies as incorporated in the JEDEC standards. CCF 2899-04, 2915-22.

G. Rambus Acquired Its Monopoly Power Through Exclusionary Conduct

1. Antitrust Causation Principles Only Require Proof that Respondent's Conduct Was a "Material" Cause of its Monopoly Power

In antitrust cases, causation is established upon proof that the challenged conduct was a "material cause" of the competitive injury. *See Zenith Radio Corp. v. Hazeltine Research, Inc.*, 395 U.S. 100, 114 n.9 (1969) ("[I]t is enough that the illegality is shown to be a material cause of the injury"); *In the Matter of Boise Cascade Corp.*, 113 F.T.C. 956, 993 (1990) (violation of Section 5 proven where anticompetitive conduct "caused a material part" of the injury). Accordingly, Complaint Counsel "need not exhaust all possible alternative sources of injury in fulfilling [its] burden." *Zenith*, 395 U.S. at 114 n.9; *see also Law v. National Collegiate Athletic Ass'n*, 5 F. Supp. 2d 921, 927 (D. Kan. 1998) (plaintiff "need not rule out 'all possible alternative sources of injury'"). Rather, Complaint Counsel is required to show that Respondent's conduct "reasonably appear[s] capable of making a significant contribution to . . . monopoly power." *Microsoft*, 253 F.3d at 79.

To constitute an offense of monopolization, Respondent's monopoly power must be caused, protected or extended by its exclusionary conduct. In other words, there must be a causal link between the conduct at issue and the acquisition of monopoly power. *See T. Muris, The FTC and the Law of Monopolization*, 67 *Antitrust L.J.* 693, 694 (2000). However, in an action for injunctive relief, the courts will "infer causation from the fact that a defendant has

engaged in anticompetitive conduct that ‘reasonably appear[s] capable of making a significant contribution to ... monopoly power.’” *Microsoft*, 253 F.3d at 79, citing 3 Areeda & Hovenkamp, *Antitrust Law* ¶ 651 c, at 78. Complaint Counsel is not required to demonstrate that had Respondent disclosed, they would not have monopoly power because “[t]o require that § 2 liability turn on a plaintiff’s ability or inability to reconstruct the hypothetical marketplace absent a defendant’s anti-competitive conduct would only encourage monopolists to take more and earlier anti-competitive action.” *Id.*⁵⁶

In *Microsoft*, the district court had found that both Netscape Navigator and Java were potential competitors to Microsoft’s operating systems. The question was “whether the exclusion of nascent threats is the type of conduct that is reasonably capable of contributing significantly to a defendant’s monopoly power.” *Id.* at 79. Microsoft had claimed that its market power was the result of its superior innovation and business acumen. The court rejected that argument. “[S]uffice it to say that it would be inimical to the purpose of the Sherman Act to allow monopolists free reign to squash nascent, albeit unproven, competitors at will – particularly in industries marked by rapid technological advance and frequent paradigm shifts.” *Id.*

2. Rambus’s Exclusionary Conduct Altered the Outcome of JEDEC’s Standardization Process, and Was a Material Cause to Rambus Obtaining Monopoly Power

Proof of causation in this case requires two showings: first, that Rambus’s failure to disclose “is the type of conduct that is reasonably capable of” causing JEDEC to include the

⁵⁶ Similarly, in the damages context, the Supreme Court has long held that a defendant cannot benefit from the uncertainties created by its own violative conduct. “Any other rule would enable the wrongdoer to profit by his wrongdoing at the expense of his victim. . . . The most elementary conceptions of justice and public policy require that the wrongdoer shall bear the risk of the uncertainty which his own wrong has created.” *Bigelow v. RKO Radio Pictures, Inc.*, 327 U.S. 251, 264-65 (1946).

undisclosed intellectual property in the DRAM standards; and second, that the JEDEC standards reasonably appear capable of making a significant contribution to Respondent's monopoly power. The second point has already been established. As described above, the DRAM industry, including customers and suppliers of complementary components, are committed to both the JEDEC SDRAM and DDR SDRAM standards, and have been for quite some time. As a result of the fact that the industry is locked in to the JEDEC standards, there are no current substitute technologies that could constrain Rambus's pricing power. *Id.* All that remains is to show that Rambus's failure to disclose and its other misconduct is the type of conduct that is reasonably capable of causing JEDEC to include the undisclosed intellectual property in the DRAM standards.

JEDEC had a strong and clearly stated institutional objective of developing open standards and avoiding the inclusion of patented technologies in its standards where possible. Rambus's conduct, by concealing the intellectual property that it believed would cover the JEDEC standards it saw being developed while it was at JEDEC, set the industry on a development path that JEDEC would not otherwise have followed. Voluminous record evidence shows that, had Rambus complied in good faith with JEDEC's policies and disclosed relevant patent-related information, JEDEC's members likely would have worked around Rambus's patents. *See* CCFF 2101, 3021, 3029-3030. At a minimum, the record demonstrates that JEDEC standards would not have included Rambus's proprietary technologies absent Rambus's advance commitment to license on terms far more favorable than what it has demanded since 2000. *See* CCFF 2441-2464, 3021.

JEDEC members had available to them a variety of not just viable, but in many cases, preferable alternatives for each of the four Rambus technologies to which they are now locked in. CCFF 2102-2107. As witness after witness testified, JEDEC participants could have – and

would have – worked around Rambus’s patent technology had they known about Rambus’s intellectual property claims at the time JEDEC was developing its SDRAM and DDR SDRAM standards. CCFF 2101 (*citing, e.g., Lee, Tr. 6636* (If Rambus had disclosed before 1996 that Rambus might have patents on programmable CAS latency and burst length, Mr. Lee testified, “[Micron] would have opposed the full-feature device, and we would have increased our support on the SDRAM-Lite device.”); Sussman, Tr. 1416-17 (“If I understood that there was IP on the programmable [CAS latency and burst length], I would have voted--changed my direction and voted to take the fixed one.”); CX2107 at 137 (Oh, Dep.) (Hyundai would not have developed DDR SDRAM if it had known that it would have royalties associated with it.))

a. Alternatives to Programmable CAS Latency

JEDEC could have chosen from among at least six technically feasible alternatives to the programmable CAS latency feature of JEDEC SDRAM and DDR SDRAM: (1) fixed CAS latency, (2) blowing fuses to set CAS latency, (3) scaling CAS latency with clock frequency, (4) using a pin(s) to set CAS latency, (5) identifying CAS latency in the command, and (6) staying asynchronous. CCFF 2130. A number of these alternatives were shown to be commercially viable at the hearing. CCFF 2793-2796.

