The Honorable James L. Robart

UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

MICROSOFT CORPORATION, a Washington corporation, Plaintiff, v. MOTOROLA, INC., MOTOROLA MOBILITY LLC, and GENERAL INSTRUMENT CORPORATION, Defendant.	CASE NO. C10-1823-JLR DEFENDANT'S PROPOSED FINDINGS OF FACT AND CONCLUSIONS OF LAW **REDACTED**

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TABLE OF CONTENTS

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PROPOSED FINDINGS OF FACT

I. RAND SHOULD BE DETERMINED USING A HYPOTHETICAL BILATERAL NEGOTIATION

A. Standard Setting Organizations

1. Standard-setting organizations ("SSOs") are voluntary organizations whose participants engage in the development of industry standards, including telecommunication and information technology standards. (*See, e.g.*, 11/16 (Simcoe) Tr. at 15:15-20.)

2. Robust technical standards are critical to the success of products in today's marketplace. Technology standards promote efficiency and innovation by making it easier to create products and services that interoperate with one another. (11/13 (Murphy) Tr. at 143:9-18.) This interoperability and compatibility among technologies and products benefits consumers and has made standards a market necessity. (*See* 11/13 (Murphy) Tr. at 144:7-10; 11/16 (Simcoe) Tr. at 15:15-20.) The increased efficiency created by the implementation of standards generates economic benefits for the industry. (*See* Ex. 2970 at 4-5.) SSOs try to induce the creation of valuable standards and ensure that those standards are widely adopted and successful. (11/19 (Schmalensee) Tr. at 136:25-137:3.)

3. The 802.11 Standard is a wireless communication standard that has been developed over a period of years by the Institute of Electrical and Electronics Engineers ("IEEE"). (*See, e.g.*, 11/15 (Gibson) Tr. at 91:10-12, 92:14-93:11.) The H.264 Standard is a video coding standard that was developed over a period of years by the International Telecommunication Union ("ITU"). (*See, e.g.*, 11/13 (Sullivan) Tr. at 210:24:211:21, 213:7-214:1, 214:11-12.)

B. The RAND Commitment and Letters of Assurance

4. One goal of the IEEE and ITU is to develop standards that incorporate the best technology available, even if those standards include the use of known patents. (11/19 (Schmalensee) Tr. at 137:4-8.)

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5. The rules and procedures of SSOs (including the IEEE and ITU) typically request participants who believe they are contributing patented technology that is essential to a standard being developed to identify any patents covering such technology (or to identify themselves as the holders of such standard essential patents ("SEPs")) and provide an assurance that the participant is willing to grant a license to any such patent on reasonable and non-discriminatory ("RAND") terms to all applicants. This is known as the "RAND" commitment. (11/19 (Schmalensee) Tr. at 136:22-137:12.)

6. The RAND commitment and SSO rules and procedures balance the rights of patent owners with the needs of the implementers of a given standard. (11/13 (Murphy) Tr. at 167:15-169:1.)

7. To induce the creation of valuable standards, the RAND commitment guarantees that holders of valuable intellectual property who contribute technology to standards will receive reasonable returns or reasonable royalties on that property, in exchange for which the patent holders give up the right to refuse to license, or to license exclusively. (11/19 (Schmalensee) Tr. at 137:4-8.) The RAND commitment thus guarantees prospective implementers that they will be able to obtain the rights to use intellectual property necessary to practice the standard on reasonable terms. (11/19 (Schmalensee) Tr. at 137:9-12.)

8. Microsoft acknowledged the balance achieved by the RAND commitment in a June 14, 2011 letter to the Federal Trade Commission:

> Through balanced IPR policies that help make innovative technology available to implementers on reasonable terms, and that do not undercut the value of patented technology or overly burden patent holders, standards can help to catalyze innovation by encouraging companies to contribute their innovative technology to collaborative standards setting activities and to share their intellectual property with others via the standardization process. Standards will not fulfill their salutary purposes if standards policies deter innovators from contributing patented technologies or investing in further innovation related to standardized technology. (Ex. 2970 at 4-5.)

9. While RAND commitments are designed to ensure that a SEP holder will not engage in "hold up" (11/13 (Murphy) Tr. at 139:17-22, 144:9-24; 11/19 (Schmalensee) Tr. at

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142:13-16.), the RAND commitment does not prevent a patent holder from seeking full and fair value for its patented technology. (*See, e.g.*, 11/16 (Lynde) Tr. at 150:2-4.)

10. As Microsoft's Gary Sullivan, who was also the chairman of the Joint Video Team, the organization that finalized the H.264 video standard (11/13 (Sullivan) Tr. at 208:24-209:16), explained:

> [M]y understanding is that [RAND] is only intended as a way to prevent capricious discriminatory abuse, not to stop a patent holder from getting an amount that fairly compensates for the value of their IPR. . . . It is certainly acceptable for you to charge more for your fundamentally-important IPR than what some other Bozo charges for their minor patented tweak, and I believe you are the one in control of deciding whether your IPR is in the 'fundamentally-important' category or in the 'Bozo tweak' category.

(Ex. 2345 at MS-MOTO_1823_00002433307-08.) Sullivan added, "I don't really understand how a different impression can persist." (Ex. 2345 at MS-MOTO_1823_00002433307.)

11. SSO patent policies should not undercut the value of patented technologies (the value contributed by the patent) that contribute to the standard. (11/13 (Murphy) Tr. at 168:6-12.)

12. The IEEE refers to the assurance that a SEP holder is willing to grant RAND licenses as a "Letter of Assurance," while the ITU refers to such an assurance as a "Patent Statement and Licensing Declaration." (*See, e.g.*, Exs. 2838, 2839.) Collectively, these are often referred to as "LOAs."

13. The current IEEE form LOA provides an option for submitters to indicate a "not to exceed" royalty rate, and one of the options is "percent of product price." (Ex. 3394 at 2; 11/16 (Lynde) Tr. at 174:22-175:11.) The trial record does not indicate that any party has submitted an LOA containing a specific royalty term to the IEEE for any of the 802.11 Standards.

14. Section 6.2 of the IEEE's Policies and Procedures Section addresses patent issues. This section states that "a [Proposed] IEEE Standard may require the use of a potential Essential

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Patent Claim[,]" and in such cases "the IEEE shall request licensing assurance . . . from the patent holder or patent applicant[,]" but "[n]o license is implied by the submission of a Letter of Assurance." (Ex. 1568 at 16-17.) The IEEE bylaws further state: "The IEEE is not responsible . . . for determining whether any licensing terms or conditions provided in connection with submission of a Letter of Assurance, if any, or in any licensing agreements are reasonable or non-discriminatory." (Ex. 1568 at 17.)

15. Motorola, Inc. and Symbol Technologies have submitted LOAs to the IEEE for certain patents that they assert are essential to the 802.11 Standard. (Exs. 1407, 2839.) Motorola[1] is not aware of any instance in which the IEEE has indicated that it believes that Motorola has not complied with its RAND commitments. (11/20 (Dailey) Tr. at 33:2-5.)

16. Microsoft has submitted LOAs to the IEEE for certain patents that it asserts are essential to the 802.11 Standard. (*See, e.g.*, Ex. 3421.)

17. The ITU has published its "Guidelines for Implementation of the Common Patent Policy for ITU-T/ITU-R/ISO/IEC/." (Ex. 1575.) This policy states that a standard's "objective is to ensure compatibility of technologies and systems on a worldwide basis" (*id*. at 9); and although the standard "must be accessible to everybody without undue constraints[,]" "[t]he detailed arrangements arising from patents (licensing, royalties, etc.) are left to the parties concerned, as these arrangements might differ from case to case," (*id*.). Also, the ITU Policy and its licensing declaration form further state that "negotiations are left to the parties concerned and are performed outside the [ITU]." (*Id.*)

18. Motorola, Inc., MMI and GI have submitted LOAs to the ITU for the patents that they assert are essential to the H.264 standard. (Ex. 2838.)

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[1] Unless otherwise noted, for purposes of these Proposed Findings of Fact, Motorola Mobility, Inc., Motorola Mobility LLC, Motorola Solutions, Inc., and General Instrument Corporation are referred to collectively as "Motorola." All emphasis is added unless otherwise indicated.

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19. Motorola's LOAs include an option that conditions Motorola's willingness to license on "reciprocity." (Ex. 2838 at MOTM_WASH1823_0000036, 039, 046, 053, 057, 061.) The LOAs further state that "[a]s used herein, the word 'reciprocity' means that the Patent Holder shall only be required to license any prospective licensee if such prospective licensee will commit to license its essential patents(s) or essential patent claims for implementation of the same above document free of charge or under reasonable terms and conditions." (*See, e.g.*, Ex. 2838 at MOTM_WASH1823_0000036; *see also id*. at MOTM_WASH1823_0000040, 046, 053, 057, 061.)

20. Motorola selected the reciprocity option on all of its LOAs. (Ex. 2838 at MOTM_WASH1823_0000036, 039, 046, 053, 057, 061.)

C. RAND Licenses and How They Are Determined In the Real World

21. The IEEE and ITU focus on technical issues, and do not engage or participate in negotiations about RAND licensing terms and conditions. (*See, e.g.*, Ex. 2838 at MOTM_WASH1823_0000036.)

22. The IEEE and ITU have declined to provide a definition of what constitutes RAND terms and conditions and do not attempt to determine what constitutes a reasonable royalty rate or what other terms and conditions are reasonable or nondiscriminatory for any license between interested parties. (11/16 (Simcoe) Tr. at 47:12-16; 49:9-14, 62:19-22, 73:22-25; Ex. 3010 at 8.)

23. The IEEE and ITU contemplate many ways of determining RAND terms and conditions and leave that determination to the parties. (11/16 (Simcoe) Tr. at 63.)

24. According to Horacio Gutierrez, Microsoft's Vice President and Deputy General Counsel, "there's a range of interpretations of what [RAND] is . . . . [T]he concepts are relatively well understood and talked about, but the actual practical application has a lot of variability." (4/4 Gutierrez Depo. Tr. at 49:2-8.) There are a number of factors that relate to the definition of RAND: it is technology specific, market specific, and "very dependent on the nature

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of the standard and how it's described in the implementation." (4/4 Gutierrez Depo. Tr. at 51:13-18.) A RAND commitment leaves patent holders with considerable flexibility to pursue licensing strategies, even if, according to Microsoft's expert Dr. Simcoe, those strategies are "aggressive." (Ex. 3118 at 6; 11/16 (Simcoe) Tr. at 62:19-63:2.)

25. Maximizing profits is not contrary to RAND. (11/16 (Lynde) Tr. at 150:2-4.)

26. Dr. Simcoe, Microsoft's expert on SSOs, stated that any price that avoids royalty stacking and hold-up can be consistent with RAND. (11/16 (Simcoe) Tr. at 63:3-5.)

27. Securing the transaction costs incurred in licensing negotiations in a bilaterally negotiated license agreement is consistent with RAND. (11/16 (Lynde) Tr. at 148:21-149:1.)

28. The ITU's and IEEE's patent policies do not require or contemplate that RAND licenses will have a specific royalty rate or single common royalty rate for all potential licensees and do not require or preclude any particular structure for a RAND royalty. (*See* 11/16 (Lynde) Tr. at 166:20-25; 11/19 (Schmalensee) Tr. at 137:13-19, 171:7-19; 11/16 (Simcoe) Tr. at 63:6-9.) Instead, there is a range of rates that are compliant with a RAND obligation. (11/16 (Lynde) Tr. at 166:20-25; 11/19 (Schmalensee) Tr. at 137:13-23, 171:12-16.)

29. The RAND obligation is of the nature of an upper bound: while rates lower than the maximum rate in the RAND range are "reasonable", the patent holder may license at the highest possible rate in the RAND range that would both yield maximum profit and be consistent with its RAND commitment. (11/19 (Schmalensee) Tr. at 137:13-138:3.)

30. SSOs recognize that "terms and conditions" of a RAND license agreement encompass more than just a royalty rate. (*See* 11/16 (Simcoe) Tr. at 65:15-23; 4/4 Gutierrez Depo. Tr. at 35:16-36:12.) RAND license agreements include a range of non-monetary material terms, such as assignability; term or duration of the license; the scope of the field of use; the extent to which patents resulting from pending patent applications are included in the license; the geographic scope of the license; the release(s) granted to each party; any exclusions from either the licensed patent portfolios or the field of use; and whether a defensive suspension or

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termination clause will be included to protect a licensor who has been sued. (3/28 Heiner Depo. Tr. at 30:5-11.)

31. These additional non-royalty terms and conditions may influence the royalty rate contained in a particular agreement. (*See also* 11/20 (Donohoe) Tr. at 136:15-17 (rate influenced by cross-license); 11/14 (Ochs) Tr. at 76:9-20 (rate influenced by cross-license).)

32. Typically, the patent holder and the potential licensee determine RAND terms through good-faith, bilateral negotiations, which take place outside of the activities of ITU and IEEE. (*See, e.g.*, Ex. 2838 at MOTM_WASH1823_0000036, 039, 046, 053; Ex. 2970 at 14; 11/16 (Lynde) Tr. at 137:3-138:18; *see also* 11/13 (Murphy) Tr. at 181:12-15; 3/28 Heiner Depo. Tr. at 33:6-8; 39:10-13; Ex. 3194; 11/19 (Schmalensee) Tr. at 142:17-21, 149:18-22; 11/20 (Dailey) Tr. at 45:23-46:3.) Microsoft's experts agree that RAND licenses can be determined between parties through private *ex post* bilateral negotiations. (11/16 (Simcoe) Tr. at 65:15-66:2; 11/13 (Murphy) Tr. at 181:12-15; 11/16 (Lynde) Tr. at 138:7-18.)

33. RAND licenses are typically negotiated amongst sophisticated parties. (11/19 (Schmalensee) Tr. at 1143:2-4.) RAND licenses are typically complex agreements that usually require both extensive negotiations to account for the unique circumstances of each licensing situation, as well as the exchange of sensitive and proprietary business information. (*See, e.g.*, 11/20 (Donohoe) Tr. at 135:8-20.) For example, parties often exchange (1) confidential technical information that supports a non-infringement argument or that supports an argument that the royalty should be reduced for a particular product, (2) confidential financial information, such as past and future projected sales of products to be covered by the license and geographic location of sales; and (3) confidential information about the importance and relevance of the patented technology to products and services of the licensee. (*See, e.g.*, 11/20 (Donohoe) Tr. at 135:8-20.)

34. During RAND negotiations, parties will also learn information related to what an appropriate royalty base would be, what their counterparty's cost structures are, and what

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standard licensing terms the other parties might typically adhere to – all information that is useful to enabling the parties to understand ultimately what the structure would be for a reasonable royalty in a given case. (4/4 Gutierrez Depo. Tr. at 119:25-120:19.)

35. Microsoft believes that the negotiation associated with a standards-related patent license typically is no different from any general patent licensing discussion and will involve tradeoffs on all of the terms and conditions. (3/28 Heiner Depo. Tr. at 29:6-11.)

36. It is industry practice to cross-license standard-essential patents on a portfolio basis, taking into account respective market positions, industry conditions and other commercial considerations. (11/13 (Murphy) Tr. at 176; 11/20 (Donohoe) Tr. at 136:15-137:4; 11/20 (Dailey) Tr. at 34:18-24.) As Kirk Dailey, formerly corporate vice president of intellectual property at Motorola Mobility and current Head of Patent Transactions at Google, explained, it is standard practice for Motorola to obtain a cross-license, because Motorola's "first goal is to protect our product business to make sure we can build the products that we want to build. So, if we grant the license, we want to make sure that we're not blocked from building those very same products that we're licensing our competitors, or others in the industry, to build." (11/20 (Dailey) Tr. at 46:12-18.)

37. During license negotiations, the parties typically discuss and evaluate the scope, use, and number of patents in each party's patent portfolio. (11/20 (Donohoe) Tr. at 134:3-136:5.) The parties also typically consider economic analyses of the extent of past and anticipated future usage of each party's patents. (11/20 (Donohoe) Tr. at 136:6-137:4.) For example, during such negotiations, patent-holders may agree to "caps" or "carve-outs," which limit the licensee's royalty exposure by capping royalty payments or removing the cost of certain components from the selling price of a covered product when those components (like a camera in a cell phone) are not related to the technology. (*See, e.g.*, 11/20 (Dailey) Tr. at 119:14-18; 44:12-14.)

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38. Royalty rates in patent licenses are commonly stated as a percentage of sales (such as gross or net sales revenue) for a number of reasons, including ease of accounting, efficiency, and because the royalty will adjust as the price adjusts (thus, as a product decreases in price, so will the royalty). (11/19 (Schmalensee) Tr. at 152:10-156:3; 11/20 (Dailey) Tr. at 37:20-38:9; *see also id.* at 36:23-37:5; *see also* 11/16 (Lynde) Tr. at 169:14-21.)) Motorola has entered into numerous licenses as both licensee and licensor that use net selling price as a royalty base. (*See*, *e.g.*, 11/20/15 (Dailey) Tr. at 36:12-38:16.)

D. Microsoft's Public Statements Regarding RAND Confirm This Real-World Practice

39. On June 14, 2011, seven months after Microsoft filed its complaint in this case, David Heiner, Microsoft's Vice President and Deputy General Counsel, and Amy Marasco, Microsoft's General Manager, Standards Strategy and Policy, submitted a letter to the Federal Trade Commission on behalf of Microsoft in response to the FTC's May 13, 2011 Request for Comments and Announcement of Workshop on Standards-Setting Issues regarding "patent holdup" in connection with standardization efforts, which was part of the FTC's Patent Standards Workshop, Project No. P11-1204. In its letter (Ex. 2970), Microsoft stated:

a. "Concerns about 'patent hold-up' should not extend to any bi-lateral business disagreement between two companies regarding proposed licensing terms. These discussions typically pertain to a broader set of questions than just the proposed licensing terms for essential patent claims reading on a standard. In addition, if the Government were to attempt to quasi-regulate RAND licensing terms, then they arguably should review the inter-play among all of the substantive terms (and not just the monetary component) for all aspects of patent licensing terms. Yet that would likely be unworkable." (Ex. 2970 at 2-3.)

b. "RAND-based IPR policies provide a flexible framework to help enable customized bi-lateral negotiations for patent licenses that generally are not limited to just the essential patent claims in connection with a standard." (Ex. 2970 at 3.)

c. "The notion that "patent hold-up" is a substantial problem that should be addressed by government action seems to stem from a largely theoretical analysis of the situation. If a patent holder can charge implementers more than a reasonable royalty because those implementers are (perhaps) 'locked into' the standard, then is it not likely that it would take advantage of this opportunity? We believe that this reasoning greatly over-simplifies - and obscures - the realities of standards-related patent licensing. How any individual company will approach

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patent licensing will depend on many factors, such as: [(1)] What is the company's primary business model implicated by the relevant standard? [(2)] Is it likely that the company will proactively seek patent licenses (either as a licensor, a licensee or both)? [(3)] Who are the likely companies holding essential patent claims, and what are their business models, products and patent portfolios? [(4)] What licensing or other agreements are already in place between the parties? [(5)] If the parties decide to enter into an agreement, then what are al1 of the issues (including all of the IPR-related issues) that likely will be negotiated? [(6)] Are there trade-offs that may be made with regard to royalty payments or other financial terms? For example, there are companies who sometimes are willing to offer their essential patent claims to a particular standard free of charge, but they also include a defensive suspension clause that causes the free license in connection with these patent claims to terminate if the licensee commences litigation against the licensor on any grounds whatsoever. As a result, we respectfully suggest that a simplified and theoretical approach to defining 'patent hold-up' may not sufficiently map to complex marketplace realities. It may pull in what are essentially routine business negotiations between two parties. These negotiations almost always include considerations beyond the proposed licensing terms for just the essential claims in a standard (and just the royalty element of any such terms). Many companies question whether these types of business negotiations should be labeled as 'patent hold-up' and scrutinized by regulators. We believe that there is an important difference between intentional or deceptive conduct in connection with patents that read on standards and routine bilateral disagreements over licensing terms for the use of patented technology." (Ex. 2970 at 6-7.)

d. "Depending on their applicable business model, many companies largely use their patents vis-a-vis standards defensively. Far from seeking to 'hold up' implementers, these firms will not seek patent royalties at all in the ordinary course of business. Rather, they will seek a patent license from an implementer only when that implementer has first challenged them on other patent infringement issues." (Ex. 2970 at 7.)

e. "In addition, it is important to consider the healthy competition among different business models and how that influences debates regarding 'patent hold-up' and whether there is a need to impose further restrictions on patent holders. Some companies are largely innovators who predictably will seek a return on their investments in innovation through licensing their patents. Some product-based companies take a more nuanced position, often using their patents vis-a-vis standards defensively (as described above). Still others have a significant consulting or integration services focus, and they may benefit from having access to others' innovative technology in standards at a reduced cost if not for free. The current RAND-based structure balances these different interests. Proponents seeking to tilt that balance may largely be seeking reduced licensing costs and a related competitive advantage as opposed to solving a documented and widespread problem." (Ex. 2970 at 7-8.)

f. "RAND is a time-tested and effective approach to licensing commitments. Like other 'reasonableness' standards, it does not dictate specific licensing terms, but it does provide flexibility across a diverse range of situations. As mentioned above, companies make decisions about whether to initiate licensing discussions and, if so, what considerations beyond just the essential claims vis-a-vis the final

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standard will be included. The negotiation associated with a standards-related patent license typically is no different from any general patent licensing discussion and will involve trade-offs on all of the terms and conditions." (Ex. 2970 at 12.)

g. "There is little evidence that 'patent hold-up' in the standards context is a real problem. Most patent holders also are implementers, whether with regard to the same standard or in terms of the broader ICT standards landscape, and thus share an interest in maintaining reasonable royalty rates. This ecosystem generates few IPR-related disputes as a result." (Ex. 2970 at 16.)

E. Using A Hypothetical Bilateral Negotiation To Determine RAND

40. RAND terms and conditions can be determined by simulating a hypothetical bilateral negotiation under the RAND obligation. (11/19 (Schmalensee) Tr. at 149:14-17.)

41. A hypothetical bilateral negotiation simulates the process of what actually happens in practice. (11/19 (Schmalensee) Tr. at 149:18-150:3.) Because bilateral negotiations occur in practice, there exists evidence of the results of such real-world negotiations that can be used in simulating the hypothetical negotiation. (*Id.*)

42. Courts have experience in doing hypothetical bilateral negotiations under the *Georgia-Pacific* framework. (11/19 (Schmalensee) Tr. at 149:18-150:3; Ex. 293 at 675, 679, 680-82.)

43. As Anne Layne-Farrar, A. Jorge Padilla, and Richard Schmalensee wrote in 2007 in an article the *Antitrust Law Journal* entitled "Pricing Patents for Licensing in Standard Setting Organizations: Making Sense of FRAND Commitments," "[o]ne option" for courts seeking to "evaluate what behavior is and what is not compliant with SSO members' FRAND commitments" is "extending *Georgia-Pacific*, which is the primary case guiding reasonable royalty determination in patent infringement cases in the United States." (Ex. 293 at 673.) The "majority of [the *Georgia-Pacific*] factors are directly applicable to FRAND evaluations in a standard-setting context," they add. (Ex. 293 at 681.) In using a hypothetical bilateral negotiation, courts should modify the *Georgia-Pacific* framework to take the RAND obligation into account. (11/19 (Schmalensee) Tr. at 150:4-10.)

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44. The most relevant evidence to determining RAND royalty rates using a hypothetical bilateral negotiation is evidence as to the rates negotiated bilaterally under the RAND commitment by the same licensor for the same patents. (11/19 (Schmalensee) Tr. at 150:11-17.)

45. Dr. Simcoe, Microsoft's economist and standards expert, stated that a hypothetical bilateral negotiation could be used to arrive at RAND terms. As Dr. Simcoe testified, "any methodology that's consistent with these principles [no hold up and no stacking] would be fine." (11/16 (Simcoe) Tr. at 51:21-52:2.)

46. Dr. Simcoe explained in comments he made to the Federal Trade Commission regarding standard-setting organizations that under "[o]ne approach to the 'reasonable' prong of the RAND commitment," "courts would presumably set reasonable royalty damages based on a hypothetical negotiation between a willing licensor and willing licensee." (Ex. 3010 at 9.) "[M]y opinion," Dr. Simcoe testified, "is that as long as whatever modifications to make *Georgia Pacific* consistent with the notion of no hold-up and no royalty stacking are applied, then that modified approach could be fine." (11/16 (Simcoe) Tr. at 43:20-23.)

47. Microsoft's "multilateral *ex ante*" approach does not mirror what happens in the real world, and is not workable in practice. (11/19 (Schmalensee) Tr. at 141-42.) As Motorola's expert, Dr. Richard Schmalensee, has written, "the desirable properties of formal, transparent *ex ante* competition are unlikely to be realizable in practice." (Ex. 294 at 542.)

48. Microsoft's economists do not conduct a multilateral *ex ante* analysis in this case. Nor does Microsoft use an *ex ante* auction model. (11/19 (Schmalensee) Tr. at 168:13-16.) Rather, they rely on patent pools. (11/19 (Schmalensee) Tr. at 143:11-17.)

49. Neither the IEEE nor the ITU require *ex ante* disclosure of RAND terms during the standard-setting process. In fact, explicit multilateral *ex ante* negotiations cannot be conducted under the auspices of many SSOs, including the IEEE. (11/16 (Simcoe) Tr. at 67:11-68:1.)

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50. It is a possibility that SSOs remain generally fearful of the antitrust implications of moving to an *ex ante* policy. (11/16 (Simcoe) Tr. at 68:2-10.) As Dr. Simcoe, Microsoft's standards expert, wrote, "most SSOs prohibit any prospective discussion of licensing terms – generally citing fears of antitrust litigation." (Ex. 3118 at 6.) Dr. Simcoe believes that antitrust concerns have caused SSOs to be scared of engaging in *ex ante* multilateral negotiations. (11/16 (Simcoe) Tr. at 68:2-10.) Dr. Simcoe testified that, among the SSOs, "there are these conversations where they bring up antitrust concerns as a reason to avoid getting into explicit definition of RAND." (11/16 (Simcoe) Tr. at 62:16-18.)

51. Neither the IEEE nor the ITU specifies that RAND terms must be determined using an incremental value approach. (11/16 (Simcoe) Tr. at 63:10-12.) In practice, approaches linking the value of a patent to its "incremental" contribution to a standard may be hard to implement. (Ex. 293 at 676.) Calculating incremental value for multi-patent standards "gets very complicated, because when you take one patent out of a standard and put another one in you may make other changes, the performance of the standard is multidimensional, different people value different aspects." (11/19 (Schmalensee) Tr. at 168:3-9.)

F. The Entire Market Value Rule Is Not a Requirement of RAND Licensing

52. "A royalty rate can be RAND even if not calculated pursuant to the Entire Market Value Rule." (11/16 (Lynde) Tr. at 169:6-8, 173:21-174:5.)

53. It can be expensive to audit license agreements for compliance. (11/16 (Lynde) Tr. at 169:9-13.) To reduce costs, SEP licensing parties often choose a royalty base that relatively inexpensive to measure. (*Id*. at 169:14-18.) "Negotiating parties often use end product as the royalty base." (11/20 (Dailey) Tr. at 37:20-3.) Kirk Dailey testified that "[h]istorically in my space we've charged on end-unit pricing, and it's a matter of convenience. And for us, analysts track the average selling price, and they also track the number of units, they estimate the number of units companies are selling at the price which they're selling. So it's an easy way for me, as a licensing person, to check on royalty payments, whether or not they're close or in range

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within what we're expecting. And it's just been common practice. It's what we pay others on many of our licenses." (11/20 (Dailey) Tr. at 37:2:5-38:9).

54. Motorola has negotiated dozens of licenses that have RAND royalties based on end product price. (11/19 (Schmalensee) Tr. at 152:1-13.)

55. Microsoft expert Dr. Lynde agrees with the Federal Circuit in *Lucent v. Gateway* that "sophisticated parties routinely enter into license agreements that base of the value of the patented inventions as a percentage of the commercial product's sales price," though Dr. Lynde testified that he does not have any empirical base to know how "routine" that behavior is. (11/16 (Lynde) Tr. at 173:8-20.)

II. THE OPINIONS OF MICROSOFT'S ECONOMICS EXPERTS

A. Extent of Experience and Basis for Opinion

1. Kevin Murphy

56. Dr. Murphy has not negotiated patent licenses and is not an expert in patent licensing or patent licensing negotiations. (11/13 (Murphy) Tr. at 163:11-23.) He has not had any dealings with the IEEE or the ITU, and has never been an employee of or consultant to either the IEEE or the ITU. (11/13 (Murphy) Tr. at 164:2-10.) Dr. Murphy has never been qualified as an expert in SSOs or how they operate, and, prior to this case, had never testified about RAND issues or published any articles about RAND. (11/13 (Murphy) Tr. at 164:11-165:7.)

2. Timothy Simcoe

57. Dr. Simcoe's opinion is based on his academic research, not on any participation with SSOs or licensing negotiations. (11/16 (Simcoe) Tr. at 44:22-45:5.) Dr. Simcoe has never been an employee of or consultant to an SSO. (11/16 (Simcoe) Tr. at 42:16-23.) He has never negotiated a RAND license, and has never participated in the negotiation of a RAND license. (11/16 (Simcoe) Tr. at 42:24-43:7.) He has never testified in a patent infringement case about what a reasonable royalty might be, or about how to apply the methodology of *Georgia-Pacific* in patent litigation. (11/16 (Simcoe) Tr. at 43:8-16.)

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3. Matthew Lynde

58. Dr. Lynde is not an expert in SSOs. (11/16 (Lynde) Tr. at 131:20-22.) He has no direct experience with SSOs, and, other than in this litigation, has never testified on the subject of SSOs, or written on the subject of SSOs. (*Id*. at 131:23-132:9.) Dr. Lynde has never advised a client on the subject of patent pools, and has never written any economic literature or been invited to give a talk on the subject. (11/16 (Lynde) Tr. at 132:10-18.) Dr. Lynde has never negotiated a RAND license, or any type of license. (11/16 (Lynde) Tr. at 132:22-133:3.) Dr. Lynde has provided consulting services in connection with only six or seven licenses, none of which involved standard essential patents. (11/16 (Lynde) Tr. at 133:5-11.)

59. In formulating his opinions, Dr. Lynde never discussed with Microsoft whether its experiences with RAND licensing are consistent with those opinions regarding RAND licensing. (11/16 (Lynde) Tr. at 133:12-134:11.)

B. Microsoft's Experts' Opinions Are Contradictory

1. Dr. Timothy Simcoe

60. Dr. Simcoe testified that he does not know what the legal definition of RAND is. (11/16 (Simcoe) Tr. at 52:11-13.) Dr. Simcoe testified that his understanding is that neither the ITU nor the IEEE provide an explicit definition of RAND in their patent policies. (11/16 (Simcoe) Tr. at 47:12-16.) He believes that the IEEE "leaves parts of RAND less defined than one might need." (11/16 (Simcoe) Tr. at 49:9-14.)

61. Dr. Simcoe does not have, and has not offered, an opinion "on the definition of RAND in the intellectual property policy" of either the IEEE or the ITU. (11/16 (Simcoe) Tr. at 48:4-10.)

62. Dr. Simcoe wrote that "no one knows what the '(F)R' in (F)RAND really means. I do not think that adding FR to FRAND helps to solve the hold-up problem at all!" (Ex. 3125 at 3; 11/16 (Simcoe) Tr. at 53:22-55:8.) Dr. Simcoe testified that this comment "was meant to be

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provocative," (11/16 (Simcoe) Tr. at 53:17), but conceded that he meant what he wrote, (11/16 (Simcoe) Tr. at 54:14-55:8).

63. Dr. Simcoe similarly stated in 2009, before he had been hired by Microsoft for this litigation, that he "would argue that the FR part of FRAND is no different from the lack of a commitment." (Ex. 3125 at 2; 11/16 (Simcoe) Tr. at 55:13-56:1.)

64. In a 2007 paper entitled *Competing on Standards? Entrepreneurship, Intellectual Property and the Platform Paradox*, (Ex. 3118), Dr. Simcoe wrote:

a. "In practice, the meaning of RAND and its European equivalent FRAND ('Fair' reasonable and non-discriminatory) is unclear." (Ex. 3118 at 6; 11/16 (Simcoe) Tr. at 56:13-20.)

b. "[A] standard RAND commitment seems to leave SSO participants with considerable flexibility to pursue an aggressive licensing strategy." (Ex. 3118 at 6.)

c. "RAND licensing commitments are not a workable solution to SSOs' intellectual property problems. The problem with RAND is that it is very difficult to define (let alone measure or adjudicate) 'reasonable' prices." (Ex. 3114 at 1; 11/16 (Simcoe) Tr. at 57:5-58:13.)

d. "Ironically, the problem with RAND is that it is not a standard. The concept of 'reasonable' pricing has no clear meaning: Is RAND a commitment not to seek an injunction against the use of a technology? Is it a commitment to accept a certain percentage of the final good's price, or a commitment that all patents incorporated in the product will split a certain percentage? How should a RAND price be set? In some cases, it seems that IP holders make RAND pricing commitments with the belief that the commitment is so vague and ill-defined that it is in fact vacuous." (Ex. 3114 at 4; 11/16/12 (Simcoe) Tr. at 59:18-60:15.)

65. In comments to the Federal Trade Commission, in a submission he entitled "Can standard setting organizations address patent hold-up? Comments for the Federal Trade Commission," (Ex. 3010) Dr. Simcoe wrote:

a. "But aside from unilateral commitments, it is not clear that a RAND promise places any restrictions on prospective prices or licensing terms, aside from a ban on exclusivity." (Ex. 3010 at 8; 11/16 (Simcoe) Tr. at 60:25-61:15.)

b. "Whether because of antitrust fears, or concerns that they will upset certain members, SSOs typically shy away from providing an explicit definition of RAND, leaving the matter to individual firms, and ultimately courts. As a consequence, firms often treat this commitment as merely a promise to enter licensing negotiations." (Ex. 3010 at 8; 11/16 (Simcoe) Tr. at 61:16-22.)

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66. Dr. Simcoe stated in 2005 that SSOs presume that granted licenses are reasonable:

> "The most popular [SSO licensing rule] by far is the RAND . . . licensing requirement. In practice, this requirement is fairly vague. While it is clear that a RAND rule implies that IPR holders cannot refuse to grant a license, it leaves them with fairly wide latitude to set prices that can even vary by licensee. Moreover, most SSOs do not actually make any determination about the 'reasonableness' of a license, but rather presume that this criteria has been met as long as a license has been granted." (Ex. 3116 at 30; 11/16 (Simcoe) Tr. at 74:16-75:4.)

2. Dr. Matthew Lynde

67. Prior to this litigation, Dr. Lynde had testified on patent pools and SEPs only once before, when he was working on behalf of Fujitsu. (11/16 (Lynde) Tr. at 175:13-16.) In that lawsuit, Dr. Lynde testified that, for an SEP for the 802.11 Standard, Fujitsu was entitled to a rate higher than the rate set by the Via Licensing 802.11 pool he is relying on in this case. (11/16 (Lynde) Tr. at 175:17-176:10.) When asked, Dr. Lynde could not recall whether he had told the jury that the value of the Fujitsu patent was 100% greater than the Via Licensing pool rate, or 500% greater than the Via Licensing pool rate. (11/16 (Lynde) Tr. at 176:11-17.)

III. THE HYPOTHETICAL BILATERAL NEGOTIATION: MOTOROLA'S LICENSING PROGRAM

A. Overview

68. MSI, MML and GI commit a significant portion of their annual revenues to engineering, research and development efforts aimed at developing various telecommunication technologies for commercialization and improving current products, spending approximately $50 billion on research and development in the past 20 years. (11/20/12 (Dailey) Tr. at 30:6-20.) Motorola made significant technical contributions to both the IEEE 802.11 and ITU H.264 standards. (*See, e.g.*, 11/20 (Dailey) Tr. at 30:25-31:6.)

69. Motorola has an extensive licensing program. (*See, e.g.*, 11/20 (Dailey) Tr. at 45:23-25; Ex. 1173.) Over the last twenty years, Motorola has entered into at least 58 SEP cross licenses that have resulted from good-faith negotiations. (*See* Ex. 1173; 11/20 (Dailey) Tr. at 119:4-10.)

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70. When Motorola is negotiating a license, Motorola's licensing team typically includes (1) a lead negotiator; (2) support from the legal department; (3) team members responsible for financial reporting and forecasting; and (4) and engineers who provide technical support. (11/20 (Dailey) Tr. at 45: 8-13.) It is necessary to have a team structured in this manner because licensing negotiations are complex arrangements, during which it is necessary to consider the patents, the companies' financial and business projections, and legal terms. (11/20 (Dailey) Tr. at 45:14-22.)

71. Initial licensing negotiations can take up to two years to complete. (*Id.* at 44:23-45:2.) Renewals take less time than new license agreements to conclude, and typically take six to twelve months. (*Id.* at 45:3-7.)

72. During negotiations, Motorola and its licensing partners learn important information about each others' products and portfolios, and may discuss and agree to "caps" or "carve-outs," which limit the licensee's royalty exposure by capping royalty payments or removing the cost of certain components from the selling price of a covered product when those components (like a camera in a cell phone) are not related to the technology. (*See, e.g.*, 11/20 (Dailey) Tr. at 119:14-18; 44:12-14.)

73. [redacted]

74. [redacted]

75. [redacted]

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B. Form of Motorola's Agreements

76. Since the mid-1990s, Motorola has had an established, standard practice of offering its core portfolios of SEPs (including 802.11 and H.264) for license at rates around 2.25% of net selling price of end products. (11/20 (Dailey) Tr. at 36:16-37:19, 52:13-19; 3/20 Taylor Depo. Tr. 56:25-57:21.)

77. Prior to that, Motorola licensed at fixed dollar amount that did not adjust as prices changed, but in the 1990s converted to a percent of end price at the request of its licensees because dropping cell phones prices had resulted in an increased royalty burden. (11/20 (Dailey) Tr. at 36:23-37:5.)

78. Consistent with its current policy and practice, Motorola typically opens negotiations by offering rates at or near 2.25%. (*Id.* at 36:16-20 (2.25% is standard opening offer); 11/20 (Donohoe) Tr. at 150:2-9.) Motorola receives around 2.25% of value for its portfolios of core SEPs. (11/20 (Dailey) Tr. at 37:9-14.)

79. Many of Motorola's SEP licenses include rates at or near 2.25%. (11/13 (Murphy) Tr. at 184:12-186:16; 11/20 (Dailey) Tr. at 50:13-23, 57:16-20; 58:21-23; [redacted])

80. Motorola has a policy of not stacking rates for its portfolios of SEPs. (11/20 (Dailey) Tr. at 66:20-23, 73:18-74:1.) Under that policy, Motorola charges a single, maximum rate for its portfolios, no matter how many portfolios are implemented in a single licensed device. (11/20 (Dailey) Tr. at 66:20-23, 73:18-74:1.)

81. Most standard-essential patent licenses are cross licenses. (11/13 (Murphy) Tr. at 176:5-7; 11/20 (Dailey) Tr. at 46:12-20; Ex. 1173.) Dr. Murphy, who examined Motorola's prior licenses on behalf of Microsoft, stated that "pretty close to" all of Motorola's prior licenses are cross-licenses. (11/13 (Murphy) Tr. at 176:10-15.) All of the agreements that Kirk Dailey

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has entered into with product-producing companies are cross licenses. (11/20 (Dailey) Tr. at 46:8-11.)

82. Defensive suspension clauses in license agreements are common and valuable to Motorola, because they such clauses protect Motorola's product business. (11/20 (Dailey) Tr. at 47:8-48:1; *see also* Ex. 2970 at 12 ("While there is no exhaustive list of traditional RAND licensing terms, in addition to a possible compensation element, such terms may include a field-of-use restriction, reciprocity, non-sublicenseability, defensive suspension and other common patent licensing considerations.").)

C. The Motorola/Microsoft Negotiations

1. Motorola's October 2010 Offer Letters

83. On October 1, 2010, Microsoft filed suit in the United States District Court for the Western District of Washington at Seattle, against Motorola, Inc., claiming infringement of nine U.S. Patents. (Dkt. No. 1.) That same day, Microsoft filed a Complaint with the United States International Trade Commission, alleging infringement of the same nine U.S. Patents and requesting that the Commission enter an exclusion order barring import of Motorola's smartphone and tablet devices. (*See* 11/20 (Dailey) Tr. at 75:20-76:2.) Of the nine patents, Motorola was found to infringe only one patent. *Certain Mobile Devices, Associated Software, and Components Thereof*, ITC Inv. No. 337-TA-744, 2012 WL 3715788, at *21 (June 5, 2012) (Comm'n Op.).

84. During a licensing discussion in early October, Microsoft told Motorola's Kirk Dailey that Motorola might need to "put its patents on the table" and might have to sue Microsoft in order to show how its patents related to Microsoft's products. (11/20 (Dailey) Tr. at 36:3-11; 39:7-9.)

85. On October 21, 2010, Motorola's VP of Intellectual Property, Kirk Dailey, sent an "offer to license" letter to Microsoft's VP and Deputy General Counsel, Horacio Gutierrez. (Ex. 1.) The October 21 letter offered to grant Microsoft a worldwide license to Motorola's portfolio

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of patents and patent applications relating to the IEEE 802.11 Standards. (*Id.*; *see also* 11/20 (Dailey) Tr. at 36:3-11.)

86. The letter included Motorola's offer to grant the license under reasonable and non-discriminatory terms and conditions and included Motorola's standard terms. (Ex. 1; *see also* 11/20 (Dailey) Tr. at 121:8-18.) These standard terms included an offer to license the patents at a royalty rate of 2.25% of the price per unit for each 802.11 compliant product sold by Microsoft. (Ex. 1; *see also* 11/20 (Dailey) Tr. at 36:12-23; 37:15-38:16.) The letter indicated that the offer was "subject to a grant back license under the 802.11 essential patents of Microsoft." (Ex. 1 at MOTM_WASH1823_0018476.)

87. In the October 21, 2010 letter, Motorola also offered a license to less than its entire portfolio of 802.11 essential patents, if desired by Microsoft, again "on RAND terms." (Ex. 1 at MOTM_WASH1823_0018476.) A "non-exhaustive" list of 28 U.S. Patents (and their respective foreign counterparts) to be included by Motorola in the license was attached. (Ex. 1.)

88. In order to facilitate a response, Motorola indicated that it would "leave this offer open for 20 days." (Ex. 1 at MOTM_WASH1823_0018476; 11/20 (Dailey) Tr. at 76:12-77:13.) Motorola intended this letter to be an initial offer under Motorola's 802.11 patents so that Motorola could have a discussion and a negotiation with Microsoft. (11/20 (Dailey) Tr. at 36:6-11.) Prior to receiving this letter, Microsoft had never asked Motorola for a license to any of its 802.11 Standard-essential patents. (4/4 Gutierrez Depo. Tr. at 18:10-13.)

89. Upon receiving the October 21, 2010 letter, Mr. Gutierrez did not perform an analysis of the comparative contribution of the various 802.11 Standard-essential patent holders, and does not believe that analysis would have been warranted. (4/4 Gutierrez Depo. Tr. at 42:7-10, 18-22.) While Microsoft concluded that a 2.25 percent per unit royalty was unreasonable, Microsoft did not determine what would have been a reasonable royalty rate, because (according to Mr. Gutierrez) "the process by which a reasonable royalty can be calculated is incredibly complex and context specific" and "it really wasn't necessary to try to make that determination

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in that context because we were on a path for a broader resolution of the claims between the companies." (4/4 Gutierrez Depo. Tr. at 47:7-16.)

90. On October 29, 2010, Motorola sent Microsoft another "offer to license" letter. (Ex. 2.) This letter offered to grant Microsoft a worldwide license to Motorola's portfolio of patents and patent applications relating to the ITU-T Recommendation H.264 ("H.264"). (*Id.*) The letter included the offer to grant the license under reasonable and nondiscriminatory terms and conditions and included Motorola's standard terms. (Ex. 2 at MOTM_WASH1823_0018498.)

91. These standard terms include an offer to license the patents at a royalty rate of 2.25% of the price per unit for each H.264 compliant end product. (Ex. 2 at MOTM_WASH1823_0018498; 11/20 (Dailey) Tr. 38:17-23.) The offer also was made "subject to a grant back license under the H.264 essential patents of Microsoft." (Ex. 2; Dailey Tr. 38:17-23.) A "non-exhaustive" list of 18 U.S. patents (and their respective foreign counterparts) to be included by Motorola in the license was attached to the letter.

92. In order to facilitate a response, Motorola indicated that it would "leave this offer open for 20 days." (Ex. 2 at MOTM_WASH1823_0018498.) In the October 29, 2010 letter, Motorola also offered a license on less than its entire portfolio of H.264 essential patents, again "on RAND terms." (Ex. 2 at MOTM_WASH1823_0018498.)

93. Prior to receipt of this letter, Microsoft had never applied for a license to Motorola's H.264 patent portfolio. (4/4 Gutierrez Depo. Tr. at 63:22-25.) Mr. Gutierrez was not aware of Microsoft performing a financial valuation of Motorola H.264 patent portfolio after receiving the October 29, 2010 letter. (4/4 Gutierrez Depo. Tr. at 65:22-25.)