Fixed CAS latency parts operate with only one CAS latency. CCFF 2133. Fixed CAS latency was supported by memory manufacturers and customers (CCFF 2141-2144), had technical and cost advantages (CCFF 2137, 2139, 2144-2145), and was considered for incorporation in the SDRAM standard in 1991-92 (CCFF 2131, 2138) and in the SDRAM lite standard in 1995-1996 (CCFF 2139).

Manufacturers or OEMs could have used fuses to determine the CAS latency of parts designed to operate with more than one CAS latency. CCFF 2161, 2163; *see also* CCFF 2157-2162. Before 1996, using fuses to determine latency was potentially simpler and cheaper than

using a mode register. CCFF 2164. Indeed, this technology was proposed for incorporation in the JEDEC SDRAM standard during the 1991-1992 period. CCFF 2131, 2166-2167. Fuses have been in use since at least the early 1990's, and are still in use today. CCFF 2159.

In 1991-92, JEDEC also considered using either an existing or dedicated pin(s) to set CAS latency. CCFF 2131, 2186. This alternative offered advantages in terms of cost (CCFF 2187, 2190), simplicity (CCFF 2187), and functionality (CCFF 2188). This alternative would not necessarily have required the addition of new pins to DRAMs (CCFF 2192-2201). JEDEC could have decided that they needed only two options for CAS latency (CCFF 2214-2218), which could have been accomplished with one pin (CCFF 2213).

In addition, JEDEC could have: (1) scaled CAS latency with clock frequency. (CCFF 2178-2183); (2) identified CAS latency in the command (CCFF 2219-2227); or, (3) opted to stay with an asynchronous style DRAM. CCFF 2228-2233; *see also* CCFF 2231-2232 (discussing potential advantages associated with this approach).

b. Alternative to Programmable Burst Length

In the 1991-1996 time frame, JEDEC had at least six technically feasible alternatives to the use of programmable burst length in SDRAM and DDR SDRAM: (1) using fixed burst length, (2) using fuses to program the burst length, (3) using a dedicated pin(s) to determine the burst length, (4) identifying the burst length in the read command, (5) using a burst terminate mechanism to determine burst length, and (6) toggling the CAS pulse to determine burst length. CCFF 2234. A number of these alternatives were shown to be commercially viable at the hearing. CCFF 2801-2804. Five of these alternatives – fixed burst length, use of fuses to set burst length, use of pins to set burst length, burst terminate, and identifying burst length in the command – were proposed for incorporation in the JEDEC SDRAM standard in the 1991-1992

time period. CCFF 2235. At that time the manufacturing costs associated with these four alternatives were comparable to those associated with programmable burst length. CCFF 2236.

In 1991-92 and again in 1995-96, JEDEC considered fixing the burst length by hardwiring either a single burst length value or two different burst length values. CCFF 2235, 2243, 2250. This alternative was acceptable from both a cost and technical perspective. *See* CCFF 2240-2241, 2246, 2257-2258, 2260. At most, JEDEC would have needed to standardize two different burst lengths. CCFF 2254. On multiple occasions in the 1990's, JEDEC considered hardwiring a part with two burst length values, one of which would be selected using electrical or laser blown fuses. CCFF 2235, 2261-2262, 2265-2266. This alternative potentially was cheaper to design, produce, and test than programmable burst length (CCFF 2263-2264).

In 1991, JEDEC considered dedicating a pin to holding the burst length value during system operation. CCFF 2235, 2274. This alternative, which does not necessarily require the addition of new pins (CCFF 2277-2280), is potentially smaller, cheaper to produce, and easier to test than programming the burst length in a mode register. CCFF 2273; *see also* 2286 (explaining how this alternative could yield these advantages).

Identifying burst length in the command involves including burst length information in the command signal to initiate any operation. CCFF 2296. This alternative potentially is cheaper than programming burst length with a mode register (CCFF 2298) and would not significantly increase complexity (CCFF 2299) or require adding new pins (CCFF 2305).

With burst terminate, a short burst length could be effected in parts designed to operate with a long burst length by having the memory controller send a read command before the burst length was completed, thereby supporting both a longer burst length and a shorter burst length. *See* CCFF 2307. This burst terminate command alternative could have simplified design, testing, and manufacturing. CCFF 2309-2310.

Finally, JEDEC could have toggled the CAS pulse to control data output (CCFF 2319), which would have made the part simpler, smaller, and easier to test (CCFF 2320), and would have involved no significant disadvantages (CCFF 2321).

c. Alternatives to Dual-Edged Clocking Technology

With respect to the dual-edged clocking technology, JEDEC had at least seven technically feasible alternatives in the 1991-1996 time period: (1) doubling the clock frequency, (2) interleaving on-chip banks, (3) interleaving banks at the module level, (4) increasing the data width of the DRAM chip to double the data rate, (5) increasing the data width at the module level, (6) using simultaneous bidirectional I/O, and (7) using toggle mode DRAM. CCFF 2322. A number of these alternatives were shown to be commercially viable at the hearing. CCFF 2810-2812.

JEDEC considered doubling the clock frequency of SDRAM to double the data rate in 1996-2000. CCFF 2324. Doubling the clock frequency would require keeping the single-edged clocking scheme that SDRAM uses but with a faster clock that would output data on the positive edges fast enough to achieve the desired data rate. CCFF 2325. This clocking scheme has advantages over dual-edge clocking in terms of design and testing (CCFF 2327-2328) and was viewed as technically feasible, CCFF 2334, 2338, and also feasible from a cost perspective, CCFF 2335, 2337-2343.

A second alternative to dual-edged clocking is to interleave on-chip banks by one of two possible methods: sending two read commands that are delayed from each other by half a clock cycle, or sending a clock and a delayed clock where the first clock would control bank 1 and the delayed clock would control bank 2. CCFF 2344. This alternative has the advantage of not requiring symmetric duty cycles or slew rates, CCFF 2345, without any significant disadvantages, CCFF 2346. *See also* CCFF 2348-2349.

JEDEC also considered interleaving on-module banks in the 1996-1997 time frame, CCFF 2324, 2353, which involves organizing groups of DRAM chips into ranks of memory and doubling the data rate by having the positive edge of two clocks drive the data from each rank of memory on a module. CCFF 2351. This approach would have simplified the design of DRAM chips. CCFF 2352. *See also* CCFF 2354-2355.

To avoid dual-edged clocking, JEDEC could have also: (1) doubled the width of the data bus, which would have required a far simpler clock circuit and consumed less power than dual-edged clocking (CCFF 2356, 2358); or (2) doubled the number of data pins on the memory module, which would have reduced costs, noise, and power consumption in comparison to dual-edged clocking (CCFF 2359, 2360). Both of these alternatives would have had the additional advantage of allowing JEDEC to increase the data rate without increasing the clock rate. CCFF 2356, 2359, respectively.

Simultaneous bi-directional I/O was a sixth alternative to dual-edged clocking. CCFF 2361. Lastly, JEDEC considered using toggle mode DRAM in 1990-1991. CCFF 2365. Even though the evidence shows that toggle mode DRAM is an example of dual-edged clocking, Rambus considers them to be different. CCFF 2364. To the extent that there is a difference, toggle mode DRAM is an alternative to dual-edged clocking. CCFF 2364.

d. Alternatives to On-Chip PLL

In the 1991-1996 time frame, JEDEC could have chosen from at least seven technically feasible alternatives to the use of on-chip DLL: (1) use no method of aligning data to the system clock, (2) use either a PLL or DLL in the memory controller, (3) use either a PLL or DLL on the module, (4) use vernier circuits, (5) increase the number of pins, (6) rely entirely on the DQS strobe, and (7) adopt read clocks. CCFF 2366. A number of these alternatives were shown to be commercially viable at the hearing. CCFF 2817-2820

On-chip PLL/DLL technology aligns data to the system clock (CCFF 2368), but this alignment is not necessary for valid data capture (CCFF 2372-2372). JEDEC, in fact, considered not using a method to align the data to the system clock in its work on the DDR SDRAM standard. (CCFF 2366, 2369).

In 1996, JEDEC considered using a PLL in the memory controller instead of on every DRAM chip. CCFF 2384. This alternative would reduce power consumption, die size, and testing and manufacturing costs. CCFF 2383.

As a third alternative, DDR SDRAM could have used either a single or multiple DLLs on the module to ensure that each DRAM chip on the module was in sync with the system clock, which would have reduced power consumption, cost, and design time. CCFF 2385-2386.

A fourth alternative to the use of an on-chip PLL/DLL, considered by JEDEC in 1997, is a vernier circuit, which is a circuit that can introduce a static amount of delay on a signal to reduce timing uncertainties in a memory system. CCFF 2389, 2391-2392, 2397. Vernier circuits had potential cost and technical advantages compared to on-chip DLL. *See* CCFF 2390-2391, 2394, 2396.

JEDEC could have chosen to improve performance by increasing the number of data pins rather than by increasing the data rate on the existing pins. CCFF 2400. Adding data pins would not have required increased bus speed and, therefore, would not have needed a mechanism to guarantee valid data capture. *Id.* It also would have used less power and simplified the DDR SDRAM design. CCFF 2402.

JEDEC had the option to rely solely on the DQS strobe to guarantee valid data capture. CCFF 2403. Reliance on the DQS strobe satisfied the majority of JEDEC members. CCFF 2410.

In the 1995-1998 time period, JEDEC considered read clocks – also called echo clocks – as a yet another alternative. CCF 2411-2412. Compared to using DLL circuits, using read clocks would have required less lock time, addressed more components of skew than on-chip, and decreased the cost and power consumption. CCF 2414.

Accordingly, the evidence demonstrates that Rambus’s conduct – its failure to abide in good faith by JEDEC’s patent disclosure policy – was a material cause of its monopoly power. Had Rambus participated in JEDEC in good faith, the DRAM industry most likely would have selected alternative, unencumbered features for its SDRAM and DDR SDRAM standards, and would not be locked into using JEDEC technologies today.

H. Rambus’s Conduct Has Had Material Adverse Effects on Competition and Threatens to Cause Additional Anticompetitive Effects

As explained below, Rambus not only has acquired monopoly power through its challenged conduct, but in addition has exercised such power in ways that have already caused significant anticompetitive effects and threaten to cause future significant harm to competition, absent imposition of an appropriate remedy.

1. Rambus’s Conduct Has Enabled It to Charge Anticompetitive and Discriminatory Royalties

Rambus’s exclusionary conduct has allowed it extract anticompetitive and discriminatory royalties. Had Rambus complied with its obligations as a JEDEC member to disclose relevant patents and patent applications in good faith, the most likely result would have been exclusion of the “Rambus” technologies from JEDEC SDRAM and DDR SDRAM standards. *See* CCF 2101-2432. The only scenario in which JEDEC might have knowingly standardized Rambus’s patented or patent-pending technologies would have been if Rambus (a) agreed in advance to royalty-free or reasonable and non-discriminatory license terms, thus satisfying the requirements of JEDEC’s rules; and (b) negotiated license terms in advance with individual JEDEC

participants in order to persuade them that use of Rambus's proprietary technologies was well-justified in light of the value of such technologies vis-a-vis various competing alternatives. *See* CCF 2433-2464. By contrast, Rambus concealed its intellectual property until after the DRAM industry became locked in to JEDEC's standards and then demanded royalties from all major DRAM makers, knowing that such companies would have no realistic choice but to agree to Rambus's licensing demands or litigate.

As the evidence shows, in the wake of industry lock-in to the SDRAM standards, Rambus has been successful in securing licenses from many of the major producers of SDRAM and DDR SDRAM, collectively accounting for over half of all worldwide DRAM production. *See* CCF 2012. Typically, the licensees are required to pay _____ percent royalties to Rambus for use of its patented technology in producing SDRAM and _____ percent royalties for use of Rambus's patented technologies in DDR SDRAM.