2. Subsequent Motorola/Microsoft Negotiations

94. After receiving these letters, Microsoft sued without responding to the letters or attempting to negotiate. (11/20 (Dailey) Tr. at 39:10-13.) After filing the breach complaint, Microsoft told Motorola not to be concerned about the complaint, it was "litigation tactics

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week," and that they "expected some good work" from Motorola's lawyers. (11/20 (Dailey) Tr. at 39:18-22.)

95. Since October 1, 2010, the parties have sent as many as several dozen communications to each other in an effort to resolve their licensing dispute. (*See* 11/20 (Dailey) Tr. at 43:10-16; *see also* 4/4 Gutierrez Depo. Tr. at 46:6-15.) During the course of these communications, the parties exchanged term sheets, containing information on which patents and products would be licensed, along with information on the possible financial terms (including caps), cross-licenses, and defensive suspension and change of control clauses. (11/20 (Dailey) Tr. at 43:20-44:18.) The parties continued to conduct such kinds of communications up through the middle of trial. (11/20 (Dailey) Tr. at 44:19-21.)

IV. THE HYPOTHETICAL BILATERAL NEGOTIATION: *GEORGIA-PACIFIC* FACTOR 1

96. *Georgia-Pacific* Factor 1 is the royalties received by the patentee for the licensing of the patent in suit, proving or tending to prove an established royalty. (Ex. 293 at 680.)

A. Motorola's Licenses Are the Best Benchmark for RAND and Establish the Starting Point for the Hypothetical Negotiation

97. Rates negotiated bilaterally under a RAND commitment by the same licensor for the same patents would be "about as close as you can come" to the most relevant evidence to determining RAND royalty rates using a hypothetical bilateral negotiation. (11/19 (Schmalensee) Tr. at 150:11-17.)

98. [redacted]

99. [redacted]

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100. [redacted]

101. [redacted]

1. The VTech Agreement

102. VTech is the leading manufacturer of cordless phones in the world, and also a leading provider of electronic learning products. (11/20 (Dailey) Tr. at 49:23-50:1.) In 2011, VTech sold about $1.7 billion worth of products and several hundred million dollars in profit. (*Id.* at 50:2-4.)

103. [redacted]

104. After reviewing Motorola's cellular, 802.11 and H.264 portfolios, VTech requested a license under Motorola's 802.11 and H.264 portfolios in order to "give [VTech] some measure of protection on some future products on our road map," which included tablet products. (Ex. 2832; *see also* 11/20 (Dailey) Tr. at 51:13-24; 11/13 (Murphy) Tr. at 184-88.) According to Mr. Delany's request, VTech saw "a convergence of technologies on future home communication phones/ devices that would use some of these technologies." (Ex. 2832.)

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105. Mr. Delany proposed that VTech would pay a rate of 2.5% for products that have a MSRP of between $200-$500; VTech's proposed tiered royalty rates ranged from 0.5% to 2.5%. (Ex. 2832; 11/13 (Murphy) Tr. at 184:12-189:2; 11/20 (Dailey) Tr. at 51:13-18.)

106. [redacted] The VTech license is effective from December 1, 2011, until December 31, 2021. (11/13 (Murphy) Tr. at 192-193; Ex. 13.)

107. [redacted]

108. Dr. Murphy conceded that the VTech license was not the product of hold up. (11/13 (Murphy) Tr. at 184:9-10.)

109. [redacted]

110. VTech recently introduced a new version of its tablet (InnoTab 2S) that has both 802.11 and H.264 functionality and for which VTech will be paying a royalty to Motorola of 2.25% of the net selling price. (11/13 (Murphy) Tr. at 188:25-189:18; 11/20 (Dailey) Tr. at 52:20-22, 53:2-55:7; Exs. 3200, 3396.) The InnoTab 2S connects via secure Wi-Fi to a network to download content for users. (*See* Ex. Ex. 3396 at MOTM_WASH1823_0612338-39.)

111. Given the success of the original version of the tablet touted in VTech's annual report, it is expected that VTech license will generate significant royalty revenue in the near future. (11/20 (Dailey) Tr. at 55:1-7.)

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2. The RIM Agreement

112. [redacted]

113. Prior to and following the expiration of the 2003 RIM agreement, the parties negotiated for, but were unable to consummate, a new cross-license agreement. As a result of this impasse, the parties engaged in litigation, including litigation regarding certain of Motorola's 802.11 essential patents. (*See, e.g.*, Ex. 1672.)

114. [redacted]

115. [redacted]

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116. [redacted]

117. [redacted]

3. The Symbol Licenses

118. On January 9, 2007, Motorola, Inc. completed its acquisition of Symbol Technologies, Inc. ("Symbol"). (11/20 (Dailey) Tr. at 59:2-6.)

119. U.S. Patent Nos. 5,029,183; 5,479,441; 6,236,674; 6,404,772; and 6,473,449 are 802.11 SEPs and were owned by Symbol at the time of Motorola's acquisition. Each of these patents was listed in the Annex attached to Motorola's October 2010 offer to Microsoft. (Ex. 1; 11/20 (Dailey) Tr. at 60:3-9.)

120. In 2003, a jury awarded Symbol a royalty of 6% of the average selling price of Proxim's finished products for two of the patents offered to Microsoft (U.S. Patent Nos. 5,029,183 and 5,479,441). (11/20 (Dailey) Tr. at 59:20-60:2; 81:15-19; *see* 11/16 (Lynde) Tr. at 166:6-13.) [redacted]

121. [redacted]

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[redacted]

122. [redacted]

[redacted]

4. Motorola's Licensing Presentations to HTC, Samsung, and Apple

123. [redacted]

[redacted]

124. [redacted]

[redacted]

125. [redacted]

[redacted]

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B. Motorola's Licenses Do Not Include Hold Up And Do Not Contribute to A Stacking Problem

1. Stacking

126. "Royalty stacking" is a term used to refer to a situation in which the cumulative "stacked" royalties that a licensee may need to pay to all holders of SEPs for a given standard is so high as to make it no longer economical for the manufacturing company to develop and commercialize the product. (*See, e.g.*, Ex. 2982 at MOTM_WASH1823_0495409.)

127. While the economic literature recognizes royalty stacking as a theoretical concern, royalty stacking does not appear to be a problem in the real world, in the sense that those who have looked for actual evidence, as opposed to the predictions of relatively simple theoretical models, have not found it. (11/19 (Schmalensee) Tr. at 148:8-15.) There is no evidence of a technically attractive standard that has failed because aggregate terms have made it infeasible. (11/19 (Schmalensee) Tr. at 173:21-24.)

128. As Damien Geradin, Anne Layne-Farrar, and A. Jorge Padilla stated in a 2007 paper entitled *Royalty Stacking in High Tech Industries: Separating Myth From Reality*, the empirical evidence "does not corroborate the gloomy predictions of the proponents of the royalty stacking hypothesis." (Ex. 2982 at MOTM_WASH1823_0495407.) "The royalty stacking theory is not robust," they add. (Ex. 2982 at 39.) "[T]he so-called royalty stacking problem," they explain, "is more myth than reality." (Ex. 2982 at MOTM_WASH1823_ 0495407.)

129. As an example, Geradin, Layne-Farrar, and Padilla examined the 3G industry. In 2006, Mark Lemley and Carl Shapiro had "argued, relying on purely anecdotal evidence, that a royalty stacking problem exists in the development of the WCDMA (a 3G mobile telephony technology)." (Ex. 2982 at 4.) Lemley and Shapiro pointed out that "literally thousands of patents have been identified as essential to the proposed new standards for 3G cellular telephone systems." (Ex. 2982 at 39.)

130. When asked for an example of an industry in which there is actual evidence that royalty stacking has been a problem, Microsoft expert Dr. Simcoe testified that the Lemley and

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Shapiro paper was "the best example I have." (11/16 (Simcoe) Tr. at 66:17-23.) However, after testing Lemley's and Shapiro's theory, Geradin, Layne-Farrar, and Padilla concluded that the results of their "econometric analysis do not support those who claim the existence of a serious royalty stacking problem in the 3G telecoms industry." (Ex. 2982 at MOTM_WASH1823_0495412.) "[In] reality," they explain, "WCDMA technology is being licensed and has achieved remarkable penetration today, which belies any extreme cumulative royalty predictions made some time ago." (Ex. 2982 at 22.) They add:

> [T]he theoretical underpinnings of the model predicting royalty stacking do not match the reality of cellular standard setting. The royalty stacking model proposed in Lemley and Shapiro (2006) ignores that all key patents are regarded as strict complements by licensees and the elasticity of demand for licenses is bound to be low. Their assumption of equal patent contributions by all standard participants does not hold within the 3G standard. Some components of the standard are crucial to its functioning . . . whereas others are more peripheral.

(Ex. 2982 at 40.) Accordingly, they conclude that the "predicted royalty stacking problem is not an issue in this [the 3G cellular technology] industry." (Ex. 2982 at 33.)

131. There are a number of possible explanations for the difference between the simple theory that stacking could be a problem and the observed practice that stacking is not a problem. (11/19 (Schmalensee) Tr. at 173:25-175:10; 176:9-19.) First, many patent holders hold patents for defensive reasons, and so prospective licensees do not face numerous licensors. (*Id.*) Second, sophisticated licensees are aware that there are multiple licensors and take this consideration into account during negotiations. (*Id.*) And third, prospective licensors and prospective licensees interact repeatedly, and so are incentivized not to act unreasonably. (*Id.*)

132. Microsoft's experts did not present specific evidence of a stacking problem with respect to either 802.11 or H.264.

133. As of the date Dr. Murphy formulated his opinions in this case, although the 802.11 Standard had been released about 13 years before, there was no 802.11 stacking problem in the industry. (11/13 (Murphy) Tr. at 177:11-178:24.) Dr. Murphy testified that he "certainly [has not] reached the opinion that that [royalty stacking in the 802.11 industry] historically has

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been a problem." (*Id*. at 177:19-21.) Dr. Murphy also testified that he does not think that there is a stacking problem related to 802.11 "that's materialized itself . . . . I don't think it's really materialized per se. I don't think it is really materialized as, you know, lots of people charging substantial license fees to date." (*Id* at 178:9-13.) As Dr. Murphy confirmed: "In my opinion, based on the evidence I have seen, I don't think [a stacking problem] is there to date." (*Id*. at 178:23-24.)

134. Dr. Murphy also stated that, as of the date he formulated his opinions, although the H.264 standard had been around for close to a decade, he does not think that there has been any H.264 royalty stacking problem in the industry. (*Id*. at 179:3-12.)

135. Dr. Simcoe's evidence that royalty stacking exists is "largely the existence of patent pools." (11/16 (Simcoe) Tr. at 66:7-8.) However, Dr. Simcoe has not "looked at the total cumulative royalty burden in any particular industry to establish this, and has not "looked at any particular industry to figure out what the size of the stack would be." (11/16 (Simcoe) Tr. at 66:13-14, 66:21-23.) (Moreover, as Damien Geradin, Anne Layne-Farrar, and A. Jorge Padilla pointed out in *Royalty Stacking in High Tech Industries: Separating Myth from Reality*, "royalty stacking may not be a problem . . . even in the absence of mitigating institutions, such as patent pools)." (Ex. 2982 at MOTM_WASH1823_0495412.))

136. Dr. Lynde testified that there is "some debate in the professional literature" about "how much potential problem" royalty stacking could be. (11/16 (Lynde) Tr. at 139:22-24.) However, Dr. Lynde confirmed that, at his deposition, when asked whether royalty stacking is a problem for the Wi-Fi industry, he testified that he was "not aware of economic literature analyzing the difficulties presented by stacking," and that "in the aggregate, it has not been a problem." (*Id* at 139:22-140:19.) Dr. Lynde similarly testified that he is not aware of professional literature to the effect that implementers of the H.264 standard are suffering from a stacking problem. (*Id* at 140:23-141:15.) Dr. Lynde explained that "[a]ll I know" is that hold up

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and stacking in the H.264 industry are "not a problem for Microsoft." (11/16 (Lynde) Tr. at 151:14-152:4.)

137. As Damien Geradin, Anne Layne-Farrar, and A. Jorge Padilla state in an article published in the *Boston University Journal of Science and Technology Law* entitled "The Complements Problem Within Standard Setting: Assessing the Evidence on Royalty Stacking":

> [T]he relevant question is not whether royalty stacking is *possible*, as the theoretical arguments behind it have withstood the test of time, but whether it is common enough and costly enough in actuality to warrant policy changes. The available evidence suggests not, implying that any policy changes aimed at solving royalty stacking are likely to cause more (unintended) harm than they cure.

(Ex. 3013 at 145 (emphasis in original).) As these authors explain, there is neither direct nor indirect evidence of significant royalty stacking problems in Wi-Fi. (*Id.* at 162-63.) There is, they conclude, "scant evidence that royalty stacking and other complements issues are widespread and recurring problems." (*Id.* at 176.) Accordingly, they add, if policy recommendations were implemented in an attempt to account for royalty stacking, "it would risk setting a course for Scylla in the absence of any evidence of danger from Charybdis." (*Id.* at 176.)

2. Hold Up

138. There is no evidence of a hold up problem with respect to either 802.11 or H.264 or any of Motorola's prior licenses. (11/19 (Schmalensee) Tr. at 151:1-4; 175:25-176:3; 11/16 (Lynde) Tr. at 135:19-36:5; Ex. 2970 at 16.)

139. Dr. Murphy acknowledges that many licenses have been negotiated for standard essential patents *ex post*, but believes that every one of those license "potentially" includes hold up. (11/13 (Murphy) Tr. at 179:15-180:22.) *Ex post* bilateral negotiations can lead to a RAND license. (11/13 (Murphy) Tr. at 180:23-181:1; 11/16 (Lynde) Tr. at 138:14-18.) Dr. Murphy testified that "hold-up has not necessarily been a problem." (11/13 (Murphy) Tr. at 201:25-202:1.) Motorola's license with VTech was not the product of hold up. (11/13 (Murphy) Tr. at 184:9-10.)

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140. Dr. Simcoe has not made a detailed factual review of any of Motorola's prior licenses. (11/16 (Simcoe) Tr. at 50:22-51:4.) Dr. Simcoe has no evidence that there is any hold up in any of Motorola's prior licenses. (11/16 (Simcoe) Tr. at 66:24-67:3.) Dr. Simcoe is unable to identify any particular license from any company as an example of hold up. (11/16 (Simcoe) Tr. at 67:8-10.) Dr. Simcoe has no evidence that the dispute between Motorola and Microsoft in this case is based on hold up. (11/16 (Simcoe) Tr. at 67:4-7.)

141. When Dr. Lynde formulated his opinion, there was no Motorola license involving Motorola's 802.11 or H.264 patents as to which Dr. Lynde had any specific evidence that hold up was involved. (11/16 (Lynde) Tr. at 138:19-139:8.) As of his deposition, Dr. Lynde had "no basis from economic evidence to conclude whether or not patent hold-up is a real problem," and no basis to disagree with Microsoft's statement to the FTC that "[t]here is little evidence that patent hold-up in the standards context is a real problem." (11/16 (Lynde) Tr. at 135:19-136:5; Ex. 2970 at 16.)

C. The Via Licensing and MPEG LA Patent-Counting Pools Are Poor Comparables

1. Overview of Patent-Counting Pools

142. Patent pools are created by two or more standard-essential patent owners or by an administrator of a prospective patent pool who collects standard-essential patent owners to act as licensors, with the purpose of licensing standard-essential patents to third party licensees, and usually to the other licensors, in a single licensing package. (*See, e.g.*, Ex. 2345 at MS-MOTO_1823_00002433307-08.)

143. While patent pools and SSOs have one objective in common – the broad adoption of standards – in fact patent pools and SSOs do not share all the same objectives. For example, pools do not generally pursue the SSOs' interests in having valuable standards developed. (11/19 (Schmalensee) Tr. at 147:22-25; *see also* Ex. 2345; 11/14 (Sullivan) Tr. at 37:4-40:3.) Once a standard is developed, there is generally no advantage from the pool's point of view in

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providing a reasonable return to the holders of the intellectual property in the standard, whereas the SSO wants to balance creating the standard by providing reasonable rewards with achieving broad adoption of the standard. (11/19 (Schmalensee) Tr. at 147:25-148:7.)

144. Patent pools have a different purpose and structure than do SSOs. As Gary Sullivan, the Microsoft employee who was also the chairman of the Joint Video Team, the organization that finalized the H.264 video standard (11/13 (Sullivan) Tr. at 208:24-209:19), explained, "[o]pen standards (e.g., ITU-T, ISO, IECI) have NO OPINION whatsoever on specific licensing terms and they do not force anyone to join any pool and have no relationship whatsoever with any pools that do form. . . . Patent pooling is a notion invented entirely OUTSIDE of the standardization world to provide a simplified way for companies to get licenses to patents held by multiple patent holders." (Ex. 2345 at MS-MOTO_1823_00002433307-08.) As Sullivan explained, "I don't really understand how a different impression can persist." (Ex. 2345 at MS-MOTO_1823_00002433307.)

145. Patent pools typically have lower rates than can be achieved through bilateral, private negotiations. (Ex. 3013 at 167; 11/16 (Simcoe) Tr. at 72:6-12; 11/19 (Schmalensee) Tr. at 137:13-138:3; 11/16 (Lynde) Tr. at 141:25-142:13.) There are many factors that make patent pools more likely to have rates lower than the rates in bilaterally negotiated licenses, including the fact that: (1) the principal objective of most pools is not to maximize licensing revenue but instead to minimize royalty exposure and maximize freedom of operation for licensees, which drives down the royalty rate (11/19 (Schmalensee) Tr. at 143:23-144:6); (2) pools that allocate revenue based on patent-counting ignore the value of the patents being licensed (see 11/13 (Glanz) Tr. at 125:11-21, 134:3-6; see also 11/16 (Lynde) Tr. at 143:3-6, 145:11-13; 146:16-20); (3) due to the non-negotiable nature of pool patent licenses, royalty rates must be low to entice licensees to join (see, e.g., 11/19 (Schmalensee) Tr. at 147:25-148:4); (4) pools have low licensing transaction costs that allow for lower rates (11/16 (Lynde) Tr. at 147:11-148:8); and (5) concerns over antitrust scrutiny leads to lower rates. (*See* 11/16 (Simcoe) Tr. at 68:2-6.)

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Because of these low rates, according to Garrett Glanz, the general manager of licensing in Microsoft's intellectual property group, if a patent holder wanted to pursue an "aggressive" licensing strategy, "the pool is not the place to do that." (11/13 (Glanz) Tr. at 134:3-6.)

146. Patent pools are often entered into by vertically integrated firms that intend to profit at least largely through sales of products that embody or that practice the relevant standard. (11/19 (Schmalensee) Tr. at 143:23-144:2.) The fact that there is a systematic interest in lowering royalties means that those royalties are systematically below whatever the RAND upper bound might be. (11/19 (Schmalensee) Tr. at 144:3-6; Ex. 2945 at 174-77.) For example, Microsoft worked for lower pool rates for the MPEG LA pool in order to ensure the flow of content to Windows, rather than to reclaim a fair return for its patents. (*See* Ex. 2841; *see also* 11/13 (Glanz) Tr. at 103:15-105:19; Ex. 2961.)

147. A rate higher than a pool rate could be RAND. (11/16 (Simcoe) Tr. at 71:14-72:10; 11/19 (Schmalensee) Tr. at 137:13-17.)

148. Participation in a patent pool is voluntary. (11/13 (Glanz) Tr. at 98:7-12; 11/13 (Murphy) Tr. at 169:12-14.) As many as one-half to two-thirds of eligible firms choose not to join patent pools. (Ex. 1036 at 300.)

149. A patent holder can choose to license its SEPs outside of a pool. (11/16 (Lynde) Tr. at 151:10-13.) Microsoft itself preferred – and chose to engage in – bilateral negotiations for the 802.11 Standard, rather than joining a pool. (11/16 (Lynde) Tr. at 155:2-15.) "[A]bstaining from a patent pool is not synonymous with patent holdup." (Ex. 1036 at MOTM WASH1823 0092902.)

150. No holder of SEPs should be forced to join a patent pool. (11/13 (Murphy) Tr. at 169:19-20; 11/16 (Lynde) Tr. at 151:7-9.) As Microsoft's Gary Sullivan, who was also the chairman of the Joint Video Team, the organization that finalized the H.264 video standard (11/13 (Sullivan) Tr. at 208:24-209:16), explained, "[o]pen standards (e.g., ITU-T, ISO, IECI) . .

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. do not force anyone to join any pool and have no relationship whatsoever with any pools that do form." (Ex. 2345 at MS-MOTO_1823_00002433307.)

151. There are many reasons why patent holders do not join patent pools. (11/13 (Murphy) Tr. at 169:22-170:1; *see also* 1/13 (Glanz) Tr. at 101:7-18.) As Anne Layne-Farrar and Josh Lerner wrote in a paper in the *International Journal of Industrial Organization* entitled "To join or not to join: Examining patent pool participation and rent sharing rules," "firms with higher value patent portfolios are less likely to join a numeric proportional pool." (Ex. 1036 at 295; *see also* 11/16 (Lynde) Tr. at 145:21-146:3 ("As an economic analysis, that's a possibility.").) Layne-Farrar and Lerner further observe that the "issue of whether or not to join a patent pool is likely a straightforward matter of maximizing firm profits." (Ex. 1036 at 296.) Among the factors that reduce a firm's likelihood of joining a pool, they explain, are larger founding member groups and numeric proportional sharing rules. (Ex. 1036 at 300.) Accordingly, empirical data supports the conclusion that firms with "especially valuable contributions to a standard (say, in terms of crucial components for the standard) would opt out of the patent pool since they are morel likely to be able to negotiate higher royalties for their patents undiluted by other less-valuable contributions." (Ex. 1036 at 296, 300-01.)

152. Other things remaining the same, the higher the value of an owner's SEPs and the stronger its licensing program, the lower is its incentive to join a patent pool, and the less likely it is to join a pool. (11/13 (Glanz) Tr. at 134:3-6; *see also* 11/16 (Lynde) Tr. at 145:11-13; 146:16-20; 148:9-20; Ex. 1036 at 295; 11/19 (Schmalensee) Tr. at 146:17-147:3; Ex. 2945 at 174 ("[F]irms with higher value patent portfolios are less likely to join a proportional pool.").) Similarly, as a point of economic analysis, it is possible that the patent-counting method favors parties that have large numbers of low-value patents. (11/16 (Lynde) Tr. at 146:23-147:3.)

153. A party with a strong or broad patent portfolio may decline to join a patent pool if it will see a greater return on its investment in developing its standard-essential technology through negotiating individual licenses with potential licensees. (*See* Ex. 1036; 11/19

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(Schmalensee) Tr. at 146:17-147:3.) For example, at least three firms holding "significant" portfolios of SEPs declined to join MPEG LA's AVC/H.264 pool. (*See* 11/16 (Lynde) Tr. at 150:23-151:6; 11/13 (Glanz) Tr. at 118:18-119:2.) Specifically, among others, Nokia, Motorola, and IBM are not pool members. (11/16 (Lynde) Tr. at 150:5-151:6.)

154. Companies that have SEPs for a given standard, but also have products with high potential infringement exposure to others' SEPs for that standard, may decide to join a pool even though they may not obtain commercially reasonable value for their standard-essential patents licensed through the pool. In a paper entitled "Public Policy Toward Patent Pools," Josh Lerner and Jean Tirole stated that, for the MPEG-2 pool, "The primary motive for certain companies was not to maximize licensing revenues, but rather to accelerate the adoption of the standard." (Ex. 2945 at 175.) Microsoft's motive in joining the MPEG LA AVC patent pool was explicitly not to generate a revenue stream from its SEPs. (11/13 (Glanz) Tr. at 99:4-100:14; Ex. 3088; Ex. 2840 at MOTM_WASH1823_0392239.) On May 3, 2010, Dean Hachamovitch, Microsoft's Vice President of Internet Explorer (4/3 Hachamovitch Depo. Tr. at 19:8-14), published a blog posting entitled "Follow Up on HTML5 Video in IE9" on Microsoft's MSDN Blogs, in which he explained that:

> Microsoft pays into MPEG LA about twice as much as it receives back for rights to H.264. Much of what Microsoft pays in royalties is so that people who buy Windows (on a new PC from an OEM or as a packaged product) can just play H.264 video or DVD movies. Microsoft receives back from MPEG LA less than half the amount for the patent rights that it contributes because there are many other companies that provide the licensed functionality in content and products that sell in high volume. Microsoft pledged its patent rights to this neutral organization in order to make its rights broadly available under clear terms, not because it thought this might be a good revenue stream. We do not foresee this patent pool ever producing a material revenue stream, and revenue plays no part in our decision here.

(Ex. 2840 at MOTM_WASH1823_0392239.)

155. As Microsoft intellectual property licensing manager Garrett Glanz explained in an internal email concerning the MPEG LA AVC pool, "Microsoft has consistently argued for low codecs fees with reasonable annual caps in order to promote rapid and broad adoption of the

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technology. . . . We have taken this approach because H.264/AVC may likely be adopted in important media standards (e.g., ATSC, DVD Forum, 3GPP, DVB, etc.) and hence having the ability to support it in Windows if needed is critical to ensure the flow of content to Windows." (Ex. 2961.) Microsoft saw the setting of low MPEG LA rates as a "business win" for the company. (11/13 (Glanz) Tr. at 103:7-105:19.)

156. Bilateral negotiations can take many months, or even years, and can be expensive. (11/16 (Lynde) Tr. at 147:4-10; 11/20 (Dailey) Tr. at 44:23-45:7.) Given that bilateral licensing transaction costs can be considerable and that a licensing program consumes valuable internal resources, patent holders may decide to forego seeking bilateral licenses (even though they could probably realize higher royalties) and, instead, join a pool. (11/16 (Lynde) Tr. at 147:11-148:13.)

2. Patent Counting Royalty Structure of Pools

157. Patent pools generally (and the specific pools at issue in this case, MPEG LA and Via Licensing) distribute royalties on a per-patent basis, as part of a patent-counting system. (11/13 (Glanz) Tr. at 62:21-63:8; 132:16-24; 11/13 (Murphy) Tr. at 157:23-158:1; 11/16 (Lynde) Tr. at 143:3-5.) This structure generally provides equal compensation for any given patent in the pool, without regard to the technology of each patent, its merit, importance, or its contribution to the standard. (11/13 (Glanz) Tr. at 62:21-63:8, 124:18-125:21, 132:16-24; 11/13 (Murphy) Tr. at 157:23-158:1; 11/16 (Lynde) Tr. at 143:7-144:11.)

158. "Everyone who joins in the pool agrees to have essentially an equal valuation on a per-patent basis." (11/13 (Glanz) Tr. at 125:19-21.) Pools generally set a fee, and they do not then negotiate with individual prospective licensees. (11/13 (Murphy) Tr. at 170:12-171:3.) Once the terms of a patent pool are set, a potential licensor cannot go to the pool and renegotiate the deal. (11/13 (Murphy) Tr. at 171:1-3.) This results in fundamental or broad patents being given the same value as weak or narrow patents. (11/13 (Murphy) Tr. at 148:14-24; 11/16 (Lynde) Tr. at 143:25-144:11.)

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159. The patent-counting royalty allocation structure of pools does not take into consideration factors that are important to parties in real-world bilateral negotiations, including the value of the licensed portfolio and the extent to which customer demand is driven by that use. (*See, e.g.*, (11/16 (Lynde) Tr. at 143:7-10, 143:24-144:11.) Under a patent-counting pool system, "one patent in the pool could be critical to a core feature of the standard and it could be a feature that most standard-compliant products use and rely on heavily. And another patent could be directed to a feature that's tangential or optional and rarely ever used, and in the pool both would get the identical royalty rate." (11/16 (Lynde) Tr. at 143:25-144:11.

160. Neither the MPEG LA pool nor the Via Licensing 802.11 pool at issue in this case asses the relative value of a given participant's SEP contributions. (11/16 (Lynde) Tr. at 143:7-10.))

161. Patent pools do not use an incremental value approach. (11/16 (Simcoe) Tr. at 63:17-19.) In other words, patent pools do not try to determine the incremental value of every patent in the pool, compared to alternatives that were available prior to defining the standard. (11/16 (Simcoe) Tr. at 63:19-21.) Patent pools "don't go through the exercise of taking each patent and trying to determine what were the alternatives available at the time the standard was defined." (11/16 (Simcoe) Tr. at 64:10-13.) As Dr. Simcoe testified, as there are "thousands of patents in the pool, that would be difficult" – "[w]orking out the design around costs, and then taking each --- somehow aggregating that up into a price." (11/16 (Simcoe) Tr. at 64:15-17.)

162. Dr. Simcoe has not done enough work to determine what the overall reliability of patent counting is. (11/16 (Simcoe) Tr. at 73:5-7.) He is not aware of any situation in the real world, outside of patent pool organizations, where actual licensing has utilized patent counting. (11/16 (Simcoe) Tr. at 73:17-21.)

163. Dr. Murphy testified that a system in which every patent in a pool is given the same value is not "an exact method" and "is never going to give you exactly the right answer." (11/13 (Murphy) Tr. at 200:21-23.)

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3. The MPEG LA H.264 Patent-Counting Pool

164. The standardization of the first version of the H.264/AVC Standard was approved in March 2003. The standard was released in May of that year as H.264. (11/13 (Glanz) Tr. at 61:12.) On November 17, 2003, MPEG LA announced that essential H.264/MPEG 4 AVC patent and patent application holders had reached agreement on the terms of a joint patent license for implementation and use of ITU-T H.264 and MPEG 4 Part 10 AVC. (Ex. 1584 at MS-MOTO_1823_00002353107; 11/13 (Glanz) Tr. at 64:11-16.)

165. According to MPEG LA, 17 companies cooperated in negotiating the terms for its H.264 patent pool. (Ex. 1584; 11/13 (Glanz) Tr. at 64:11-65:2, 66:13-18.) During the negotiations, many companies with the largest potential exposure, such as Sony, Fujitsu, Mitsubishi, Samsung, and Nokia, advocated for low rates and annual caps. (*See* 11/13 (Glanz) Tr. at 78:8-17, 86:11-14; 97:6-13; Ex. 1139.)

166. Garrett Glanz, Microsoft's representative to the MPEG LA H.264 pool, does not recall any explicit discussions of whether particular licensing terms would satisfy a RAND obligation. (4/13 Glanz Depo. Tr. at 25:24-26:4.)

167. Microsoft participated in the MPEG LA pool because it wanted H.264 to become a broadly adopted standard, and argued for low codec fees with reasonable annual caps and opposed use fees, at least in part, because H.264 was considered likely to be adopted and an important media standard, and hence having the ability to support it in Windows was considered critical to ensure the flow of content to Windows. (11/13 (Glanz) Tr. at 96:20-97:23.) One reason why Microsoft wanted low codec fees and annual caps was to control part of the licensing costs as part of Microsoft's business strategy. (11/13 (Glanz) Tr. at 97:24-98:6.)

168. Microsoft considered it a "business win" to have obtained the royalty structure that it did for the MPEG LA pool, versus other, potentially higher royalty structures. (1/13 (Glanz) Tr. at 105:13-19.)

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169. In June 15, 2004, Microsoft entered into an Agreement Among Licensors Regarding the AVC Standard. (11/13 (Glanz) Tr. at 94:24; [redacted].) [redacted] A number of companies that were involved in negotiating the terms of the MPEG LA agreement did not join the pool at that time, including Motorola, Apple, Nokia, IBM, and Thompson. (11/13 (Glanz) Tr. at 117:2-119:2; 11/16 (Lynde) Tr. at 150:5-152:4.

170. [redacted] Under the terms of the Licensor Agreement, Microsoft is entitled to royalty sharing, subject to certain conditions in the agreement. (11/13 (Glanz) Tr. at 62:12-22.) Microsoft is also a Licensee of the MPEG LA's AVC/H.264 Patent Pool. Therefore, in addition to receiving a royalty for other licensees' sales of H.264-compliant products, it also receives a pool license for its own H.264-compliant products.

171. As of October 31, 2005, only 18 companies of about 100 were in the MPEG LA pool. (1/13 (Glanz) Tr. at 116:19-23; Ex. 3091 at MS-MOTO_1823_00002354131.) There were 26 licensors as of May 2012. (11/16 (Lynde) Tr. at 85:18-21; *see also* Ex. 1152.) There are currently more than 1,100 licensees in good standing. (11/16 (Lynde) Tr. at 85:18-21.)

172. Firms other than Motorola that have chosen not to include their SEPs in the pool include Nokia, IBM, and Thomson. (11/13 (Glanz) Tr. at 117:9-18; Ex. 3091; 11/16 (Lynde) Tr. at 150:5-9.) In addition, MML, GI and Motorola, Inc. have not joined the MPEG LA AVC/H.264 patent pool. (11/13 (Glanz) Tr. at 117:15-16; Ex. 3091; 11/16 (Lynde) Tr. at 150:5-9.) The understanding of Microsoft's representative to the MPEG LA pool discussions was that

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Motorola chose not to join the MPEG LA pool because Motorola decided it was advantageous for it not to license through the MPEG LA pool. (1/13 (Glanz) Tr. at 102:12-103:6.)

173. Because Motorola has chosen not to join the MPEG LA pool, its patents are not included in the value of those pools. (*See, e.g.*, 11/16 (Lynde) Tr. at 150:5-9.)

174. The MPEG LA H.264 pool royalty rate is $0 for the first 100,000 units per year, $0.20 for 100,000 to 5 million units per year, $0.10 for units above 5 million, with a cap on the maximum annual payment for an enterprise. (Ex. 3087 at MS-MOTO_1823_00002350955; *see* 11/16 (Lynde) Tr. at 101:9-17.) The annual enterprise cap is $3.5 million in 2005-2006, $4.25 million in 2007-2008, and $5 million in 2009-2010. (Ex. 3087 at MS-MOTO_1823_00002350956.)

175. At a high level, royalties in the MPEG LA H.264 pool are shared among the licensors according to the following formula: (Number of Licensor Patents / Total Number of Patents in Pool) x Total Royalties in Country. (11/13 (Glanz) Tr. at 62:23-63:11.) The MPEG LA pool thus distributes royalties based upon a patent allocation or proportional royalty structure. (11/13 (Murphy) Tr. at 171:14-18.)

176. According to Microsoft's economic expert, a reasonable royalty for a patent should be tied to the technical merit of the patent. (11/13 (Murphy) Tr. at 171:20-24.) The MPEG LA pool does not distinguish between patents in the pool on the basis of technical merit, but rather gives the exact same royalty to all patents in the pool. (11/13 (Murphy) Tr. at 172:11-73:1.)

177. While Dr. Lynde relies on patent pools as comparables, he has not evaluated whether the average value of Motorola's H.264 SEPS is higher or lower than the average value of the MPEG LA patents, nor does he think it is necessary to do so. (11/16 (Lynde) Tr. at 145:17-20.) Dr. Lynde's royalty rate calculations for Motorola's H.264 portfolio, which are based on the MPEG LA patent pool, do not take into account the extent to which Microsoft's products use Motorola's H.264 standard essential patents, in that he "did not use that as a

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particular complement of [his] economic conclusion about a RAND rate." (11/16 (Lynde) Tr. at 171:14-172:9.)

4. The Via Licensing 802.11 Patent-Counting Pool

178. The IEEE 802.11 working group issued its first standard "IEEE 802.11" (referred to as "802.11-1997") in 1997. (11/15 (Gibson) Tr. at 92:20-93:11.) Subsequently, IEEE 802.11 has issued various amendments to the original standard including amendments for high-speed access at up to 54 Mbit/s (802.11a, 802.11b, and 802.11g), security (802.11i), quality of service (802.11e), higher throughput (802.11n), and other areas. (11/15 (Gibson) Tr. at 92:20-94:14; Ex. 520.) The various amendments have been rolled into consolidated standards – IEEE 802.11, 1999 Edition (R2003) (in 2003), IEEE 802.11-2007 (in 2007) and IEEE 802.11-2012 (in 2012). (11/15 (Gibson) Tr. at 92:20-94:14; Ex. 520.)

179. The Via Licensing pool was formed in 2005. (11/13 (Murphy) Tr. at 174:6-7.) According to Dr. Murphy's "*ex ante*/*ex post*" dividing line, the Via Licensing pool was six years *ex post*. (11/13 (Murphy) Tr. at 174:3-11; Ex. 1173.)

180. Only five licensors have joined the Via Licensing 802.11 pool: Electronics and Telecommunications Research Institute (ETRI); Japan Radio Co., Ltd.; Koninklijke Philips Electronics N.V.; LG Electronics, Inc.; and Nippon Telegraph and Telephone Corporation. (11/13 (Murphy) Tr. at 174:16-175:3; Ex. 1125.)

181. It has been estimated that there are at least 93 holders of 802.11 SEPs. (*See, e.g.*, 11/13 (Murphy) Tr. at 175:4-7.) Thus, the vast majority of the firms holding SEPs, including MML and Microsoft, have not joined the Via Licensing 802.11 pool as licensors. Only about five percent of potential licensors have joined the Via Licensing Group. (11/13 (Murphy) Tr. at 175:7-10.)

182. The following companies are or have been licensees to the Via Licensing 802.11 pool: Archos, S.A.; Eastman Kodak; Enfora, L.P.; Fujitsu Ltd.; Guillemot Corp. S.A.; Imagination Technologies Ltd.; Japan Radio Co., Ltd.; Koninklijke Philips Electronics N.V.;

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Koss Corp., LG Electronics; and Sony Corp. (Ex. 1164; 11/16 (Lynde) Tr. at 106:25-107:4.) It has been estimated that there are hundreds (if not thousands) of implementers of the 802.11 Standard. Thus, a very small percentage of implementers of the 802.11 Standard have joined the Via Licensing pool. (11/13 (Murphy) Tr. at 174:14-175:16.)

183. The Via Licensing pool has not been very successful. (11/13 (Murphy) Tr. at 174:12-14.)

184. Microsoft decided not to join the Via Licensing pool as either a licensor or licensee. (11/13 (Murphy) Tr. at 173:6-9.) It was reasonable for Microsoft not to join the pool. (11/13 (Murphy) Tr. at 173:10-12.) Motorola similarly made the decision to keep its patents out of the pool. (11/13 (Murphy) Tr. at 173:16-21.) Because Motorola has chosen not to join the MPEG LA pool, its patents are not included in the value of those pools. (*See, e.g.*, 11/16 (Lynde) Tr. at 150:5-9.)

185. When asked about whether it might take a license to the Via Licensing 802.11 Pool, Microsoft informed Via Licensing Corporation that Microsoft's objections to taking a license "were the lack of Licensees and critical mass of the program," and that Microsoft "prefers to enter into bi-lateral discussions with the Licensors individually." (Ex. 3194.) Dr. Lynde, Microsoft's patent valuation expert, agrees that "it makes sense" that Microsoft objected to taking a license from the Via Licensing 802.11 pool because of a lack of licensees and the critical mass of the program, and that Microsoft prefers to enter into bilateral discussions with the licensors individually. (11/16 (Lynde) Tr. at 154:3-155:10; Ex. 3194.)

186. The Via Licensing 802.11 pool charges rates ranging from $0.05 per unit to $0.55 per unit, depending on the number of units licensed annually. Specifically, the Via Licensing 802.11 pool charges $0.55 for 1 to 500,000 units; $0.50 for 500,001 to 1,000,000 units; $0.45 for 1,000,001 to 5,000,000 units; $0.30 for 5,000,001 to 10,000,000 units; $0.20 for 10,000,001 to 20,000,000 units; $0.10 20,000,001 to 40,000,000 units; and $0.05 for 40,000,001 or more. (Ex. 52.)

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187. Royalties in the Via Licensing 802.11 pool are shared among the licensors according to a Worldwide Revenue Sharing Algorithm. The algorithm includes a country-weight factor and divides revenue between licensors based on the relative number of patents each has contributed, adjusted by country. (*See* 11/16 (Lynde) Tr. at 112:12-113:2.) The Via Licensing pool thus distributes royalties based upon a patent allocation or proportional royalty structure. (11/13 (Murphy) Tr. at 171:14-18.)

188. The Via Licensing pool does not distinguish between patents in the pool on the basis of technical merit, but rather give the exact same royalty to all patents in the pool. (11/13 (Murphy) Tr. at 172:11-173:1.)

189. Dr. Simcoe was not asked to apply the Via Licensing pool rates in this case, has not done the work that would have allowed him to answer the question of how to apply those rates, and has no opinion as to whether the Via Licensing rates are an appropriate benchmark for evaluating proposed RAND terms for 802.11. (11/16 (Simcoe) Tr. at 49:15-50:5.) He has not done the work that would let him asses the quality of Via Licensing as a benchmark. (11/16 (Simcoe) Tr. at 71:9-13.)

190. While Dr. Lynde relies on patent pools as comparables, he has not evaluated whether the average value of Motorola's 802.11 SEPs is higher or lower than the average value of the Via 802.11 patents. (11/16 (Lynde) Tr. at 144.) Dr. Lynde's royalty rate calculations for Motorola's 802.11 portfolio, which are based on the Via Licensing patent pool, do not take into account the extent to which Microsoft's products use Motorola's 802.11 Standard essential patents, in that he "did not use that as a particular complement of [his] economic conclusion about a RAND rate." (11/16 (Lynde) Tr. at 171:14-172:9.)

D. Microsoft's "Confirmatory" Evidence Should be Disregarded

1. ETSI Proposals

191. Dr. Simcoe relies on a 2006 proposal Ericsson, Motorola, and Nokia made to the European Telecommunications Standards Institute ("ETSI"). (11/16 (Simcoe) Tr. at 25:2-8.)

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The proposal "clarified" the FRAND commitment "by articulating two core principles [he thinks] are central to the meaning of FRAND." (11/16 (Simcoe) Tr. at 26:4-7.)

192. ETSI is a different organization from the IEEE and the ITU, and the 2006 ETSI proposal was unrelated to 802.11 and H.264. (11/16 (Simcoe) Tr. at 68-69.) The parties that made this proposal identified it repeatedly as a suggested "clarification" and stated that they were proposing "to revise" the ETSI intellectual property rights policy. (Ex. 1031 at § 6.1; 11/16 (Simcoe) Tr. at 69:22-70:25.) The proposal was to "introduce" two principles "into the FRAND definition." (Ex. 1031 at § 6; 11/16 (Simcoe) Tr. at 77:12-20.) One part of this proposal was that ETSI participants "continue to rely on bilateral licensing." (Ex. 1031 at § 6.1.)

193. ETSI rejected this proposal. (11/16 (Simcoe) Tr. at 70:14-21.) Even had this proposal been accepted by ETSI, that would have not changed the intellectual property rights policies of the ITU or IEEE, or the meaning of contracts between patent holders and the IEEE or ITU. (*See, e.g.*, 11/16 (Simcoe) Tr. at 68:22-69:10.)

194. Dr. Simcoe also relies on a 2006 document from several companies discussing "approaches based on collective licensing principles" which were not implemented by ETSI. (11/16 (Simcoe) Tr. at 32:16-22; Ex. 1033 at MOTM_WASH1823_0421106.) This document states that collective licensing arrangements would be "compatible with" (Ex. 1033 at MOTM_WASH1823_0421106) the proposal "introduce[ing] the principles of aggregated reasonable terms and proportionality into the [ETSI] FRAND definition" (Ex. 1031 at § 6). These ideas "never became part of any policy," either at ETSI or in any other SSO. (11/16 (Simcoe) Tr. at 70:22-24.)

2. ARM

195. Dr. Lynde purported to rely on a license from ARM holdings as a "corroborating benchmark," (11/16 (Lynde) Tr. at 120:5-10), and "corroborative information about what chip licensing maximums could be," (*id*. at 160:5-11). The ARM license agreement "is not a comparable to an *ex ante* multilateral negotiation." (*Id.* at 160:12-14.)

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196. Dr. Lynde testified that, by referring to ARM Holdings, he was referring to a publically available chip license. (11/16 (Lynde) Tr. at 160:16-19.) However, in formulating opinions about the ARM license, Dr. Lynde never reviewed this ARM license itself, nor did he attach it to his expert report, or ask that it be put on Microsoft's exhibit list. (*Id*. at 160:20-161:14.) Because he never reviewed the agreement, Dr. Lynde never learned what specific restrictions, if any, the ARM license imposes on the use of ARM's patents. (*Id*. at 161.) He similarly never determined whether the ARM license would cover a licensee making its own chip without using ARM's tools. (*Id*. at 161:23-162:1.) If the ARM license only covers chips made with ARM tools, then the license could be "quite a bit less valuable" than an unrestricted patent license. (*Id.* at 162:15-163:7.)

197. There is no evidence in the record regarding the actual terms of any ARM license – except for Dr. Lynde's testimony that the license does not involve standard essential patents. (11/16 (Lynde) Tr. at 163:15-17.)

3. InteCap

198. Dr. Lynde relied on a 2003 study performed by InteCap of five Motorola 802.11 SEPs as another "corroborating benchmark." (11/16 (Lynde) Tr. at 124:17-126:20.)