_____. These royalty rates are anticompetitive and reflect the exercise of Rambus's monopoly power in the relevant technology markets. Had Rambus not engaged in such conduct, it would not be in a position to demand royalties at such high levels, if indeed it could charge any royalties at all for use of its technology in the production of JEDEC-compliant SDRAMs. *See* CCF 2963-2975. Moreover, it appears that Rambus intends to "ratchet[] up royalty rates over time." CCF 2035. The accumulated market impact of Rambus's anticompetitive royalties is massive, and could easily, over the life of the patents, range into the billions of dollars. *See* CCF 2043.

Rambus's SDRAM and DDR SDRAM royalties are anticompetitive not only in the sense that they are substantially higher than any royalty amount Rambus might have been able to charge in the absence of its conduct, but also in that Rambus has exploited its monopoly power to discriminate in the royalties it charges to different licensees, in a manner that suits Rambus's

strategic objectives. To begin with, Rambus has strategically elected to demand higher royalties on licenses to its patents for use in producing DDR SDRAM than it charges for use of its patents in producing RDRAM. *See* CCF 1999, 2001, 2004-09, 2011.⁵⁷ In the words of Rambus’s former Vice-President of Intellectual Property, Joel Karp, the objective of charging such higher royalties was “to prevent a competitive device.” *See* CCF 1712.

Finally, Rambus has threatened to deny any license to companies that choose to litigate against it and lose. *See* CCF 1981-94. Needless to say, this is a serious threat to the three companies that are presently involved in patent litigation with Rambus – Infineon, Micron, and Hynix – which together produce nearly half of the world’s supply of commodity DRAMs. *See* CCF 2012.⁵⁸ Such discriminatory licensing practices are anticompetitive and reflect the exercise of Rambus’s monopoly power. In the absence of the conduct at issue here, Rambus not only would lack the power to engage in such discrimination,

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⁵⁸ These three companies have been adversely impacted by Rambus’s conduct already, in terms of the substantial costs and disruptions associated with litigating against Rambus. CCF 2021. However, the costs and disruptions of litigation pale in comparison to the risks that these companies’ DRAM business could literally be shut down in the event Rambus were to succeed in enforcing its patents through litigation. CCF 2028

but – assuming its technologies were used at all in JEDEC’s standards – would be limited to charging non-discriminatory royalties.⁵⁹

Over the long run, the increased costs due to the royalties paid by DRAM manufacturers to Rambus can be expected to increase the downstream prices of DRAM. CCFF 3051. First, DRAM manufacturers will attempt to recover their costs of production, including the cost of royalty payments to Rambus. CCFF 2033-43, 3051. Second, royalty payments to Rambus also are likely to reduce DRAM output, further raising the costs to consumers. CCFF 2044. The artificial restraint on the expansion of supply will keep prices higher than they would have been absent Rambus’s exclusionary conduct. CCFF 2045, 3051. These added costs, in the long run, are likely to be passed on to consumers. CCFF 2045, 3051.

2. Rambus’s Conduct Will Impose Additional Costs on the Industry if the Industry is Forced to Devote Scarce Resources to Working Around Rambus Patents

Although the DRAM industry presently is locked in to using Rambus’s patented technologies, if in the future the DRAM industry were able to shift to alternative standards in order to escape Rambus’s supracompetitive royalty rates, the costs and disruption associated with such a change would reflect further competitive harm. CCFF 2047, 3055, 3058. But for

⁵⁹ The substantial evidence of Rambus’s anticompetitive and discriminatory licensing practices summarized above and in Complaint Counsel proposed findings (*see* CCFF 1975-2032) serves as further proof that Rambus in fact does possess monopoly power. *See, e.g., Rebel Oil*, 51 F.3d at 1434 (monopoly power may be proven though “direct evidence of the injurious exercise of monopoly power.”); *FTC v. Indiana Federation of Dentists*, 476 U.S. 447, 460-61 (1986) (“Since the purpose of the inquiries into market definition and market power is to determine whether an arrangement has the potential for genuine adverse effects on competition, ‘proof of actual detrimental effects, such as a reduction of output,’ can obviate the need for an inquiry into market power, which is but a ‘surrogate for detrimental effects.’” (citations omitted)). *See also* ROBERT BORK, *THE ANTITRUST PARADOX* 395 (1978) (it is “essential” to “[p]ersistent or stable price discrimination in favor of specific customers” that a “seller possess[] . . . a substantial degree of market power or monopoly”); RICHARD POSNER, *ANTITRUST LAW* 63 (1976) (“[p]ersistent discrimination is very good evidence of monopoly because it is inconsistent with a competitive market.”).

Rambus's conduct, these resources would be devoted to other productive uses, such as further innovation to bring the next standard to market. *Id.* Hence, Rambus's conduct threatens harm to consumers through delayed standards and decreased innovation and output.

3. Failure to Remedy Rambus's Misconduct Will Have a Chilling Effect on Participation in Standard-Setting Organizations

Rambus's conduct, if left unpunished, threatens an even more troubling consequence – to undermine confidence in standard-setting organizations, thereby depriving consumers of their procompetitive benefits.

Rambus's ability to capitalize on its exclusionary conduct by garnering billions of dollars in royalty payments – to the detriment of other members of the DRAM industry who participate in JEDEC in good faith, and ultimately of consumers – serves as a potent disincentive for firms to participate in open-standards organizations. CCF 2050-54. The open standard-setting process requires trust that participants are not exploiting the process to gain competitive advantage. CCF 2051-52. Rambus's conduct makes it impossible to foster an environment of trust, and provides incentives for other firms to game the system. *Id.* The overall result, if Rambus's conduct is not punished, will be to retard innovation in the semiconductor industry and other industries that rely heavily on industry standards. *Id.*

The DRAM industry derives substantial benefits from standard-setting activities. *See Amicus Brief of Advanced Micro Devices, Inc., et al., at 5-8, Infineon v. Rambus [Tab3]; Amicus Brief of JEDEC Solid State Technology Ass'n at 5-7, Infineon v. Rambus [Tab 2].* Formal standards provide assurance of quality and reliability, interoperability and multiple suppliers, assurance of adequate supply for customers, and assurance of demand to justify the massive specific investments required of manufacturers. CCF 112-21. Rambus's conduct, absent appropriate relief, jeopardizes these benefits, and threatens to chill participation the standard-

setting process. *See Amicus Brief of Consumer Electronics Ass'n, et al., at 17-18, Infineon v. Rambus* [Tab 4]; *Amicus Brief of JEDEC Solid State Technology Ass'n at 5-7, Infineon v. Rambus* [Tab 2]. Lack of broad participation tends to result in inferior solutions and reduced market acceptance. CCF 2051, 3050-52.

Another likely consequence is a significant delay in the creation and adoption of new standards. CCF 3052-55. *See Amicus Brief of Consumer Electronics Ass'n, et al., at 17-18, Infineon v. Rambus* [Tab 4]. In industries in which patents play a significant role, the uncertainty of the patent status of a proposed standard is likely to delay the approval of the standard and impede the widespread adoption of the standard. *Id.*, CX3089 at 20. Moreover, efficient, timely development of standards would be impossible because participants would be required to reevaluate the patent and the standard each time that either the patent or the standard changes.

IV. THE RECORD EVIDENCE OF RAMBUS'S EXCLUSIONARY, ANTICOMPETITIVE CONDUCT WARRANTS IMPOSITION OF THE COMMISSION'S PROPOSED REMEDY

Complaint Counsel seeks an order prohibiting Rambus from enforcing any U.S. patent that claims priority back to Rambus's U.S. Patent Application 07/510,898 (filed Apr. 18, 1990) or to any other U.S. patent application filed before June 17, 1996 (the date Rambus formally resigned from JEDEC) against anyone manufacturing, using, or selling JEDEC-compliant DRAMs or products that use or interface with JEDEC-compliant DRAMs (including future versions of the JEDEC standards). The requested order would also prohibit Rambus from enforcing any foreign patent that claims priority back to any U.S. patent application filed before June 17, 1996, with respect to any products that are intended for import into or export from the

United States, that conform to the JEDEC standards. The prohibition would extend to any future-issued patents that claim a priority date before June 17, 1996.⁶⁰

Such an order is necessary to restore market conditions as closely as possible to those that would have prevailed in the absence of Rambus's conduct, to prevent future harm to the markets at issue and related markets, and to prevent harm to the standard-setting process. The proposed order goes no further than reasonably necessary to correct the harm. It permits Rambus to enforce any of its patents against any products other than those that comply with, interface with, or use JEDEC-compliant DRAMs. It also permits Rambus to enforce all of its patents with a priority date after it withdrew from JEDEC against any and all products, including those that comply with the JEDEC SDRAM standards. Such an order therefore falls well within the Commission's broad discretion in fashioning remedies.

A. The Proposed Remedy, Designed to Stop Rambus's Unlawful Practices and Restore Competition to Relevant Markets, Falls Well Within the Commission's Broad Remedial Power

The Commission has broad discretion to fashion relief to restore competition. Such relief may include practices or products not implicated directly in the original violations. Not only has the Commission's authority to place substantial constraints on the use or licensing of patents been upheld, but the Commission has explicitly stated that it has authority to order compulsory licensing with no royalties. Moreover, it has recognized that an order barring enforcement of patent rights is appropriate when warranted to restore competition. Accordingly, barring Rambus from enforcing patents whose sole value derives from its misconduct while at JEDEC against JEDEC-compliant technologies is properly subject to a Commission order, because such

⁶⁰ See Notice of Contemplated Relief (issued June 18, 2002).

a remedy is necessary to restore the relevant markets as nearly as possible to the condition they would be in absent Rambus's misconduct, and because it is directly related to such misconduct.

The principal objective in framing antitrust relief is to restore competition. *See, e.g., Ford Motor Co. v. U.S.*, 405 U.S. 562, 573 (1972); *International Salt Co. v. U.S.*, 332 U.S. 392, 401 (1947) (relief should “pry open to competition a market that has been closed by defendants’ illegal restraints”). Thus, relief in an antitrust case should, “so far as practicable, cure the ill effects of the illegal conduct, and assure the public freedom from its continuance.” *U.S. v. U.S. Gypsum Co.*, 340 U.S. 76, 88 (1950). Likewise, a Commission order endeavours to restore the markets at issue to the condition they would be in “but for the unlawful conduct.” *Ekco Prods. Co.*, 65 F.T.C. 1163, 1216 (1964), *aff’d sub nom. Ekco Prods. Co. v. FTC*, 347 F.2d 745 (7th Cir. 1965). As discussed above, remedying Rambus’s misconduct requires restoring the relevant markets to the condition they would be in had Rambus disclosed its relevant intellectual property while it was at JEDEC, as well as attempting to “cure the ill effects” associated with participation in standard-setting organizations.

The Commission has broad discretion in fashioning relief to restore competition to the affected markets. *See Jacob Siegel Co. v. FTC*, 327 U.S. 608, 611 (1946); *accord Firestone Tire & Rubber Co.*, 81 F.T.C. 398, 467 (1972), *aff’d*, 481 F.2d 246 (6th Cir.), *cert. denied*, 414 U.S. 1112 (1973); *see also FTC v. Cement Inst.*, 333 U.S. 683, 726 (1948). Its remedial authority extends beyond the exact practices, exact products, or exact geographic area involved in the violation. Indeed, the Commission may order relief applicable to all geographic areas in which a respondent does business, even if the violation occurred only in a limited area. *See, e.g., National Dairy Prods. Corp. v. FTC*, 395 F.2d 517, 529 (7th Cir.), *cert. denied*, 393 U.S. 977

(1968). Similarly, Commission orders are not limited to either the products or practices involved in the violation. *See, e.g., FTC v. Colgate-Palmolive Co.*, 380 U.S. 374, 394-95 (1965); *Niresk Indus., Inc. v. FTC*, 278 F.2d 337, 343 (7th Cir.) (FTC may bar practices “related and similar” to those found unlawful), *cert. denied*, 364 U.S. 883 (1960).