199. When the InteCap study was undertaken, there was significant near-term uncertainty as to the competitive landscape of the value achieved. (*Id*. at 163:18-23.) Ultimately, the InteCap analysis was viewed by Motorola as way to determine whether there was "viability in proceeding." (7/12/12 Curtis Depo. Tr. at 35:7.) Motorola wanted to do "a worst case assessment of what a minimal opportunity might be." (*Id.* at 38:7-9.) Dr. Lynde was not aware of any evidence that Motorola relied on the InteCap study in any way since the early 2000s. (11/16 (Lynde) Tr. at 163:24-164:2.) Motorola had not relied on the InteCap study for the previous nine years because the study was based on projections, and those projections "fell short of reality." (*Id*. at 164:3-7.)

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200. InteCap studied only five Motorola 802.11 SEPs. (*Id*. at 164:8-10) In contrast, the Motorola 802.11 portfolio at issue in this case contains many more patents, dozens of which were explicitly listed in Motorola's offer letter. (*Id*. at 164:13-18; Ex. 1.) Of all the 802.11 patents in the portfolio at issue in this case, only *one* (U.S. Patent No. 5,560,021) was considered by InteCap. (Ex. 1; Ex. 6 at MOTO-MS-000237726.) In his analysis, Dr. Lynde did not look into or consider whether any of the patents considered by InteCap in 2003 were included in the 802.11 portfolio at issue in this case. (11/16 (Lynde) Tr. at 164:19-165:1.)

201. In formulating his opinions, Dr. Lynde did "nothing to assess the relative strength of the patents that InteCap considered, as compared to the patents at issue in this litigation owned by Motorola." (*Id*. at 165:14-21.) In fact, InteCap did not consider two patents (U.S. Patent Nos. 5,029,183 and 5,479,441), originally owned by Symbol, which were found valid and infringed by a jury, and for which the reasonable royalty rate was 6% of the net selling price. (Ex. 6 at MOTO-MS-000237726; 11/16 (Lynde) Tr. at 166:3-15.) Neither of those patents was in the Motorola portfolio at the time of the 2003 InteCap study. (11/16 (Lynde) Tr. at 166:16-19.) While InteCap did not consider these patents, both of these patents were listed in the offer letter Motorola sent to Microsoft. (Ex. 1 at 8-11 (Patent No. 5,029,183); Ex. 1 at 12-15 (U.S. Patent No. 5,479,441).)

4. "Smallest Saleable Unit" Testimony

202. Dr. Lynde's "general economic understanding of smallest saleable unit is the item is in commerce for which we can observe an arms-length transaction for a component or part that embodies essentially the functionality of the patent." (11/16 (Lynde) Tr. at 156:16-20.) Dr. Lynde was not offering a legal opinion, and does not know what the legal standard (as opposed to the theoretical economic definition) is for "smallest salable unit." (11/16 (Lynde) Tr. at 156:21-157:8.) When Dr. Lynde "used this phrase 'smallest saleable unit' in [his demonstrative] and in [his] testimony," he "didn't mean to suggest that the Marvell chip was sufficient to practice the 802.11 functionality in the Xbox." (11/16 (Lynde) Tr. at 158:20-

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159:13.) Applying his own, economic, non-legal definition of "smallest saleable unit," Dr. Lynde testified that the Marvell chip "is the only thing that could reasonably be construed" as the "smallest saleable unit." (11/16 (Lynde) Tr. at 159:24-160:2.)

203. The price of the Marvell chipset currently does not include any licensing fees for intellectual property. (11/19 (Schmalensee) Tr. at 156:13-17.)

V. THE HYPOTHETICAL BILATERAL NEGOTIATION: *GEORGIA-PACIFIC* FACTORS 6, 8, 9 AND 13

204. *Georgia-Pacific* Factor 6 addresses the effect of selling the patented specialty in promoting sales of other products of the licensee; the existing value of the invention to the licensor as a generator of sales of its non-patented items**;** and the extent of such derivative or convoyed sales. (Ex. 293 at 680.)

205. *Georgia-Pacific* Factor 8 addresses the established profitability of the product made under the patent; its commercial success; and its current popularity. (Ex. 293 at 680.)

206. *Georgia-Pacific* Factor 9 addresses the utility and advantages of the patent property over the old modes or devices, if any, that had been used for working out similar results. (Ex. 293 at 680.)

207. *Georgia-Pacific* Factor 13 addresses the portion of the realizable profit that should be credited to the invention as distinguished from non-patented elements, the manufacturing process, business risks, or significant features or improvements added by the infringer. (Ex. 293 at 681.)

A. Overview of the Parties' Products

1. Microsoft's Xbox

208. The Xbox is a special-purpose computer. (11/15 (Del Castillo) Tr. at 9:3.) The Xbox is used to download games from the Internet, to stream media services over the Internet, to play games over the Internet and to make financial transactions over the Internet. (11/15 (Del Castillo) Tr. at 9:12-17, 11:5-17.)

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209. Wi-Fi capability in the Xbox is "a key and very important marketing lever we have with our competition and not having 802.11b/g/n Wi-Fi logo is not an option." (Ex. 3145; 11/19 (Williams) Tr. at 83:1-6; *see also* 11/15 (Del Castillo) Tr. at 42:24-44:10; [redacted].)

210. Microsoft included built-in Wi-Fi in the Xbox products because wireless connectivity using Wi-Fi had become a customer expectation. (11/15 (Del Castillo) Tr. at 46:13-19, 50:6-8.)

211. In June 2010, Microsoft began selling an Xbox with 802.11 capabilities built into the console. (11/15 (Del Castillo) Tr. at 15:4-13; [redacted].)

212. The Wi-Fi Alliance is an organization that certifies equipment to be compliant with the 802.11 Standard. (11/15 (Gibson) Tr. at 180:2-6.) Microsoft Xbox products are certified by the Wi-Fi Alliance as compatible with 802.11b/g/n. (11/15 (Gibson) Tr. at 180:18-24; Ex. 2329A; 11/19 (Williams) Tr. at 81:4-16; Ex. 2329 at MOTM_WASH1823_0606790; 11/15 (Del Castillo) Tr. at 15:4-13, 25:20-25, 45:16-18, 48:3-5, 48:17-22.)

213. The Xbox uses an integrated circuit chip that provides some, but not all, of the Wi-Fi capabilities of the Xbox. ([redacted] 11/19 (Williams) Tr. at 99:3-21.) Software of the Xbox interacts with the Wi-Fi chipset and provides some of the Wi-Fi functionality. (11/15 (Del Castillo) Tr. at 25:15-17, 64:20-24.)

214. Storage of the user's passphrase, required for the '571 patent, is on the Xbox console, and not the Wi-Fi chip. (11/19 (Williams) Tr. at 98:11-16, 99:3-100:13; [redacted].) In addition, the Xbox uses a WPA supplicant, which is software that uses the stored passphrase. (11/19 (Williams) Tr. at 98:11-16, 99:3-21.) That software is executed on the Xbox console, and outside the Wi-Fi chip. (*Id.*)

215. Without other circuitry and software provided by Xbox, the Wi-Fi chip, by itself, cannot communicate or otherwise function in accord with even those aspects of the 802.11 Standard that are implemented in circuitry within the chip. (11/19 (Williams) Tr. at 132:13-133:5.) The Xbox itself, containing the Wi- Fi chip and all of the other circuitry and software of

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the Xbox, is the functioning system that embodies, implements, and uses the 802.11 Standard. (11/19 (Williams) Tr. at 132:13-133:5.)

216. The Xbox complies with the Baseline, Main, and High profiles of the H.264 Standard, up to level 4.1. (Ex. 2082, 937 at MOTM_WASH1823_0602056.)

217. Microsoft began selling the HD DVD player accessory to the Xbox in 2006. (Ex. 3347 at MOTM_WASH1823_0612158.) The HD DVD accessory for Xbox requires support for the Main and High profiles of the H.264 Standard, up to level 4.1 (11/15 (Del Castillo) Tr. at 36:1-14; [redacted])

218. Microsoft incorporated support for H.264 into the Xbox console in the Spring of 2007. (Ex. 2724 at MOTM_WASH1823_0610520.)

2. [redacted]

219. [redacted]

220. [redacted]

221. [redacted]

222. [redacted]

223. [redacted]

224. [redacted]

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3. External Xbox Wireless Adaptor

225. Prior to selling Xboxes with built-in Wi-Fi, Microsoft sold an external Wi-Fi adaptor that supported 802.11a, 802.11b and 802.11g and was available from November 2005. (11/15 (Del Castillo) Tr. at 25:20-25; 48:17-23; [redacted].)

226. The Omni N is an external Xbox wireless networking adaptor. ([redacted].) The Omni N external wireless adapter provides 802.11b, 802.11g and 802.11n capability to any version of the Xbox 360. (11/15 (Del Castillo) Tr. at 48:17-23, 53:3-14; [redacted]

227. The Omni N was released in 2009. ([redacted].)

4. Microsoft's Surface Tablet

228. Microsoft's Surface is a tablet computer sold by Microsoft. (11/13 (DeVaan) Tr. at 40:5-10.)

229. Microsoft's Surface includes 802.11 functionality. (11/13 (DeVaan) Tr. at 41:9-10.)

230. Microsoft's Surface supports H.264. (Ex. 2082; 11/13 (DeVaan) Tr. at 40:5-24.) Microsoft's Surface complies with the Baseline, Main, and High profiles of the H.264 Standard up to level 5.1. (11/19 (Drabik) Tr. at 38:1-6; Ex. 2042 at MOTM_WASH1823_0601505; Ex. 2082.)

231. The only way to access the Internet with the Surface tablet is by using 802.11-compliant communications. (11/13 (DeVaan) Tr. at 52:14-18.)

232. Microsoft's Surface was first sold in the fall of 2012. (11/13 (DeVaan) Tr. at 40:5-7.)

5. Microsoft's Windows Products

233. Microsoft released Windows 7 in June of 2009. ([redacted].)

234. Microsoft's Windows products, including Windows Vista (from February 2011 and after), Windows 7, Windows 8, and Windows Server 8, comply with the profiles and levels of the H.264 Standard. (Ex. 2082.)

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235. Microsoft's Windows H.264 decoder supports the Baseline, Main, and High profiles of the H.264 Standard up to Level 5.1. (Ex. 2042 at MOTM_WASH1823_0601505; 11/19 (Drabik) Tr. at 34:21-24; 11/13 (DeVaan) Tr. at 43:1-20.)

6. Microsoft's Windows Phone

236. Microsoft's Windows Phone products support the Baseline, Main, and High Profiles of the H.264 Standard, level 3.1 (for phones using the Qualcomm 8x50 and 8x55 processors). (Ex. 936 at MOTM_WASH1823_0601732; 11/19 (Drabik) Tr. at 34:21-35:3.)

7. Microsoft's Lync, Skype and Silverlight

237. Lync W15 / 015, Silverlight (version 3 and later), and some versions of Skype comply with Profiles/Levels of the H.264 Standard. (Ex. 2082.)

8. Smallest Saleable Unit for Microsoft's Xbox and Windows Products

238. The Xbox is the smallest saleable unit sold by Microsoft that provides complete 802.11 functionality. (11/19 (Williams) Tr. at 98:11-16, 99:3-100:13.)

239. The smallest saleable unit for the H.264 functionality in Microsoft's Xbox and Windows products is the Xbox and Windows 7. Microsoft does not sell the Xbox H.264 decoder or the Windows 7 H.264 codec separately. [redacted] Likewise, the Windows H.264 codec functions are carried out in the CPU and memory of the PC and may also use a hardware accelerator. 11/13 Tr. 35:6-14; Ex. 591 at 5.

9. Motorola's Set-Top Boxes

240. Motorola's set-top boxes include H.264 functionality. (11/20 (Dansky) Tr. at 125:18-126:11.)

10. Motorola's Android Smartphones & Tablets

241. Motorola's smartphones and tablets include H.264 functionality. (11/20 (Dansky) Tr. at 125:18-126:11.)

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B. Overview of the 802.11 Standard

242. The 802.11 Standard is a wireless communications standard colloquially known as "Wi-Fi." (11/15 (Del Castillo) Tr. at 48:3-10.)

243. As of 2005, the 802.11 Standard was just beginning to be used in homes, and was increasing in popularity. (11/15 (Del Castillo) Tr. at 43:4-44:2.)

244. Currently, the 802.11 Standard is the most widely used and universally accepted wireless communications standard for ordinary consumer and business use. (11/15 (Del Castillo) Tr. at 46:4-19; 77:23-78:14; 11/15 (Gibson) Tr. at 89:15-18.) Most homes do not have wired networks, and instead rely on 802.11 networks because 802.11 networks do not require the inconvenience of placing cables all over the home. (11/15 (Del Castillo) Tr. at 78:1-14.)

245. A patent is deemed "essential" to the 802.11 Standard if any of its claims is essential. (11/19 (Williams) Tr. at 71:19-72:14; Ex. 5 at 14, § 6.1.) An essential patent claim is a claim that is "necessary to create a compliant implementation of either mandatory or optional portions of the normative clauses of the [Proposed] IEEE Standard when, at the time of the [Proposed] IEEE Standard's approval, there was no commercially and technically feasible non-infringing alternative." (11/19 (Williams) Tr. at 71:19-72:14; Ex. 5 at 14, § 6.1.)

1. History of the 802.11 Standard

246. Wireless networks, or wireless LANs ("WLANs"), use radio waves rather than wires to transmit data. (11/15 (Gibson) Tr. at 86:3-16, 86:22-87:3.) WLANs present several engineering challenges not present in wired LANs. For example, transmitting information wirelessly requires different channel access techniques than wired systems, and is more vulnerable to eavesdropping by unauthorized third-parties. (11/19 (Williams) Tr. at 87:23-88:7, 105:1-16; Ex. 386A (802.11-2012) at 75, § 4.5.4.4.)

247. The IEEE decided in 1990 to establish the 802.11 working group to create a wireless LAN standard. (11/15 (Gibson) Tr. at 91:6-12.)

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248. The IEEE 802.11 working group issued its first standard, "IEEE 802.11," in 1997 (referred to as "802.11-1997"). (11/15 (Gibson) Tr. at 92:20-93:11.) Subsequently, the 802.11 working group issued various amendments to the original standard including amendments for higher speeds (802.11a, 802.11b, and 802.11g), improved security (802.11i), quality of service (QoS) (802.11e), higher throughput (802.11n), and other areas. (11/15 (Gibson) Tr. at 92:20-94:14; Ex. 520.)

249. Periodically, the various 802.11 amendments have been rolled into consolidated standards. The most recent consolidation was in 2012 with IEEE 802.11-2012. (Ex. 520; Ex. 386A at ix-x.)

250. In 2009, the "802.11n" protocol, which provides for higher throughput, was approved. (11/15 (Gibson) Tr. at 94:2-4, Ex. 520.) The 802.11n amendment to the Standard requires compliant devices to have backward compatibility with 802.11b and 802.11g. (11/15 (Gibson) Tr. at 190:3-12, 192:1-7.)

2. The Relative Technical Value of Different Portions of the 802.11 Standard

251. When considering the relative technical importance of different sections of the 802.11 Standard, core enabling features are more important than advanced features and peripheral features. (11/19 (Williams) Tr. at 71:6-8, 73:9-74:14.) The core features are needed to build either any 802.11-compliant device or a particular type of 802.11-compliant device. (11/19 (Williams) Tr. at 73:9-80:3.) Advanced features are technologies that may be in a particular device. (11/19 (Williams) Tr. at 74:4-14, 80:2-19.) Peripheral features to the standard are features in technology areas that have not been proven and may or may not have future technological value. (11/19 (Williams) Tr. at 102:6-14.)

252. **Core Enabling Features.** Four core enabling features of an 802.11 communications network are: (1) network setup, (2) channel access management, (3) data modulation, and (4) security and encryption. (11/19 (Williams) Tr. at 84:7-88:19.)

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253. Before any communication can occur in 802.11, a network connection must first be established through a network setup procedure. (11/19 (Williams) Tr. at 85:8-86:2.)

254. Once a network connection exists, the network's communication units then must gain access to a communication channel before they can send or receive information. (11/19 (Williams) Tr. at 86:3-23.) This is accomplished by a channel access procedure specified by the 802.11 Standard. (*Id.*)

255. Further, to send and receive information over the channel, a communication unit's receiver must understand how transmitted information is formatted so that the receiver can interpret the messages it receives from a sender. In particular, it is necessary to properly synchronize and modulate signals between two communication units. (11/19 (Williams) Tr. at 86:24-87:22.)

256. Another core enabling feature of 802.11 communications is security, which is needed because wireless communications can be intercepted by third-party eavesdroppers. (11/15 (Gibson) Tr. at 178:22-179:19; 11/19 (Williams) Tr. at 87:23-88:19.) Transmissions can be made secure by encrypting the transmitted information using an encryption key. (11/19 (Williams) Tr. at 88:8-12.) In addition, it is important to know that a received message was actually sent by an authorized sender, rather than by an interloper masquerading as the sender. (11/15 (Gibson) Tr. at 113:6-9; 11/19 (Williams) Tr. at 84:24-85:1, 87:23-88:19.) This requires a process to enable a receiver to confirm that a received message was transmitted by the particular communication device the receiver is expecting the message from. (11/15 (Gibson) Tr. at 113:6-9; 11/19 (Williams) Tr. at 88:13-19.)

257. **Advanced Features.** Some features in 802.11 are important to some devices, but not all devices. (11/19 (Williams) Tr. at 80:2-19.) For example, battery operated devices typically make use of power management patents. (11/19 (Williams) Tr. at 80:12-19.) Other features that fall in this category are features that are not currently mandatory in the 802.11

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Standard, but are being considered to become mandatory in future generations of the Standard. (11/19 (Williams) Tr. at 80:12-19.)

258. **Peripheral Features.** Some features of the 802.11 Standard are peripheral and based on technology that has not yet been proven, and their future value to the Standard is questionable. (11/15 (Williams) Tr. at 102:6-14.)

C. Motorola's 802.11 SEPs Are Technologically Valuable

259. Motorola owns a portfolio of U.S. patents and foreign counterparts that are essential to the practice of the 802.11 Standard. (11/19 (Williams) Tr. at 71:1-5; Ex. 1.) Motorola's essential patents are distributed among 23 patent "families." (11/19 (Williams) Tr. at 71:1-5.) Each family includes at least one U.S. patent with at least one claim that is essential to the practice of the 802.11 Standard. (*Id.*)

260. The 23 Motorola families of 802.11 essential patents can be grouped into nine general technological categories: (A) network setup; (B) channel access management; (C) data modulation techniques; (D) security and encryption; (E) power management; (F) low density parity check codes; (G) data defragmentation; (H) fast transitions; and (I) mesh networking. (11/19 (Williams) Tr. at 80:2-19, 84:7-18). Of these, network setup, channel access management, data modulation techniques, and security and encryption are core enabling features of the 802.11 Standard. (11/19 (Williams) Tr. at 84:7-18.)

261. Motorola's essential patents are predominantly directed to important core enabling aspects of the 802.11 Standard that are necessarily and widely used by devices that are compliant with the 802.11 Standard. (11/19 (Williams) Tr. at 71:1-11, 78:7-20, 80:2-88:19.)

262. Motorola owns 14 patents relating to core enabling features of the 802.11 Standard. (11/19 (Williams) Tr. at 73:9-74:3.) Of these 14 patents, 11 must be used to implement any 802.11-compliant device. (11/19 (Williams) Tr. at 73:9-74:3, 78:7-20, 80:20-83:6.) The remaining three patents covering core enabling features must be used by certain types of 802.11-compliant devices. (11/19 (Williams) Tr. at 73:23-74:8.)

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263. Motorola owns nine patent families that are required for other important, advanced features that may or may not be used in a particular 802.11 device. These features include: Power management; LDPC codes; data defragmentation; fast transitions; and mesh networking. (11/19 (Williams) Tr. at 74:10-17, 80:2-19.)

1. Patents Relating to Network Setup and Channel Access Management: U.S. Patent Nos. 6,069,896 (Borgstahl) and 6,331,972 (Harris)

264. Motorola's '896 and '972 patents disclose a system for establishing a network connection between two wireless devices without the need for substantial user interaction during the setup process. (11/19 (Williams) Tr. at 85:5-86:2; Ex. 171 ('896 patent) at col. 10, lns. 4-6; Ex. 177 ('972 patent) at col. 7, lns. 34-37.) Instead of requiring that a device specifically identify the address of another device with which it will attempt to connect, the connecting device in the '896 and '972 patents broadcasts an unsolicited request for other devices, identifying only itself in its unsolicited message. (Exs. 171 ('896 patent) at col. 9, ln. 66 – col. 10, ln. 7; col. 12, lns. 39-48; Ex. 177 ('972 patent) at col. 28, lns. 18-38; col. 29, lns. 23-35.)

265. In the 802.11 Standard, a "station" is a device, such as a computer or an Xbox, that wirelessly communicates in an 802.11 wireless network. (11/15 (Gibson) Tr. at 109:15-18.) An "access point" is an "infrastructure" device that may connect by wires to another network (*e.g.*, the Internet), and also wirelessly with a station. (11/15 (Gibson) Tr. at 87:7-16, 109:16-18, 110:6-7.)

266. In a typical home environment, an infrastructure network includes a "router" (an access point) connected to the Internet, and stations such as a computer and/or an Xbox that are wirelessly connected to the access point. (11/15 (Gibson) Tr. at 109:15-18; 11/15 (Del Castillo) Tr. at 29:12-23.)

267. A probe request is a signal broadcast by a station that wishes to connect to an access point having a particular SSID. (11/15 (Gibson) Tr. at 173:2-8; Ex. 386A (802.11-2012) at 429, § 8.3.3.9; *id*. at 980, § 10.1.4.3.3.) A station can send to an access point a probe request

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to connect to a network without receiving a beacon from that access point. This process is called "active scanning." (11/15 (Gibson) Tr. at 171:18-173:8, 174:1-24, 175:4-12; Ex. 386A (802.11-2012) at 980, § 10.1.4.3.3.)

268. The claimed inventions of the '896 and '972 patents are "essential," as that term is used by the 802.11 Standard, to the network setup process described above. (11/19 (Williams) Tr. at 73:9-22, 85:5-86:2.) At least one claim of each patent covers the set up process described by the 802.11 Standard, and so devices complying with the Standard would necessarily infringe those claims. (11/19 (Williams) Tr. at 72:20-73:8, 74:18-22, 76:11-77:19, 85:5-86:2.) For example, since Microsoft's Xbox, wireless network adaptor and Surface products use 802.11, they necessarily infringe those claims. (11/13 (DeVaan) Tr. at 41:9-10; 11/15 (Del Castillo) Tr. at 15:4-13, 25:20-25, 45:16-18, 48:3-5, 48:17-23)

269. The inventions claimed by the '896 and '972 patents are important to the 802.11 Standard because the network setup procedure is a core enabling feature of the Standard. (11/19 (Williams) Tr. at 84:7-86:2.) Before any communication can occur with an 802.11 network, a station must go through the 802.11 network setup procedure. (11/19 (Williams) Tr. at 85:8-86:2.) Thus, every time a computer or an Xbox connects wirelessly to an access point, the 802.11 network set up process - and the inventions claimed by the '896 and '972 patents - must be used. (11/19 (Williams) Tr. at 78:7-20, 85:8-86:2; 11/13 (DeVaan) Tr. at 41:9-10; 11/15 (Del Castillo) Tr. at 15:4-13, 25:20-25, 45:16-18, 48:3-5, 48:17-23.)

270. The 802.11 Standard states: "The purpose of this standard is to provide wireless connectivity for fixed, portable, and moving stations within a local area." (Ex. 386A (802.11-2012) § 1.2, p. 1.) There can be no communication between stations if there is no network setup. (11/19 (Williams) Tr. at 84:19-20.)

271. Dr. Gibson testified that the '896 and '972 patents are related to "peer-to-peer" networks, not communication between a station and an access point, and therefore the Xbox does not make use of these patents under normal use. (11/15 (Gibson) Tr. at 109:11-110:5.) But the

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claims of the '896 patent and the '972 patent do not contain the term "peer-to-peer" and are not limited to peer-to-peer communications. (11/19 (Williams) Tr. at 95:14-21, 96:5-8; Ex. 171 ('896 patent) at claim 17; Ex. 177 ('972 patent) at claim 9; 11/15 (Gibson) Tr. 193:15-16.)

2. Patents Relating to Channel Access Management: U.S. Patent Nos. 5,142,533 (Crisler) and 6,404,772 (Beach)

a. U.S. Patent No. 5,142,533 (Crisler)

272. The '533 patent discloses a method of controlling the timing of access to a communication resource shared by multiple communication units. (Ex. 148 ('533 patent) at col. 2, lns. 49-51.) When multiple communication units attempt to transmit messages on a shared communication medium (such as a wireless medium) at the same time, the messages will collide and none of the messages will be properly received by the target communication units. (*Id*. at col. 2, lns. 6-35.) If, immediately after this collision, all of the communication units again attempt to access the wireless medium by transmitting their messages, another collision will occur. (*Id*.)

273. To solve this problem, the '533 patent discloses that a communication unit wanting to transmit information first determines when another communication unit is using the communication resource (in the terminology of the '533 patent, when a communication unit is using the communication resource, this creates an "inhibit condition" for other units). (*Id*. at Abstract, claim 1, col. 6, lns. 39-42.) If another unit is using the communication resource, the communication unit determines the time period during which the other communication unit uses the communication resource (*i.e.*, when the inhibit condition will occur). (*Id*. at Abstract, claim 1.) The communication unit also determines the time when it desires to access the shared communication resource to transmit its signal. (*Id*.) Using a clock, the communication unit then attempts to access the shared communication resource at a time that depends on when the inhibit condition occurs and the time when access to the communication resource is desired. (*Id*.)

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274. The basic channel access method used by the 802.11 Standard is called "distributed coordination function" (DCF), which uses a technique called "carrier sense multiple access with collision avoidance" (CSMA/CA). (Ex. 386A (802.11-2012) at 818-819, § 9.2.2.) In CSMA/CA, when a station wants to transmit, it first senses the wireless medium to determine if another station is using the wireless medium. (*Id*.) If the wireless medium is not being used, the station transmits. (*Id*.) But if the medium is being used, the station performs a "backoff' procedure. (*Id*.)

275. In the backoff procedure, the station selects a random "backoff time" that is decremented only during periods when the wireless medium is not being used by other stations. (*Id*. at 819, § 9.2.2; *Id*. at 838-839, § 9.3.4.3.) When the backoff timer reaches 0, the station will commence transmission. (*Id*. at 838-839, § 9.3.4.3.)

276. If a message is being transmitted, the station extracts duration information from a duration field that accompanies the transmitted message. (*Id*. at 824, § 9.3.1.) The duration information indicates how long the sending unit has reserved the wireless medium for transmission. (*Id*.)

277. Another 802.11 channel access mechanism, used in "quality of service" (QoS) network configurations, is enhanced distributed channel access (EDCA). (*Id*. at 819, § 9.2.4.1.) EDCA implements an enhanced variant of DCF in quality of service (QoS) devices (*i.e.*, devices that prioritize data transmission based on its time-sensitive nature). (*Id*. at 820, § 9.2.4.2.)

278. The invention claimed by the '533 patent is essential to the channel access mechanism used in the 802.11 Standard. (11/19 (Williams) Tr. at 86:2-23; Ex. 386A (802.11-2012) at 818, § 9.2.1-2, FIG. 9-1.) At least one claim of the patent covers the channel access mechanism described by the 802.11 Standard, and so devices complying with the Standard - including Microsoft's Xbox and wireless network adaptor - would necessarily infringe this claim. (11/19 (Williams) Tr. at 72:20-73:8, 74:18-22, 76:11-77:19, 86:3-23; 11/15 (Del Castillo) Tr. at 15:4-13, 25:20-25, 45:16-18, 48:3-5, 48:17-23.)

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279. The claimed subject matter of the '533 patent is a core enabling feature of the 802.11 Standard. (11/19 (Williams) Tr. at 86:3-23.)

280. By taking into account both when a station desires to access the wireless medium and when inhibit conditions occur, an 802.11-compliant system can more fairly allocate network resources among multiple devices. (Ex. 148 ('533 patent) at col. 2, lns. 40-60.)

281. Dr. Gibson testified that the '533 patent is not used by the Xbox because he understands that the Xbox does not use RTS/CTS or quality of service. (11/15 (Gibson) Tr. at 106:21-107:21.) But as Dr. Williams explained, the '533 patent is practiced by the general channel access mechanism in 802.11, and the use of RTS/CTS and quality of service is not required. (11/19 (Williams) Tr. at 97:14-98:10.)

b. U.S. Patent No. 6,404,772 (Beach)

282. The '772 patent discloses an access point for use in a mixed traffic (*i.e.*, different types of data) wireless local area network that includes a plurality of remote terminals that are associated with the access point. (Ex. 179 ('772 patent) at Abstract.) The access point prioritizes delivery to remote stations of voice data packets over other types of data. (Ex. 179 ('772 patent) at Abstract, claim 1.)

283. An 802.11 access point prioritizes voice data over other types of data. (11/15 (Gibson) Tr. at 199:23-200:21; Ex. 386A (802.11-2012) at 820, § 9.2.4.2, Table 9-1.)

284. The invention claimed by the '772 patent is essential to access point functionality in the 802.11 Standard. (11/19 (Williams) Tr. at 72:20-73:2.) At least one claim of the patent covers access point functionality as described by the 802.11 Standard for access points. (11/19 (Williams) Tr. at 72:20-73:2, 74:1-8, 76:11-77:19, 79:17-24.)

285. The claimed subject matter of the '772 patent is a core enabling function of the 802.11 Standard. (11/19 (Williams) Tr. at 72:20-73:2, 73:9-17, 73:23-74:8.) The rise of real-time communications over wireless networks, such as voice information, necessitates the use of

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features to prioritize voice data over other types of data for transmission. (Ex. 179 ('772 patent) at col. 1, lns. 55-56; 11/15 (Gibson) Tr. at 137:13-20.)

3. Patents Relating to Data Modulation Techniques: U.S. Patent Nos. 6,473,449 (Cafarella), 5,329,547 (Ling), 5,822,359 (Bruckert), 5,519,730 (Jasper), 5,272,724 (Solomon), and 6,038,263 (Kotzin)

a. U.S. Patent No. 6,473,449 (Cafarella)

286. The '449 patent discloses a method of wirelessly transmitting data using a technique known as "direct sequence spread spectrum" (DSSS) to suppress interference. (Ex. 180 ('449 Patent) at col. 6, lns. 55-67, claim 1.) The method also uses a type of modulation called "Differential Quadrature Phase Shift Keying" (DQPSK) to increase the data transmission rate. (*Id*. at col. 11, lns. 14-22, claim 1.)

287. After a connection has been established, data must be transmitted from a transmitter to a receiver. (11/19 (Williams) Tr. at 84:19-85:1, 87:4-6.) Data is wirelessly communicated by "modulating" the data onto a radio signal. (*Id*. at 87:4-6.) One modulation technique used in 802.11 is "Direct Sequence Spread Spectrum" (DSSS). (Ex. 386A (802.11-2012) at 1536, § 17.1.1.) DSSS is used in 802.11b and 802.11g. (11/15 (Gibson) Tr. at 110:15-111:1.)

288. The invention of the '449 patent is essential to the DSSS modulation scheme used in 802.11b and 802.11g. (11/19 (Williams) Tr. at 72:20-73:2, 96:4-21; 11/15 (Gibson) Tr. at 110:15-111:1.) At least one claim of the patent covers DSSS modulation as described by the 802.11 Standard, and so devices complying with the Standard - including Microsoft's Xbox, external wireless adaptor and Surface products - would necessarily infringe this claim. (11/19 (Williams) Tr. at 72:20-73:8, 74:18-22, 76:11-77:19; 11/13 (DeVaan) Tr. at 41:9-10; 11/15 (Del Castillo) Tr. at 15:4-13, 25:20-25, 45:16-18, 48:3-5, 48:17-23.)

289. The technology claimed by the '449 patent is important because it is used for DSSS in 802.11b and 802.11g, which is a core enabling feature of the 802.11 Standard. (11/19 (Williams) Tr. at 72:20-73:2, 96:4-21.) Support for 802.11b and 802.11g is necessary to pass

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802.11 compliance testing. (11/15 (Gibson) Tr. at 190:3-12; 11/19 (Williams) Tr. at 79:17-24, 96:4-21.)

290. Dr. Gibson testified that the '449 patent is not relevant to the Xbox because it relates to the 802.11b and 802.11g modulation techniques, but not the 802.11n modulation technique. (11/15 (Gibson) Tr. at 110:15-112:1.) But the Xbox supports 802.11b and 802.11g. (11/19 (Williams) Tr. at 81:11-16; Ex. 2329 at MOTM_WASH1823_0606790; Ex. 2329A.) Further, as Dr. Gibson admitted, the availability of 802.11b and 802.11g in the Xbox allows the Xbox to drop back from 802.11n when there is too much interference to allow the Xbox to communicate using 802.11n. (11/15 (Gibson) Tr. at 192:1-7; *see also* 11/19 (Williams) Tr. at 96:9-19.) The use of 802.11b and 802.11g in the Xbox also allows the Xbox to be used in homes with older access points. (11/19 (Williams) Tr. at 96:19-21.)

b. U.S. Patent No. 5,329,547 (Ling) and U.S. Patent No. 5,822,359 (Bruckert)

291. The '547 and '359 patents disclose methods of sending data signals coherently. (Ex. 156 ('547 patent) at Abstract; Ex. 170 ('359 patent) at Abstract.) The coherency is obtained by inserting "reference symbols" into data to be transmitted. (*Id*.) The reference-coded stream of data symbols is then "spread" using a "spreading code" for transmission. (*Id*.) When a signal with inserted reference symbols is received, the receiver uses the reference symbols to estimate certain characteristics of the communications channel on which the signal was received. (*Id*.)

292. The 802.11b and 802.11g versions of the Standard use "DSSS" modulation. (11/15 (Gibson) Tr. at 110:15-111:1.) In 802.11 DSSS modulation, each packet of data is formatted with a preamble and header, which include a predetermined series of synchronization bits. (Ex. 386A (802.11-2012) at 1538-39, §§ 17.2.2.2-17.2.2.3, Figs. 17-1 to 17-2.) The formatted packet is then spread for transmission. (Ex. 386A (802.11-2012) at 1567, §§ 17.4.6.5-17.4.6.6.)

293. The inventions claimed by the '547 and '359 patents are essential to the DSSS modulation scheme used in 802.11b and 802.11g. (11/19 (Williams) Tr. at 72:20-73:2, 96:4-21;

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11/15 (Gibson) Tr. at 110:15-111:1.) At least one claim of each patent covers DSSS modulation as described by the 802.11 Standard, and so devices complying with the Standard - including Microsoft's Xbox, external wireless adaptor and surface products - would necessarily infringe these claims. (11/19 (Williams) Tr. at 72:20-73:8, 74:18-22, 76:11-77:19; 11/13 (DeVaan) Tr. at 41:9-10; 11/15 (Del Castillo) Tr. at 15:4-13, 25:20-25, 45:16-18, 48:3-5, 48:17-23.)

294. The technology claimed by the '547 and '359 patents is important because it is used for DSSS in 802.11b and 802.11g, which is a core enabling feature of the 802.11 Standard. (11/19 (Williams) Tr. at 72:20-73:2, 96:4-21.) Support for 802.11b and 802.11g is necessary to pass 802.11 compliance testing. (11/15 (Gibson) Tr. at 190:3-12; 11/19 (Williams) Tr. at 79:17-24, 96:4-21.)

295. Dr. Gibson testified that the '547 and '359 patents are not relevant to the Xbox because it relates to 802.11b and 802.11g, but not 802.11n. (11/15 (Gibson) Tr. at 110:15-112:1.) As discussed above in FF 290, the use of 802.11b and 802.11g in the Xbox also allows the Xbox to be used in homes with older access points, and Dr. Gibson admitted that the availability of 802.11b and 802.11g in the Xbox allows the Xbox to drop back from 802.11n when there is too much interference to allow the Xbox to communicate using 802.11n.

c. U.S. Patent No. 5,519,730 (Jasper)

296. The '730 patent discloses a method of inserting time domain pilot reference symbols into the transmitted information to facilitate the recovery of data by a receiver. (Ex. 164 ('730 patent) at col. 1, lns. 9-12; col. 4, lns. 13-22; col. 5, lns. 43-47; col. 6, lns. 37-39.) A time domain pilot reference is data used to synchronize the timing of a signal so that a receiver is able to properly interpret received data frames. (*Id*. at col. 1, lns. 39-42.)

297. The data modulation technique used in 802.11a, 802.11g and 802.11n is called "Orthogonal Frequency Division Multiplexing" (OFDM). (11/19 (Williams) Tr. at 86:24-87:12, 87:17-19.) In this technique, data is divided up to modulate and transmit the data using a number of separate subcarriers at the same time. (11/19 (Williams) Tr. at 86:24-87:12; Ex. 386A

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(802.11-2012) at 1589, § 18.3.2.2 (step j).) The transmitted OFDM signal has 52 modulated subcarriers (48 for data, and 4 pilot subcarriers for use as a synchronization reference). (Ex. 386A (802.11-2012) at 1589, § 18.3.2.2 (steps j and k).) Training sequences of bits are sent with the 48 data subcarriers to provide synchronization. (Ex. 386A (802.11-2012) at 1588-89, §§ 18.3.2.1-18.3.2.2; *id*. at 1593, § 18.3.3.)

298. The '730 patent is essential to the OFDM modulation scheme used in the 802.11a, 802.11g, and 802.11n versions of the Standard. (11/19 (Williams) Tr. at 86:24-87:12, 87:17-19.) At least one claim of the patent covers OFDM modulation as described by the 802.11 Standard, and so devices complying with the Standard - including Microsoft's Xbox and external wireless device products – would necessarily infringe this claim. (11/19 (Williams) Tr. at 72:20-73:8, 74:18-22, 76:11-77:19; 11/15 (Del Castillo) Tr. at 15:4-13, 25:20-25, 45:16-18, 48:3-5, 48:17-23.)

299. The claimed subject matter of the '730 patent is important to the synchronization of data in OFDM used for 802.11a, 802.11g and 802.11n, which is a core enabling feature of the 802.11 Standard. (11/19 (Williams) Tr. at 86:24-87:12.)

300. Dr. Gibson testified that the '730 patent is not essential to the 802.11 Standard because the PLCP preamble—a synchronization signal—is sent for all subcarriers in a signal, while claim 14 of the '730 patent, which Motorola asserts is essential, requires the synchronization signal to be intermixed with the information signals. (11/15 (Gibson) Tr. at 108:10-21.) Dr. Gibson did not explain why sending the synchronization signal with all subcarriers does not satisfy the claim limitation that the synchronization signal be intermixed with the information signals. (*Id*.) Further, as Dr. Williams explained, the 802.11 Standard requires information signals to be combined with the PLCP preamble, as Dr. Gibson testified is required by claim 14 of the '730 patent. (11/19 (Williams) Tr. at 95:5-11.) Thus, the '730 patent is essential.

d. U.S. Patent No. 5,272,724 (Solomon)

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301. The '724 patent discloses a method of synchronizing the timing of a wideband data signal. (Ex. 151 ('724 patent) at Abstract.) A synchronization signal of the wideband data signal is divided into at least two "narrowband" synchronization signals. (*Id.*) The narrowband synchronization signals are summed together before being transmitted. (*Id.*)

302. A transmitted OFDM signal of the 802.11 Standard has 52 modulated subcarriers transmitted at different frequencies. (Ex. 386A (802.11-2012) at 1589, § 18.3.2.2 (step j).) The modulated subcarriers at different frequencies have two synchronization signals. (11/19 (Williams) Tr. at 94:24-95:3.) Before these signals are transmitted, they are summed together to be sent over a single channel with a desired center frequency. (Ex. 386A (802.11-2012) at 1589-90, § 18.3.2.2 (step j).)

303. The claimed invention of the '724 patent is essential to the OFDM modulation scheme used in 802.11a, 802.11g and 802.11n. (11/19 (Williams) Tr. at 86:24-87:12, 87:17-19.) At least one claim of the patent covers OFDM modulation as described by the 802.11 Standard, and so devices complying with the Standard - including Microsoft's Xbox, external network adaptor and Surface products - would necessarily infringe this claim. (11/19 (Williams) Tr. at 72:20-73:8, 74:18-22, 76:11-77:19; 11/13 (DeVaan) Tr. at 41:9-10; 11/15 (Del Castillo) Tr. at 15:4-13, 25:20-25, 45:16-18, 48:3-5, 48:17-23.)

304. The claimed subject matter of the '724 patent is important to the synchronization of data in OFDM used for 802.11a, 802.11g and 802.11n, which is a core enabling feature of the 802.11 Standard. (11/19 (Williams) Tr. at 86:24-87:12.)

305. Dr. Gibson testified that the '724 patent is not essential to the 802.11 Standard because the PLCP preamble - a synchronization signal - is sent for all the subcarriers in a signal, while claim 20 of the '724 patent requires first and second synchronization signals. (11/15 (Gibson) Tr. at 108:22-109:7.) But as Dr. Williams explained, the 802.11 Standard requires two synchronization signals to be sent, as Dr. Gibson testified is required by claim 20 of the '724 patent. (11/19 (Williams) Tr. at 94:24-95:3.) Thus, the '724 patent is essential.

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e. U.S. Patent No. 6,038,263 (Kotzin)

306. The '263 patent discloses a method of transmitting signals in a communication system using a process called "MIMO," a multiple input multiple output antenna system. (11/19 (Williams) Tr. at 79:5-10.) In the method of the '263 patent, "orthogonal" codes modify information transmitted in different pilot channels so the channels do not interfere with each other. (Ex. 383 ('263 patent) at col. 2, lns. 24-42; col. 3, lns. 1-7.) The pilot channels are transmitted to a mobile station by two or more spatially separated antennas. (*Id.* at Abstract, col. 2, lns. 42-46.)

307. The 802.11n amendment to the Standard provides for a High Throughput (HT) mode. (11/15 (Gibson) Tr. at 93:12–94:4.) One feature of HT mode is "multiple input multiple output" (MIMO), which uses multiple, separated antennas for transmission and receipt of data on multiple spatial streams. (11/19 (Williams) Tr. at 79:1-9; Ex. 386A (802.11-2012) at 16 ("MIMO"); *id*. at 21 ("spatial stream"), *id*. at 56, § 4.3.10; *id*. at 1669, § 20.1.1; *id*. at 1681, § 20.3.1.)

308. The claimed invention of the '263 patent is essential to the use in 802.11of the multiple input multiple output (MIMO) technique using multiple antennas. (11/19 (Williams) Tr. at 79:1-9.) At least one claim of the patent covers MIMO as described by the 802.11 Standard, and so devices practicing MIMO as implemented in the 802.11 Standard would necessarily infringe this claim. (11/19 (Williams) Tr. at 72:20-73:2, 83:19-24, 84:3-6.)

309. The features of the '263 patent are a necessary component of operation in MIMO. (11/19 (Williams) Tr. at 79:1-9.) MIMO is becoming increasingly important in today's products. (*Id*.)

4. Patents Relating to Security and Encryption — 802.11i: U.S. Patent Nos. 5,357,571 (Banwart), 5,467,398 (Pierce), 5,689,563 (Brown), and 5,412,722 (Sherly)

a. U.S. Patent No. 5,357,571 (Banwart)

310. The '571 patent discloses a method for generating encryption keys for encrypting data. (Ex. 157 ('571 patent) at Abstract, col. 5, lns. 13-17.) The '571 patent provides that one

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communication device can generate a new encryption key by receiving an "identity" of a stored key (*e.g.*, an index number or label corresponding to one of a set of pre-stored keys), and other information, from another communication device. (*Id.*)

311. In the 802.11 Standard, several different levels of security can be selected by a user, including Temporal Key Integrity Protocol (TKIP) and Counter Mode with Cipher Block Chaining Message Authentication Code Protocol (CCMP). (Ex. 386A (802.11-2012) at 75, § 4.5.4.4.)

312. Although TKIP and CCMP use different encryption algorithms are used, both use the same procedure, known as the "4-way handshake," to generate the encryption keys to be used in their respective encryption algorithms. (11/15 (Gibson) Tr. at 112:18-23; Ex. 386A (802.11-2012) at 75, § 4.5.4.5.) The 4-way handshake involves an exchange of messages between an access point and a connecting station, which messages contain random numbers and other information that are used to derive a unique encryption key. (Ex. 386A (802.11-2012) at 1262, § 11.6.6.7.)

313. The claimed invention of the '571 patent is essential to the first step of the 4-way handshake process used in the TKIP and CCMP encryption methods of the 802.11 Standard, and results in the generation of encryption keys. (11/19 (Williams) Tr. at 87:23-88:12; 11/15 (Gibson) Tr. at 112:18-23.) At least one claim of the patent covers the first step of the 4-way handshake as described by the 802.11 Standard, and so devices complying with the Standard - including Microsoft's Xbox, external wireless adaptor and Surface products - would necessarily infringe this claim. (11/19 (Williams) Tr. at 72:20-73:8, 74:18-22, 76:11-77:19; 11/13 (DeVaan) Tr. at 41:9-10; 11/15 (Del Castillo) Tr. at 15:4-13, 25:20-25, 45:16-18, 48:3-5, 48:17-23.)