The Commission may utilize the “complete array of essentially equitable remedies” in fashioning relief. *Ekco*, 65 F.T.C. at 1213. For example, the Sixth Circuit has affirmed the Commission’s authority to order compulsory licensing of patents on a reasonable royalty basis. *American Cyanamid Co. v. FTC*, 363 F.2d 757, 772 (6th Cir. 1966), *aff’d by Charles Pfizer & Co. v. FTC*, 401 F.2d 574, 577 (6th Cir. 1968), *cert. denied*, 394 U.S. 920 (1969). *See also, e.g., L.G. Balfour Co. v. FTC*, 442 F.2d 1, 23 (7th Cir. 1971) (divestiture); *Amrep Corp. v. FTC*, 768 F.2d 1171, 1180 (10th Cir. 1985), *cert denied*, 475 U.S. 1034 (1986) (prohibition on enforcement of clauses in contracts requiring affirmative disclosures and corrective advertising).

Although the Commission in *Pfizer* ordered compulsory licensing of patents on a reasonable royalty basis, on remand it explicitly asserted: “We have no doubt that, where the circumstances justify such relief, the Commission has the authority to require royalty-free licensing. Indeed, were this to be considered a *de novo* question, we might well agree with the dissenting Commissioner on the desirability of such a provision here, particularly on the basis of the evidence adduced at the hearing on remand.” *In Re American Cyanamid Co.*, 72 F.T.C. 623 (1967), 1967 FTC LEXIS 43, *151-52 (citations omitted), *aff’d, Charles Pfizer & Co. v. FTC*, 401 F.2d 574 (6th Cir. 1968). Moreover, courts recognize that compulsory royalty-free licensing is an appropriate remedy in industries where price competition and narrow profit margins prevail. *E.g., U.S. v. General Electric*, 115 F.Supp 835, 844 (D.N.J. 1953). As the evidence

demonstrates, both factors do indeed prevail in the DRAM industry. *See* CCFF 96-100, 107-111.

In fact, the Commission has recognized that even a remedy barring enforcement of patents is an appropriate form of equitable relief. Specifically, the Commission's consent order in the *Dell* matter barred enforcement of patents as part of the remedy for the precise conduct at issue here – a firm's unfair methods of competition consisting of misleading a standard-setting group into adopting a standard over which the firm held patent rights. *See Dell Computer Corp.*, 121 F.T.C. 616 (1996) (consent order). The Commission noted that the relief ordered was consistent with cases decided under the concept of equitable estoppel. *Id.* at 624-25.⁶¹

Had Rambus disclosed its intellectual property while at JEDEC, the royalties Rambus would have been able to extract today for technology complying with the SDRAM, DDR SDRAM, or DDR 2 SDRAM standards would have been de minimus or zero. *See* CCFF 2033, 2967. Consequently, barring Rambus from enforcing patents whose value derives solely from

⁶¹ Indeed, courts routinely preclude patent holders from future enforcement of patents when they failed properly to disclose the existence of the patents or when the patent holders engaged in misleading conduct suggesting that patent rights would not be enforced. *See, e.g., Scholle Corp., v. Blackhawk Molding Co.*, 133 F.3d 1469, 1471 (Fed. Cir. 1998) (recognizing patent holder's claim for infringement damages may be barred entirely by equitable estoppel); *Stambler v. Diebold, Inc.*, 11 U.S.P.Q.2d 1709, 1988 U.S. Dist. LEXIS 10132, at *20-21 (E.D.N.Y. 1988) (patent holder that engaged in intentionally misleading silence while participating in a standard-setting organization was barred by laches from enforcing for past infringement and by equitable estoppel from future enforcement of patent), *aff'd mem.*, 878 F.2d 1445 (Fed. Cir. 1989).

Similarly, patent misuse, which derives from the equitable doctrine of "unclean hands" and constitutes a defense to an action to enforce patent rights, leads to a remedy barring enforcement of patents. Indeed, the Supreme Court has approved a bar on enforcing a patent against an infringer where the patentee was found to have misused the patent by tying the lease of the patented machine to the purchase of unpatented materials. *Morton Salt Co. v. G.S. Suppiger Co.*, 314 U.S. 488, 494 (1942).

Rambus's anticompetitive conduct while at JEDEC is tantamount to ordering compulsory licensing of such patents on a reasonable royalty basis.

As discussed below, the evidence demonstrates that the scope of the proposed order is necessary to restore the competitive marketplace to what it would have been absent Rambus's misconduct, and that the proposed order is linked directly to such misconduct. It is also necessary to prevent harm to open standard-setting. The proposed order would not invalidate any of Rambus's patents, nor would it interfere with Rambus's ability to derive income from such patents to the extent such income would not constitute the fruit of Rambus's unlawful conduct.

B. Barring Rambus from Enforcing Specified Patents Is Reasonably Related to its Unlawful Conduct and Is an Appropriate Exercise of the Commission's Wide Latitude to Implement Remedies to Restore Competition

The proposed relief directly relates to Rambus's violation of Section 5 and is designed to restore the competitive landscape that would have prevailed but for Rambus's anticompetitive conduct. Had Rambus disclosed to JEDEC the appropriate patent-related information when it was obligated to do so, the DRAM industry today likely would be able to manufacture, sell, and use JEDEC-compliant memory free of Rambus's patents claims. As the evidence demonstrates, had Rambus complied in good faith with its obligations while a member of JEDEC, JEDEC most likely would have adopted standards using alternate technologies that would have been free of Rambus's patents. CCFF 2415, 2433, 2440. Rambus therefore would not have been in a position to exclude DRAM manufacturers from, or demand supracompetitive royalties for, the use of technologies contained in the JEDEC standards.

1. The Remedy Should Apply to All Rambus U.S. Patents Claiming A Priority Date Before June 17, 1996

The remedy should prohibit Rambus from enforcing any U.S. patent claiming a priority date before June 17, 1996 with respect to any technologies incorporated in the JEDEC SDRAM and DDR SDRAM standards, including future versions of those standards. Although the Commission has the authority to order relief that extends beyond the unlawful conduct at issue as outlined above, the relief requested here is directly related to Rambus's misconduct.