314. The technology claimed by the '571 patent is important to the 802.11 Standard, because the encryption procedure used by an 802.11-compliant network is a core enabling function that prevents a third-party interloper from intercepting data transmissions. (11/19 (Williams) Tr. at 87:23-88:12.) Information transmitted in wireless communication systems is

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extremely vulnerable to unauthorized eavesdropping, since information is communicated over the air and not confined to physical wires, and the generation of encryption keys helps solve this problem. (11/19 (Williams) Tr. at 87:23-88:12; Ex. 386A (802.11-2012) at 75, § 4.5.4.4.) Further, the lack of user involvement in the process decreases the burden on the user. (Ex. 386A (802.11-2012) at 1128, Annex M.4.)

315. The 4-way handshake is used with both CCMP and TKIP, the two most secure protocols in 802.11, and is important to provide the security benefits of 802.11. (11/15 (Gibson) Tr. at 112:10-11, 112:18-23, 178:5-8; Ex. 386A (802.11-2012) at 1295, §§ 11.7.1, 11.7.3; *see also* Ex. 386A (802.11-2012) at 1236, § 11.6.1.3.)

316. Dr. Gibson testified that the '571 patent is not relevant to the Xbox because the Xbox provides security for all of the information that Microsoft thinks the Xbox needs to protect. (11/15 (Gibson) Tr. at 112:18-113:16.) But as Dr. Gibson admitted and others testified, Xbox security does not encrypt all transmitted information, and does not secure any information sent by a user of Internet Explorer. (*See* FF 316-326, below) Dr. Gibson also admitted that 802.11 security adds technical value to the Xbox and is not redundant to Xbox security. (11/15 (Gibson) Tr. at 185:10-15.)

317. In order to get Wi-Fi Alliance certification for a device, it is necessary to include 802.11 security in the device. (11/15 (Gibson) Tr. at 180:10-13.) Microsoft Xbox products have been certified by the Wi-Fi Alliance to be compatible with all levels of 802.11 security. (11/15 (Gibson) Tr. at 180:14-24; Ex. 2329A; 11/19 (Williams) Tr. at 81:3-19; Ex. 2329 at MOTM_WASH1823_0606790; [redacted].)

318. In a typical home setting, when an Xbox product is set up to wirelessly communicate with a Wi-Fi access point, the Xbox must be set to the same security setting as the access point to be able to communicate wirelessly with the access point. (11/15 (Gibson) Tr. at 176:5-179:13.)

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319. Microsoft implements in the Xbox security that operates independently of the 802.11 Standard. However, it is nevertheless the case that, if an access point is set by a user to use a particular level of 802.11 security, then the Xbox must also be set to that level of 802.11 security in order for it to communicate. (11/15 (Gibson) Tr. at 176:16-20, 177:4-10.) Being able to use the Xbox in an environment with 802.11 security as required by a network provides technological value to the Xbox. (11/15 (Gibson) Tr. at 177:4-10, 177:15-20.)

320. Two benefits to a user by using 802.11 security are that it prevents third-parties from glomming the user's internet connection and that it protects the user's information from eavesdropping. (11/15 (Gibson) Tr. at 179:9-19.)

321. Survey results show that more than 32% of users of the Xbox 360 use TKIP (12.6%) or CCMP (19.6%) security when connecting to the Internet through Wi-Fi. (11/19 (Sukumar) Tr. at 191:4-18, 191:25-192:9; Ex. 2392; Ex. 3034-A, FF 703-707)

322. Dr. Gibson has his home access point set to CCMP security. (11/15 (Gibson) Tr. at 178:5-8.)

323. The Xbox provides security that is limited to communications between two Xboxes or between an Xbox and an Xbox Live service. (11/15 (Del Castillo) Tr. at 26:16-22.)

324. The Xbox allows a user to use Internet Explorer, a web browser. (11/15 (Del Castillo) Tr. at 22:15-16.) [redacted]

325. When a user streams videos from Netflix or other service providers over the Internet, the Xbox security is not used. (11/15 (Del Castillo) Tr. at 27:16-28:1.)

326. Even in those circumstances where an Xbox's own security is implemented, transmitted Internet addresses and header information relating to the data being transmitted are

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exposed to eavesdroppers, notwithstanding the internal security measures that are used in the Xbox outside of the 802.11 Standard. (11/15 (Gibson) Tr. at 181:6-182:7, 182:16-183:2.)

b. U.S. Patent No. 5,467,398 (Pierce)

327. The '398 patent discloses a method for encrypting an authentication key using an encryption key, called a "messaging key," that is associated with a unique address of the transmitting communication unit. (Ex. 161 ('398 patent) at Abstract.)

328. In the 802.11 TKIP and CCMP encryption schemes, each message is transmitted with a "message integrity code" (MIC). (Ex. 386A (802.11-2012) at 1194, § 11.4.2.2, Fig. 11-7; *id.* at 1206, § 11.4.3.2, Fig. 11-16.) The MIC allows a receiver to know that the message was sent by the particular transmitter rather than by an unauthorized transmitter. (11/19 (Williams) Tr. at 87:23-88:19; 11/15 (Gibson) Tr. at 113:6-9; Ex. 386A (802.11-2012) at 1191, § 11.4.2.1.1; *id.* at 1194-1196, §§ 11.4.2.3.1 – 11.4.2.3.2.) Before transmission, the MIC is encrypted using an encryption key. (Ex. 386A (802.11-2012) at 1196, § 11.4.2.3.2; *id.* at 1206, § 11.4.3.2, Fig. 11-16.) The unique MAC address of the transmitting station is transmitted together with the encrypted MIC in each message. (Ex. 386A (802.11-2012) at 414, § 8.3.2.1.)

329. The technology claimed by the '398 patent is essential to message authentication using a MIC, as performed in TKIP and CCMP encryption, a core enabling function of the 802.11 Standard. (11/19 (Williams) Tr. at 87:23-88:19.) At least one claim of the patent covers the encryption and transmission of the MIC code in both the TKIP and CCMP security schemes as described by the 802.11 Standard, and so devices complying with the Standard - including Microsoft's Xbox, wireless network adaptor and Surface products - would necessarily infringe this claim. (11/19 (Williams) Tr. at 72:20-73:8, 74:18-22, 76:11-77:19, 87:23-88:19; 11/13 (DeVaan) Tr. at 41:9-10; 11/15 (Del Castillo) Tr. at 15:4-13, 25:20-25, 45:16-18, 48:3-5, 48:17-23.)

330. Message authentication is necessary to the 802.11 Standard to prevent interlopers from forging wireless communications by pretending to be using a different device. (11/19

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(Williams) Tr. at 87:23-88:19; 11/15 (Gibson) Tr. at 113:6-9; Ex. 386A (802.11-2012) at 1191, § 11.4.2.1.1.) By encrypting an authentication message with a key associated with the address of the transmitting device, as in the '398 patent and as is done in TKIP and CCMP, there is less likelihood that an interloper will be able to forge communications. (Ex. 386A (802.11-2012) at 1196, § 11.4.2.3.2.) The message integrity code is used billions of times per day in 802.11 systems in the United States. (11/19 (Williams) Tr. at 88:16-19.)

331. Dr. Gibson testified that the '398 patent is not relevant to the Xbox on the ground that the Xbox provides security for all of the information that Microsoft thinks the Xbox needs to protect. (11/15 (Gibson) Tr. at 112:18-113:16.) But as Dr. Gibson admitted and others testified, Xbox security does not encrypt all transmitted information, and does not secure any information sent by a user of Internet Explorer. (*See* FF 316-326, above) Dr. Gibson also admitted that 802.11 security adds technical value to the Xbox and is not redundant to Xbox security. (11/15 (Gibson) Tr. at 185:10-15.)

c. U.S. Patent No. 5,689,563 (Brown)

332. The '563 patent discloses a method of secure messaging in a communication system using "instant specific" information that is maintained by communication units in the system. (Ex. 169 ('563 patent) at Abstract.) Examples of instant-specific information disclosed in the '563 patent include, *e.g.*, the time of day, a radio port number, a time slot number and a packet number. (*Id.*) The communication unit uses the instant specific information to generate an authentication message. (*Id.* at col. 4, lns. 26-38.) The authentication message is then sent to another communication unit, which uses the authentication message to authenticate the sender. (*Id.*)

333. In both TKIP and CCMP encryption schemes, each packet is transmitted with a packet sequence number (TSC in TKIP; PN in CCMP), and a message integrity code (MIC) in a packet is encrypted using the packet sequence number. (Ex. 386A (802.11-2012) at 1193-1194, §§ 11.4.2.1.3, 11.4.2.2, Figs. 11-6, 11-7; *id.* at 1206-1207, §§ 11.4.3.2-11.4.3.3, Figs. 11-16, 11-

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17.) Thus, the MIC is based on instant-specific information. (Ex. 169 ('563 patent) at Abstract, col. 4, lns. 26-38.)

334. The technology claimed by the '563 patent is essential to the message authentication provisions of TKIP and CCMP security, a core enabling function of the 802.11 Standard. (11/19 (Williams) Tr. at 87:23-88:19; *see also* Ex. 386A (802.11-2012) at 1193-1194, §§ 11.4.2.1.3, 11.4.2.2, Figs. 11-6, 11-7; *id*. at 1206-1207, §§ 11.4.3.2-11.4.3.3, Figs. 11-16, 11-17.) At least one claim of the patent covers the encryption and transmission of the MIC code in both TKIP and CCMP as described by the 802.11 Standard, and so devices complying with the Standard - including Microsoft's Xbox, wireless network adaptor and Surface products - would necessarily infringe this claim. (11/19 (Williams) Tr. at 72:20-73:8, 74:18-22, 76:11-77:19, 87:23-88:19; 11/13 (DeVaan) Tr. at 41:9-10; 11/15 (Del Castillo) Tr. at 15:4-13, 25:20-25, 45:16-18, 48:3-5, 48:17-23.)

335. Message authentication is necessary to prevent interlopers in secure systems. (11/19 (Williams) Tr. at 87:23-88:19; 11/15 (Gibson) Tr. at 113:6-9; Ex. 386A (802.11-2012) at 1191, § 11.4.2.1.1.) By using an instant-specific variable in the creation of an authentication message, the '563 encryption method makes it more difficult for an interloper to impersonate a station in an 802.11 network and enhances the reliability of the authentication process. (Ex. 386A (802.11-2012) at 1196, § 11.4.2.3.2; Ex. 169 ('563 patent) at Abstract.) This mechanism is used with both TKIP and CCMP, the strongest forms of 802.11 security. (Ex. 386A (802.11-2012) at 1194, § 11.4.2.2, Fig. 11-7; *id*. at 1206, § 11.4.3.2, Fig. 11-16; 11/15 (Gibson) Tr. at 112:10-11, 178:5-8.) The message integrity code is used billions of times per day in 802.11 systems in the United States. (11/19 (Williams) Tr. at 88:16-19.)

336. Dr. Gibson testified that the '563 patent is not relevant to the Xbox on the ground that the Xbox provides security for all of the information that Microsoft thinks the Xbox needs to protect. (11/15 (Gibson) Tr. at 112:18-113:16.) But as Dr. Gibson admitted and others testified, Xbox security does not encrypt all transmitted information, and does not secure any information

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sent by a user of Internet Explorer. (*See* FF 316-326, above) Dr. Gibson also admitted that 802.11 security adds technical value to the Xbox and is not redundant to Xbox security. (11/15 (Gibson) Tr. at 185:10-15.)

d. U.S. Patent No. 5,412,722 (Sherly)

337. The '722 patent discloses a method of key generation (rekeying) in a secure communication environment. (11/19 (Williams) Tr. at 79:25-80:1; Ex. 160 ('722 patent) at Abstract.) A central key management controller used to manage rekeying sends out information about when the rekeying will occur, together with the necessary variables required to generate a new key. (Ex. 160 ('722 patent) at col. 2, lns. 16-39.) When the time to rekey arrives, communication units generate the new keys. (Ex. 160 ('722 patent) at col. 2, lns. 16-39.)

338. In 802.11, a "group temporal key" (GTK) is used to protect transmissions of data to a group of devices (as opposed to an individual device). (Ex. 386A at 1234, § 11.6.1.1.) A GTK is generated using a group key handshake. (Ex. 386A at 1264, § 11.6.7.1.) During the group key handshake, the access point sends each message with a "key replay count" that is used by the receiving station to compare with and update a stored key replay count. (Ex. 386A (802.11-2012) at 1265-1266, § 11.6.7.1-11.6.7.3.)

339. The technology claimed by the '722 patent is essential to the group rekeying feature of the 802.11 Standard. At least one claim of the patent covers key generation in the group key handshake as described by the 802.11 Standard, and so devices that practice the group key handshake for broadcasting in accord with the Standard would infringe this claim. (11/19 (Williams) Tr. at 72:20-73:8, 74:18-22, 76:11-77:19, 79:17-80:1.)

340. The group key handshake is necessary to allow secure group communication. (11/19 (Williams) Tr. at 79:25-80:1; Ex. 386A (802.11-2012) at 1234, § 11.6.1.1.)

5. Patents Relating To Power Management: U.S. Patents Nos. 5,029,183 (Tymes), 5,479,441 (Kramer), 5,560,021 (Vook), and 6,236,674 (Morelli)

a. U.S. Patent Nos. 5,029,183 (Tymes) and 5,479,441 (Kramer)

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341. The '183 and '441 patents disclose methods in which a device in a power save mode decides when it wants to receive messages from a base station by transmitting a signal to the base station. (Ex. 2013 ('183 patent) at Abstract; Ex. 2014 ('441 patent) at Abstract.) The base station responds with an acknowledgement ('183 patent), or a reply signal ('441 patent), to the device in the power save mode. (Ex. 2013 ('183 patent) at claim 1 (MOTM_WASH1823_0589210); Ex. 2014 ('441 patent) at claim 1 (MOTM_WASH1823_0590972).)

342. The 802.11 Standard defines a power save (PS) mode. (Ex. 386A (802.11-2012) at 984-985, §§ 10.2.1.1-10.2.1.2, Tbl. 10-1.) A station will enter a "doze" state during which messages at an access point destined for the station are not sent immediately, but instead are stored (buffered) at the access point until the station wakes up and sends a "PS-Poll message" to the access point. (Ex. 386A (802.11-2012) at 985, § 10.2.1.2, Tbl. 10-1.)

343.

344. The claimed inventions of the '183 and '441 patents are essential to the power saving features of the 802.11 Standard. (11/19 (Williams) Tr. at 80:2-11.) At least one claim of each patent covers the 802.11 Standard's power saving mode, and so devices implementing the 802.11 power save mode - such as battery-powered mobile devices - would infringe this claim. (11/19 (Williams) Tr. at 72:20-73:8, 74:18-22, 76:11-77:19, 80:2-11.)

345. The invention of the '183 and '441 patents are important to power management, an advanced feature of the 802.11 Standard. (11/19 (Williams) Tr. at 74:4-17, 80:2-15. Power management is an important consideration for 802.11-compliant battery-powered devices. (Ex. 386A (802.11-2012) at 45, § 4.2.4; 11/19 (Williams) Tr. at 80:12-15.)

b. U.S. Patent No. 5,560,021 (Vook)

346. The '021 patent relates to power management for use in a wireless LAN, in which a communication device enters a power saving mode in which the device only periodically transitions to an active mode of operation to listen for messages. (Ex. 166 ('021 patent) at

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Abstract.) The receiving device further is informed when more information is to be received, thereby ensuring that the receiving device does not enter the power saving mode until after the data has been received. (*Id.*)

347. When an 802.11-compliant device in power save mode receives a DTIM message indicating that a message for the device is being stored at the access point, the device remains in an awake state until the entire message is received. (Ex. 386A (802.11-2012) at 993-994, § 10.2.1.8.)

348. The claimed invention of the '021 patent is essential to the power saving features of the 802.11 Standard. (11/19 (Williams) Tr. at 80:2-11.) At least one claim of the patent covers the 802.11 Standard's power saving mode, and so devices implementing the 802.11 Standard's power save mode - such as battery-powered mobile devices - would infringe this claim. (11/19 (Williams) Tr. at 72:20-73:8, 74:18-22, 76:11-77:19, 80:2-11.)

349. The invention of the '021 patent is important to power management, an advanced feature of the 802.11 Standard. (11/19 (Williams) Tr. at 74:4-17, 80:2-15. Power management is an important consideration for 802.11-compliant battery-powered devices. (Ex. 386A (802.11-2012) at 45, § 4.2.4; 11/19 (Williams) Tr. at 80:12-15.)

c. U.S. Patent No. 6,236,674 (Morelli)

350. The '674 patent discloses methods of switching a device between a low-power consumption mode and an active mode. (Ex. 2016 ('674 patent) at Abstract, col. 3, lns. 35-38.) The device switches from low-power mode to active mode in response to receiving an indication that a message is directed towards the device, and then receives the message in the active mode. (Ex. 2016 ('674 patent) at col. 4, lns. 24-34.)

351. The '674 patent is essential to the power saving features of the 802.11-2012 Standard. (11/19 (Williams) Tr. at 72:20-73:2, 74:4-17, 80:2-15.) At least one claim of the '674 patent covers the 802.11 Standard's power saving mode, and so devices implementing the 802.11

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Standard's power save mode - such as battery-powered mobile devices - would infringe this claim. (11/19 (Williams) Tr. at 72:20-73:8, 74:18-22, 76:11-77:19, 80:2-11.)

352. The invention of the '674 patent is important to power management, an advanced feature of the 802.11 Standard. (11/19 (Williams) Tr. at 74:4-17, 80:2-15. Power management is an important consideration for 802.11-compliant battery-powered devices. (Ex. 386A (802.11-2012) at 45, § 4.2.4; 11/19 (Williams) Tr. at 80:12-15.)

6. Patents Relating to Low Density Parity Check Codes: U.S. Patent Nos. 7,143,333 (Blankenship), 7,165,205 (Blankenship), and 7,493,548 (Nimbalker)

353. The '333, '205 and '548 patents relate to encoding and decoding data using low-density parity-check ("LDPC") codes. (Ex. 181 ('333 patent) at col. 1, lns. 6-10; Ex. 183 ('205 patent) at col. 1, lns. 6-10; Ex. 2019 ('548 patent) at col. 1, lns. 6-10.) LDPC codes are used by communicating devices to detect and correct wireless transmission errors in a received message. (Ex. 181 ('333 patent) at col. 3, lns. 1-6; Ex. 183 ('205 patent) at col. 2, lns. 5-7; Ex. 2019 ('548 patent) at col. 3, lns. 1-2.)

354. Error correction codes such as LDPC codes are specified in the 802.11 Standard to provide high performance error correction. (Ex. 386A (802.11-2012) at 1711, § 20.3.11.7.1.) LDPC codes are optional in the 802.11 Standard. (*Id.*)

355. The '333, '205 and '548 patents are essential to the use of LDPC codes as described in the 802.11-2012 Standard. (11/19 (Williams) Tr. at 80:2-11.) At least one claim of each of the patents covers the use of LDPC codes as described by the 802.11-2012 standard, and so 802.11-compliant devices that use LDPC codes would infringe these claims. (11/19 (Williams) Tr. at 72:20-73:8, 74:18-22, 76:11-77:19, 80:2-11.)

356. The technologies claimed by the '333, '205 and '548 patents provide an advanced feature to the 802.11 Standard, and are increasing in importance. (11/19 (Williams) Tr. at 80:2-19.) For example, LDPC codes are a mandatory part of a next generation draft of the 802.11 Standard. (11/19 (Williams) Tr. at 80:12-19.)

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7. Patent Relating to Data Defragmentation: U.S. Patent No. 5,311,516 (Kuznicki)

357. The '516 patent is directed towards message defragmentation in which a data packet that has been separated into smaller fragments for easy transmission is reconstructed. (Ex. 154 ('516 patent) at Abstract; 11/19 (Williams) Tr. at 80:2-11.) When a received fragment indicates that no more fragments are to be received, a receiver begins reconstructing the message. (Ex. 154 ('516 patent) at Abstract.)

358. Fragmentation is used in an 802.11-compliant device to split packets into smaller units, thereby improving reliability and increasing the probability of successful transmission. (11/15 (Gibson) Tr. at 131:25-132:7; Ex. 386A (802.11-2012) at 822, § 9.2.7.) Defragmentation is the process of recombining packet fragments into a single packet. (Ex. 386A (802.11-2012) at 822, § 9.2.7.) When defragmenting packets in 802.11, each fragment of the packet has a bit indicating to the receiving station whether the fragment is the last fragment of the packet to be received. (*Id*. at 382, § 8.2.4.1.1; *id*. at 384, § 8.2.4.1.5.)

359. The '516 patent is essential to the advanced defragmentation process of the 802.11 Standard. (11/19 (Williams) Tr. at 80:2-11.) At least one claim of the patent covers defragmentation as described by the 802.11 Standard, and so devices that defragment data in an 802.11-compliant network would infringe this claim. (11/19 (Williams) Tr. at 72:20-73:8, 74:18-22, 76:11-77:19, 80:2-11.)

8. Patent Relating to Fast Transitions – 802.11r: U.S. Patent No. 7,236,477 (Emeott)

360. The '477 patent discloses a method of reducing the time to complete an authenticated handover of a mobile station from one access point to another access point by performing some steps normally performed upon leaving one access point while still associated with that access point. (Ex. 101 ('477 patent) at Abstract.) A cryptographic key is derived at the mobile station and in the wireless local area network (WLAN) infrastructure and stored until the mobile station initiates a handover. (*Id.* at Abstract.)

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361. The '477 patent is essential to the fast transition capability as described in the 802.11-2012 standard. (11/19 (Williams) Tr. at 80:2-11.) The technology claimed by the '477 patent provides an advanced feature to the 802.11 Standard. (11/19 (Williams) Tr. at 80:2-19.) At least one claim of the patent covers fast transitions as described by the 802.11 Standard, and so 802.11 compliant devices that use fast transitions would infringe this claim. (11/19 (Williams) Tr. at 72:20-73:8, 74:18-22, 76:11-77:19 80:2-11.)

362. [Not Used]

9. Patent Relating to Mesh Networking – 802.11s: U.S. Patent No. 7,197,016 (Belcea)

363. The '016 patent discloses a "multihopping" radio system in a network of wireless devices, where each wireless device is able to operate as a "node" of a path of a call from one wireless device to another. (Ex. 100 ('016 patent) at col. 1, lns. 18-32; col. 23, ln. 65 – col. 24, ln. 17.) Each wireless device in the system stores registration information about other wireless devices in the system in order to keep track of a path to other devices. (Ex. 100 ('016 patent) at col. 23, ln. 65 – col. 24, ln. 17.)