First, the remedy must apply not only to those patents that Rambus has thus far sought to enforce, but to all other patents arising from the applications that were pending when Rambus was a member of JEDEC. Every patent Rambus has asserted against SDRAM and DDR SDRAM products resulted from a continuation or divisional application flowing from the original '898 application, and claim the priority date of that application. CCFE 1122. Rambus has thus far sought to enforce against DRAM manufacturers only twelve of its patents claiming priority back to the '898 application. Rambus, however, holds, and could assert, a number of additional patents covering the same four technologies at issue in this case.⁶² CCFE 1631-74. Indeed, Rambus has publically stated that it intends to assert additional patents against DRAM manufacturers.⁶³ CCFE 2023, 2030, 3116, 3187, 3220, 3225. If Rambus's own public

⁶² Because of the assertion of attorney-client privilege, Complaint Counsel is not in a position to evaluate the extent of such patent claims. CCFE 1675.

⁶³ Rambus Press Release (5/4/01) [CX1888] (In addition to the patents at issue in the Infineon, Micron and Hynix litigations, "Rambus holds newly issued U.S. and European patents covering Rambus inventions used by SDRAMs and DDR SDRAMs that have not yet been asserted in any litigation . . ."). Rambus also has a number of pending patent applications covering these technologies and that it intends to assert them. CCFE 3166.

statements are accurate, Rambus is positioned to continue its monopolistic practices through the enforcement of any of a number of different issued patents.

Second, Rambus has patents covering a number of additional technologies that were the subject of JEDEC work while Rambus was a JEDEC member.⁶⁴ CCFF 3113-82. Evidence indicates that Rambus sought to add patent claims covering as many of the technologies used in SDRAMs and DDR SDRAMs as possible. *See, e.g.*, CCFF 856-57, 964, 967, 981, 1000-03, 1040, 1045. Evidence further shows that Rambus (1) observed JEDEC work involving at least five additional technologies while a JEDEC member, (2) believed that it had pending patent applications containing claims covering, or could amend pending patent applications to add claims covering, the technologies at issue, (3) did not disclose to JEDEC relevant patent-related information with respect to the technologies in question, and (4) may be able today to assert patents against DRAM manufacturers and others that use these technologies in SDRAMs, DDR SDRAMs or products that interface with SDRAMs or DDR SDRAMs. *See* CCFF 3113-82. Thus, Rambus may be in a position to monopolize, based on its conduct while a JEDEC member, by means of asserting patents relating to other technologies used in JEDEC-compliant SDRAMs and DDR SDRAMs. An order that is limited to specific technologies risks permitting Rambus to achieve the identical result, through identical conduct, by means of different patents.

Third, the proposed relief should not be limited to DRAMs that comply with JEDEC's existing SDRAM and DDR SDRAM standards, but should incorporate any future generations of

⁶⁴ In addition to the four technologies identified in the complaint, evidence in the record indicates that Rambus may have patents containing claims relating to the following technologies that are or may be used in JEDEC-compliant SDRAMs and DDR SDRAMs: externally supplied reference voltage, low voltage swing signaling, dual bank design, auto-precharge and source synchronous clocking. CCFF 3113-3182.

the JEDEC SDRAM and DDR SDRAM standards, such as the DDR-2 SDRAM standard. The evidence demonstrates in detail that JEDEC does not start from scratch to create independent, free-standing standards each time it standardizes a new generation of memory. Rather, JEDEC's standards are evolutionary, and incorporate as much as possible from previous generations. CCF 127-28, 653, 2569-73. Indeed, in most instances, the new standard *is* the old standard with a very small number of added features.

This is particularly true of the DDR-2 SDRAM standard. JEDEC began work on the DDR-2 SDRAM standard in April 1998, long before JEDEC or its members learned of Rambus's patents. CCF 2569, 3230 (work on DDR-2 began in 1998), 1241, 1950, 1953 (industry was unaware of Rambus' patents until late 1999 or early 2000). JEDEC used the DDR SDRAM standard as the baseline, thus incorporating many of the technologies of the DDR SDRAM standard into the DDR-2 SDRAM standard, including the four technologies at issue. CCF 2573, 3236-27, 3250. Almost two years later, when industry members learned of Rambus's patents, they faced a dilemma: whether to continue to use the technologies at issue in the DDR-2 SDRAM standard and face the possibility that DRAM manufacturers, their customers or ultimately consumers might have to pay the cost of royalties to Rambus, or to switch technologies. Switching would entail: (1) significant lost work on the part of firms preparing to produce, or currently producing to the new standard; (2) delay in the completion of the standard; (3) delay in the completion of products designed to the standard; (4) a less evolutionary change to the new standard than is currently contemplated (and thus additional work and engineering costs to implement the new standard); and (5) the loss of the ability to transition smoothly to the new standard by means of controllers and other products that would

support both the DDR SDRAM and the DDR-2 SDRAM standards, as controllers and DRAM chips that would support both standards would face the same threat they would violate the Rambus patents as do the current products. CCF 2506-84. Faced with this unpleasant choice, industry members chose the latter option, even at the risk of having to pay, or pass on to consumers, the cost of Rambus royalties. CCF 3229-61.

Although industry members saw potential payment of royalties to Rambus as the lesser evil (CCF 2003-12), it is nevertheless an evil resulting from Rambus's conduct. JEDEC would have avoided this whole dilemma with regard to the DDR-2 SDRAM standard had it adopted alternative technologies in the SDRAM and DDR SDRAM standards in response to a timely disclosure by Rambus. Elimination of this anticompetitive effect and restoration of the *status quo ante* requires that the remedy apply to enforcement of Rambus's patents not only with respect to the existing SDRAM and DDR SDRAM standards, but also to future versions of those standards, including the DDR-2 SDRAM standard.

2. The Worldwide Geographic Market for Memory Requires a Remedy that Applies Globally

To remedy the anticompetitive harm and restore competitive conditions in the market, the relief must also reach Rambus's foreign patents. From the very beginning, Rambus planned to pursue patents in strategically selected foreign countries. CCF 1115-20, 3200-08. Rambus filed patent applications in key foreign countries claiming priority back to its initial U.S. application. CCF 1117, 1120. Over time, Rambus actively prosecuted its foreign patent applications, and in particular sought to ensure that amendments to its pending U.S. applications were followed in its European filings as well. CCF 3205. Rambus has obtained foreign patents, especially in Europe, that it asserts cover the technologies at issue in this matter. CCF

1968-74, 2024, 2026-27, 3209-12, 3214-19. By failing to disclose its U.S. patent rights to JEDEC, Rambus denied JEDEC the opportunity to consider alternatives that would have avoided infringement of Rambus's foreign patents.⁶⁵

Because the markets for the technologies at issue are worldwide in nature, Rambus's enforcement of its foreign patents could have a significant effect in the United States. DRAM, and specifically JEDEC-compliant DRAM, is manufactured and shipped world-wide. A substantial volume of the memory sold in the United States is imported from foreign countries, either in its original form or incorporated into intermediate products such as video cards. *See* CCF 3183, 3188-98. Permitting Rambus to enforce its parallel foreign patents would frustrate the effectiveness of the relief because Rambus would be able to monopolize by enforcing its foreign patents with respect to DRAMs or intermediary products destined for U.S. consumers before the products reached the United States. Indeed, extending the remedy to preclude the enforcement of foreign patents is particularly necessary and appropriate here because Rambus has sought to enforce foreign patents that cover some of the same inventions as those involved in this matter. CCF 3187, 3200-01, 3206-09, 3212; Answer at p. 42, ¶ 102; CX1888 at 1 (“ . . . there are a dozen U.S. and European patents involved in other infringement cases pending against Infineon, Hyundai and Micron. Rambus intends to pursue all these cases vigorously, including a trial against Infineon in Germany . . .”). Rambus representatives have publicly stated

⁶⁵ Although JEDEC's rules do not expressly require members to disclose foreign patents, its disclosure policy is based on the assumption that any member with significant foreign patent rights will at least have filed a patent application in the United States to protect those rights. Accordingly, disclosure of U.S. patent rights would effectively disclose rights (if claimed at all) in other countries. Thus, if Rambus had disclosed its U.S. patent rights, JEDEC members would have been made aware of potential foreign rights as well, and, in adopting different technologies that avoided U.S. patents, would also have avoided Rambus's foreign patent claims.

their belief that success in patent infringement litigation in one major jurisdiction is sufficient. (CCFF 2032, 3226 [citing Rambus CFO, Bob Eulau], CX1890 at 35 (“We’ve said that the litigation requires success in a major jurisdiction, but not in every jurisdiction.”)).

Restoring competitive conditions throughout the world is, of course, beyond the jurisdiction of the Commission. 15 U.S.C. § 45(a)(3) (limiting jurisdiction to U.S. commerce, import commerce, and export commerce, inter alia, of persons in the United States). To ensure restoration of competitive conditions in U.S., import and export commerce, however, relief must apply to Rambus’s foreign patents to the extent Rambus seeks to enforce them against products exported from, or intended to be imported into, the United States. Specifically, Rambus should be barred from enforcing any foreign patents claiming priority to the ‘898 patent application or any other U.S. patent application filed before June 17, 1996, against anyone exporting from, or importing into, the United States a product that utilizes technology covered by current or future versions of the JEDEC SDRAM or DDR SDRAM standards.

C. The Remedy Is Necessary to Prevent Harm to the Standard-Setting Process

Extending the remedy to all patents, including foreign patents, claiming priority back to when Rambus participated in JEDEC is also necessary to preserve the procompetitive benefits of the standard-setting process. Participants in this process need to have confidence that their co-participants have no incentive to subvert the process for anticompetitive gain. Allowing Rambus to derive benefits that are possible only because of its misconduct while at JEDEC monopolized, from lock-in, or from the worldwide scope of the technology marketplace – sends a dangerous message. It provides an incentive to similarly inclined companies to subvert the standard-setting

process, because they still stand to benefit. This incentive, in turn, undermines the environment of trust necessary for effective and efficient standard-setting.

D. Less Restrictive Remedies Are Not Sufficient to Cure the Effects of Rambus's Violations

A remedy more limited than the one proposed here will not accomplish the dual objectives of restoring competition and preserving the procompetitive benefits of open standard-setting. *See* CCF 3100-3260. As set forth above, to accomplish these goals, the remedy must extend to all patents arising from Rambus's misconduct while at JEDEC, to prevent Rambus from asserting additional patents on the relevant technologies or monopolizing additional technology markets based on the identical practices challenged in this case. It must incorporate future generations of the SDRAM and DDR SDRAM standard, given that the JEDEC's standards are evolutionary and the industry has already been locked in the use of Rambus technology. Moreover, the remedy must be worldwide, to the extent allowable under the Commission's jurisdiction, given the worldwide scope of the relevant markets. Without each of these components, Rambus will be allowed to derive anticompetitive benefits from its misconduct. Accordingly, the affected markets will remain distorted and participation in open standard-setting will be chilled.

The proposed remedy goes "no further than is reasonably necessary to correct the evil and preserve the rights of competitors and public." *See FTC v. Royal Milling Co.*, 288 U.S. 212, 217 (1933). Like the order in *Dell*, the proposed remedy would not restrain Rambus's enforcement of its patents against any products other than those made in conformity with the JEDEC standards. It therefore does not interfere with Rambus's ability to enforce any of its patents regarding

Rambus architecture memory (*e.g.*, RDRAM) or any other technology. It does not apply to any Rambus patents with a priority date after it withdrew from JEDEC, and thus serves to exclude all Rambus patents that are independent of its conduct at JEDEC. The remedy would leave Rambus completely free to collect royalties for technologies that have been accepted in the marketplace through legitimate competition.

V. CONCLUSION

For the reasons stated above, Complaint Counsel respectfully submits that the enormous body of record evidence compels a finding of liability against Rambus on each count alleged in the Commission's Complaint. To restore market conditions as closely as possible to those that would have prevailed absent Rambus's conduct, to prevent future harm to the markets at issue and related markets, and to prevent harm to the standard-setting process, we respectfully request Your Honor to issue the accompanying order.

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