364. [Not Used]

365. The '016 patent is essential to the advanced mesh networking provisions of the 802.11-2012 standard. (11/19 (Williams) Tr. at 80:2-11.) At least one claim of the patent covers mesh networking as described by the 802.11 Standard, and so devices implementing mesh networking features in compliance with the Standard would infringe this claim. (11/19 (Williams) Tr. at 72:20-73:8, 74:18-22, 76:11-77:19, 80:2-11.)

D. There Were No Alternatives to Motorola's 802.11 Patented Technology

366. Microsoft expert Dr. Gibson's assertion that there were purported alternatives to the technology in the 802.11 Standard covered by Motorola's patents was not credible. Dr. Gibson's proposed alternatives were simply a set of technologies that he asserted were similar to the technologies in the 802.11 Standard, but he did not attempt to perform any technical analysis

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of the proposed technologies to determine their suitability as alternatives. (11/19 (Williams) Tr. at 103:19-25; 11/15 (Gibson) Tr. at 85:12-16, 114:15-144:15. *See also* FF 367-385, below)

367. To establish that a proposed technology is an acceptable alternative to what was adopted in the 802.11 Standard, it must be shown that: (1) the proposed alternative has equal or better performance to the technology being replaced; (2) the proposed alternative does not have an adverse effect on other portions of the standard that would require significant changes to the rest of the standard; (3) the 802.11 working group was aware of the proposed alternative; and (4) the proposed alternative does not practice a Motorola patent. (11/19 (Williams) Tr. at 103:1-18.) Dr. Gibson did not analyze any of his proposed alternatives in this, or any other, fashion. (11/19 (Williams) Tr. at 103:19-22.)

368. Dr. Gibson did not compare the performance of his purported alternatives with the performance of the 802.11 Standard. (11/15 (Gibson) Tr. at 168:10-13.)

369. Dr. Gibson did not attempt to show how any purported alternative would or could have been implemented in the Standard and, if implemented, whether and how the Standard would have needed to be amended or rewritten, and what technological or commercial advantages or disadvantages would have resulted from such alternative implementation. (11/15 (Gibson) Tr. at 115:20-25, 166:8-20, 166:24-167:3, 167:23-168:13; 11/19 (Williams) Tr. at 102:17-104:18.) Nor did Dr. Gibson show whether there would have been any additional cost to implement the purported alternatives in the 802.11 Standard. (11/15 (Gibson) Tr. at 169:8-13.)

370. Dr. Gibson made no attempt to show that any of his purported alternatives to the 802.11 technologies covered by Motorola's essential patents were actually considered for implementation by the 802.11 IEEE Standards Organization. (11/15 (Gibson) Tr. at 166:24-167:3; 11/19 (Williams) Tr. at 103:13-15.)

371. The lack of credible analysis by Dr. Gibson led him to admit that he was wrong about at least one of his proposed alternatives. (11/15 (Gibson) Tr. at 175:9-12.) Dr. Gibson testified on direct examination that the WaveLAN system was an alternative to the '896 patent in

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the 802.11 Standard. (11/15 (Gibson) Tr. at 121:19-122:6, 122:14-19.) But when, on cross examination, Dr. Gibson considered the active scanning procedure in the 802.11 Standard, Dr. Gibson admitted that active scanning is a benefit of the 802.11 Standard that WaveLAN does not provide. (11/15 (Gibson) Tr. at 174:19-24.)

372. Overall, Dr. Gibson identified 34 alternatives across the 24 Motorola patents considered by Dr. Williams. (11/15 (Gibson) Tr. at 85:12-16, 114:15-144:15.) Dr. Gibson did not provide any opinion as to whether any combination of these alternatives could be used together. (*Id*.) In fact, Dr. Gibson proposed a combination of alternative technologies that engineers in the field of wireless communications had previous rejected. For example, Dr. Gibson refers to a WaveLAN article by an engineer from NCR, a company involved in the development of WaveLAN. (Ex. 545 at 27, 37; 11/15 (Gibson) Tr. at 91:14-15.) In that article, the NCR engineer explained that 802.3 collision detection was considered but rejected for WaveLAN. (Ex. 545 at 28.) In particular, the article states:

> Another standard protocol considered was 802.3 *CSMA/CD*, which has the largest installed base in the IAN market Due to the large dynamic range of the radio medium, bandwidth-efficient collision detection is technically difficult. Various mechanisms exist for implementing collision detection, but the cost in bandwidth seems to exceed the benefits in overall throughput in normal loading conditions.

(Ex. 545 at 28.) Dr. Gibson proposed WaveLAN and 802.3 Ethernet collision detection as alternatives to different Motorola patented technology in the 802.11 Standard, but failed to describe why the two technologies would be compatible if adopted into the 802.11 Standard. (11/15 (Gibson) Tr. at 120:6-121:3, 121:19-122:19.)

373. Dr. Gibson proposed alternatives that would not have been considered to be viable alternatives by members of the 802.11 working group. For example, Dr. Gibson testified that there were techniques described in his undergraduate textbook that provided alternatives to the synchronization techniques used by the 802.11 Standard. (11/15 (Gibson) Tr. at 128:1-4.) But the technologies involved in the 802.11 Standard are far more complex than what is taught in an undergraduate textbook. (11/19 (Williams) Tr. at 105:17-106:4.)

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374. Dr. Gibson proposed alternatives based on documents that themselves state that the proposed alternatives are not suitable to provide the functionality being replaced in the 802.11 Standard.

375. For example, Dr. Gibson asserts that a protocol known as RTP is a suitable alternative to quality of service functionality in the 802.11 Standard. (11/15 (Gibson) Tr. at 136:20-137:20, 138:1-7.) But the document cited by Dr. Gibson to describe RTP states that "RTP itself does not provide any mechanism to ensure timely delivery or provide other quality-of-service guarantees, but relies on lower-layer services to do so." (Ex. 540 at 5.) Dr. Gibson did not explain how a system that does not itself provide quality of service can be an alternative to the quality of service functionality in the 802.11 Standard. (11/15 (Gibson) Tr. at 136:20-137:20, 138:1-7.)

376. Dr. Gibson failed to show that some of his alternatives had ever been implemented in any system, let alone a wireless system similar to 802.11. For example, Dr. Gibson testified that the subject matter of US Patent 5,440,560 is an alternative to power management technology in the 802.11 Standard. (11/15 (Gibson) Tr. at 142:3-13, 143:3-20.) But Dr. Gibson pointed to no evidence that the approach of the '560 patent was ever implemented in an actual application. (*Id*.)

377. As another example, Dr. Gibson testified that as an alternative to using the claimed method of the '398 patent (Ex. 161) to encrypt an authentication key, a "new encryption key" could be used to encrypt an authentication key. (11/15 (Gibson) Tr. at 124:7-16.) Dr. Gibson did not describe what the "new encryption key" was, or how the use of the "new encryption key" would not practice the '398 patent. (11/15 (Gibson) Tr. at 124:7-16.)

378. As still another example, Dr. Gibson testified that an alternative to using the claimed method of the '563 patent (Ex. 169) to generate an authentication key with a packet number would be the use of the message data itself to generate an authentication key. (11/15 (Gibson) Tr. at 124:21-25.) Dr. Gibson testified that the use of the message data itself to

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generate an authentication key was established or known in the art at the time, but he did not point to a technology that generated an authentication key from message data that was or could have been known to the 802.11 working group. (11/15 (Gibson) Tr. at 124:21-125:3.)

379. In evaluating some of the alternatives, Dr. Gibson overlooked trade-offs in costs of implementation. (11/15 (Gibson) Tr. at 169:8-13)

380. For example, Dr. Gibson cites Wittneben, "Base Station Modulation Diversity for Digital SIMULCAST," as an alternative to the HT mode of 802.11n. (11/15 (Gibson) Tr. at 129:1-7, 130:3-13.) But this article discusses a SimulCast system in which separate base stations transmit the same message to a receiver. (Ex. 550 (Wittneben – Simulcast) at abstract.) Dr. Gibson did not explain how a system that would require a user to purchase multiple devices in order to simultaneously transmit a single message would be a suitable alternative for the 802.11 Standard's technology, in which a single device is used to transmit a message to another device. (11/15 (Gibson) Tr. at 87:7-16, 129:1-7, 130:3-13.)

381. Dr. Gibson relied on the Static Spatial Multiplexing (SM) Power Save Mode of the 802.11-2012 Standard as an alternative to Dynamic Spatial Multiplexing (SM) Power Save Mode. (11/15 (Gibson) Tr. at 142:3-13.) But "[a station] in static SM power save mode maintains only a single receive chain active," while in dynamic SM power save mode, "a [station] enables its multiple receive chains." (Ex. 386A (802.11-2012) at 1010, § 10.2.4.) Dr. Gibson did not explain how using only a single receive chain can have the same performance as using multiple receive chains. (11/15 (Gibson) Tr. at 142: 3-13.)

382. Dr. Gibson relied on Fazel, "Performance of CDMA/OFDM for mobile communications," as describing an alternative to HR/DSSS. (11/15 (Gibson) Tr. at 126:9-127:2.) But the Fazel article is directed to OFDM, not DSSS. (Ex. 527 (Fazel Article) at Abstract.) The 802.11 committee included both OFDM and HR/DSSS in the 802.11 Standard, and Dr. Gibson's proposed alternative suggests, without support, that the 802.11 working group

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would have dropped HR/DSSS from the standard and used only OFDM. *See* Ex. 386A (802.11-2012) at 1583-1630, § 18.)

383. Dr. Gibson further relies on the use of the channel access mechanism in 802.3 Ethernet as an alternative to the channel access mechanisms used in 802.11 and taught by the Crisler patent. (11/15 (Gibson) Tr. at 120:6-9, 120:17-121:3.) But 802.3 Ethernet uses collision detection, while 802.11 uses collision avoidance, two entirely different methodologies of channel access. (11/19 (Williams) Tr. at 105:1-13.)

384. Further, the approach used in 802.3 Ethernet is appropriate for wired systems, but is expensive and complicated to implement in a wireless device because the device must transmit and listen at the same time. (11/19 (Williams) Tr. at 105:14-16.)

385. Dr. Gibson relied on Whitfield Diffie's paper, "New Directions in Cryptography" as an alternative to the 802.11 Standard's technology covered by the '571 patent. (11/15 (Gibson) Tr. at 123:8-16; Ex. 505.) The Diffie paper discusses a system in which an "enciphering key" can be "publicly disclosed" such that each user can "place his enciphering key in a public directory." (Ex. 505 at 29.) In 802.11, however, a passphrase is stored in devices that connect using security, which is secret, not public. (11/19 (Williams) Tr. at 99:3-21.) Dr. Gibson provided no analysis as to how his proposed alternative using a public key could be used in place of the 802.11 technology that uses a private key. (11/15 (Gibson) Tr. at 123:8-16.)

E. Microsoft Overstates the Number of Patents in the 802.11 Standard

386. Dr. Gibson discussed third-party patents that he opined were relevant to the same technological areas as Motorola's 802.11 essential patents. (11/15 (Gibson) Tr. 148:8-153:19.) Dr. Gibson assumed, without any analysis, that all third-party patents identified in letters of assurance are essential to the 802.11 Standard. (11/15 (Gibson) Tr. at 157:19-24; 158:4-22; 160:14-24.) Dr. Gibson's analysis of third-party patents was based on the understanding that a company submits a letter of assurance saying that the company has patents that are essential to the Standard. (11/15 (Gibson) Tr. 161:15-21.)

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387. But third-party patent declared by its patent owner to be essential to the 802.11 Standard in a letter of assurance cannot be assumed to be, in fact, essential to the Standard. A letter of assurance submitted by a company does not say that the company has patents that are essential to the 802.11 Standard. (11/15 (Gibson) Tr. at 162:11-15; Ex. 3421.) No quality control process or analysis is performed on patents declared essential. (11/15 (Gibson) Tr. at 199:10-22; *see also* 11/16 (Simcoe) Tr. at 19:25-20:10.) Further, patents are often declared essential to the 802.11 Standard in letters of assurance before the technology to be included in the Standard is finalized. (11/19 (Williams) Tr. at 117:10-17.) It is impossible to know whether a patent is essential to the 802.11 Standard before the Standard is defined. (11/16 (Simcoe) 18:22-19:2.)

388. For example, prior to this lawsuit, Microsoft had declared at least one patent to be essential to the 802.11 Standard in letters of assurance to the IEEE. (11/15 (Gibson) Tr. at 161:22-163:11; Ex. 3421.) But Microsoft does not now allege that all of these patents are essential to the 802.11 Standard. (11/15 (Gibson) Tr. at 144:16-145:7, 161:22-164:8; Ex. 3421; Exs. 345, 434, 435, 437, 438, 439 and 503.) Microsoft identified U.S. Patent No. 7,089,415 in a letter of assurance to the IEEE, but does not assert in this action that this patent is essential. (11/15 (Gibson) Tr. at 161:22-164:8.)

F. Motorola's 802.11 SEPs Are Valuable To Microsoft's Products

389. At least the following 11 Motorola 802.11 U.S. patents must be used by any product that is compliant with the 802.11 Standard: 6,331,972 (Harris); 6,069,896 (Borgstahl); 6,473,449 (Cafarella); 5,329,547 (Ling); 5,822,359 (Bruckert); 5,519,730 (Jasper); 5,272,724 (Solomon); 5,142,533 (Crisler); 5,357,571 (Banwart); 5,467,398 (Pierce); 5,689,563 (Brown). (11/19 (Williams) Tr. at 78:7-20.)

1. Demand for and Benefits of Use of 802.11

390. Most electronic devices with the ability to connect to the Internet, such as, for example, smartphones, gaming systems, PCs, and tablets, include Wi-Fi functionality. There is

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an expectation by consumers that such devices will include this functionality. (11/19 (Dansky) Tr. at 212:2-15; 11/15 (Del Castillo) Tr. at 46:13-19, 78:9-14.)

391. A Microsoft employee told his colleagues that Wi-Fi capability is "a key and very important marketing lever we have with our competition and not having 802.11b/g/n Wi-Fi logo is not an option." (Ex. 3145; (11/19 (Williams) Tr. at 83:1-6, Ex. 3145; *see also* 11/15 (Del Castillo) Tr. at 42:24-44:10; [redacted].)

392. Microsoft was concerned that the Xbox 360 would appear "dated" compared to its competitors if it lacked integrated 802.11, [redacted] (*See* 11/15 (Del Castillo) Tr. at 42:18-44:15 [redacted].)

393. The Xbox 360 first launched in November 2005, and did not include integrated 802.11 capability. (11/19 (Dansky) Tr. at 209:20-210:1.) Following the November 2006 launch of the Sony PlayStation 3 and the Nintendo Wii, both of which included integrated 802.11 capability, Microsoft's market share dropped from approximately 70% to 26%. (11/19 (Dansky) Tr. at 214:16-24; Ex. 2451.)

394. 802.11 functionality has certain advantages over wired and cellular connectivity. (11/15 (Gibson) Tr. at 97:8-15; 11/19 (Dansky) Tr. at 212:2-15.)

395. Product reviews reflected consumer frustration with the lack of integrated 802.11 capability in the Xbox 360: "the older Xbox [i.e., original Xbox 360] was limited to a wired network connection. Sadly, that hasn't changed on the [new Xbox model, i.e., Xbox 360 Elite]." (Ex. 2684.)

396. Microsoft understood that "wireless connectivity using wifi was becoming a customer expectation." (11/15 (Del Castillo) Tr. at 46:16-17, 50:7-8.)

397. Microsoft began its effort to integrate 802.11n in the Xbox 360, which it touted as a "key product differentiator," where Nintendo and Sony only "have 802.11b/g included in [the

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console]. (11/19 (Dansky) Tr. at 209:20-210:14; 11/15 (Del Castillo) Tr. at 46:1-19; Ex. 2684, [redacted]

398. Microsoft sold its Xbox 360 wireless adapter, which was directed solely to providing improved wireless functionality for $99.99, despite its cost of goods sold of less than $15. (11/15 (Del Castillo) Tr. at 25:20-25, 50:12-17, 51:7-25, 53:3-14; 11/19 (Dansky) Tr. 211:14-25; Ex. [redacted]

399. Following launch in 2010 of the Xbox 360 S (with its now-integrated Wi-Fi) and the Omni N adapter, Microsoft regained the top market share. (11/19 (Dansky) Tr. at 214:25-215:5; Ex. 2451.)

400. Microsoft has admitted that "most homes do not have wired networks today. When you go into a home, if they have a connection, it's going to be WiFi, because it's the easiest to set up." (11/15 (Del Castillo) Tr. at 78:2-4.)

401. The Administrative Law Judge in International Trade Commission Investigation No. 337-TA-752 determined that the Xbox 360 S infringes claims 12 and 13 of the '571 patent. *In the Matter of Certain Gaming and Entertainment Consoles, Related Software, and Components Thereof*, Inv. No. 337-TA-752, Initial Determination (April 25, 2012) at 214-224, 330.

402. Albert Penello, a Principal Product Planner at Microsoft has testified that it would be difficult to sell the Xbox today without 802.11 support. (5/25/11 Penello Depo. Tr. 71:10-14; *see also* 11/15 (Del Castillo) Tr. at 42:18-44:10, [redacted]

403. Microsoft has continued its efforts to make the Xbox an all-in-one entertainment hub capable of providing television content and video as part of its "own the living room" strategy. (11/15 (Del Castillo) Tr. at 54:7-1356:10-15; 11/19 (Dansky) Tr. 217:10-218:4; Ex. 2265, [redacted]

404. Microsoft considers Wi-Fi to be a critical aspect of its "own the living room" strategy, stating that such connectivity "opens up the world for all the other features that you can

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get to," such as multiplayer video games, and bandwidth-intensive content like HD video, available for example, through Xbox LIVE subscriptions. (11/15 (Del Castillo) Tr. 46:20-25, 78:7-8; 11/19 (Dansky) Tr. 212:2-12; Ex. [redacted]

405. In the next-generation Xbox console, 802.11 technology will be "vital" to the overall user experience. (11/19 (Dansky) Tr. 218:20-24; Ex [redacted]

406. [redacted]

407. Motorola's patented MIMO technology provides advances in increasing through-put and reliability, and any product that is associated with use of MIMO will infringe Motorola's Kotzin patent. (11/19 (Williams) Tr. at 83:13-24.)

408. [redacted]

409. Microsoft also makes and sells the Surface tablet device, which has no other means than 802.11 technology to connect to the Internet. (11/13 (DeVaan) Tr. at 52:14-18.)

410. [Not Used]

2. Revenue Related to 802.11-Compliant Products and Convoyed Sales

411. Microsoft sells an 802.11-compliant adapter to add Wi-Fi functionality to older Xbox gaming systems, which had a projected retail price of $99, and from 2006 to 2010 sold for an average of $69.18. (*See* [redacted], 2466; *see also* 11/20 (Dansky) Tr. at 10:3-7.) The 802.11n version of this adapter, the "Omni N," was projected to provide speeds up to twice that of the Xbox 360 S integrated adapter. (11/15 (Del Castillo) Tr. at 53:3-14; Ex. [redacted]

412. The 802.11 functionality in the Xbox 360 console promotes and generates the sales of other Microsoft products and is a generator of a significant source of derivative or convoyed sales. For example, Xbox users who use Xbox Live to play games and download

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content often connect to the Xbox Live system using a Wi-Fi connection. ([redacted].) [redacted] Furthermore, 802.11 functionality enabled Microsoft to sell high-margin add-on accessories, like the Xbox 360 Wireless N Gaming Adapter. (11/15 (Del Castillo) Tr. at 48:11-23; 11/20 (Dansky) Tr. at 10:3-7; Ex. [redacted]

413. Frequent Xbox users who utilize Motorola's 802.11 technology will often buy multiple accessories, including controllers, headsets, and the Kinect. (11/20 (Dansky) Tr. at 124:21-24.)

414. [redacted]

415. [redacted]

416. [redacted]

G. Microsoft's Alleged 802.11 Essential Patents Have Little Value

1. Microsoft's 802.11 Patents and their Technical Value

417. Microsoft has alleged that seven of its patents are essential to the 802.11 Standard: (1) Shen U.S. Patent 7,974,574 ("Shen '574"); (2) Kuehnel U.S. Patent 7,613,426 ("Kuehnel '426"); (3) Giaimo U.S. Patent 7,522,551 ("Giaimo '551"); (4) Bahl U.S. Patent 7,440,754 ("Bahl '754"); (5) Bahl U.S. Patent 7,194,263 ("Bahl '263"); (6) Karr U.S. Patent 6,999,545 ("Karr '545"); and (7) Srinivas U.S. Patent 6,745,360 ("Srinivas 360"). (11/15 (Gibson) Tr. at 144:16-145:11; Exs. 345, 434, 435, 437, 438, 439 and 503.)

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418. Microsoft presented no evidence, however, that any of these families includes a patent that is, in fact, essential to the 802.11 Standard. (11/15 (Gibson) Tr. at 144:16-145:11, 161:2-5.)

419. Kuehnel '426, Bahl '754, Srinivas '360 and Karr '545 are not essential to the 802.11 Standard. (11/19 (Williams) Tr. at: 100:24-101:14.) Bahl '263 is the parent application of Bahl '754. (Ex. 437)

420. Shen '574 and Giaimo '551, if essential, relate to emerging technologies that involve peripheral portions of the standard. (11/19 (Williams) Tr. at 101:22-102:5.) These technologies are in technological areas that have no current technological value, as they have not been proven, and may not have any future value. (11/19 (Williams) Tr. at 102:6-14.)

421. Because Motorola's 802.11 essential patent portfolio includes numerous patents directed to core features of the 802.11 Standard that must necessarily be used by companies desiring to make and sell a device that is compliant with the 802.11 Standard, while Microsoft's portfolio relates to optional non-core features, Motorola's portfolio is significantly more valuable, as a technical matter, than Microsoft's portfolio. (11/19 (Williams) Tr. at 73:9-74:3, 78:7-20, 80:20-83:6, 102:6-16.)

2. The Value of Microsoft's 802.11 patents to Motorola's Products

422. Only two of Microsoft's asserted 802.11 patents are essential to the 802.11 Standard, and Microsoft's 802.11 patents therefore give no appreciable value to Motorola's products.802.11 Standard (11/19 (Williams) Tr. at 101:22-102:14; 11/20 (Dansky) Tr. at 13:17-14:3, 129:15-17.)

H. Overview of the H.264 Standard

423. The H.264 Standard is a video coding standard, also known as MPEG-4 Part 10 and AVC (Advanced Video Coding). (Ex. 421; Ex. 424 at 560.)

424. The first version of the H.264 Standard was adopted in May 2003. (Ex. 610.)

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425. H.264 is currently the most widely used video coding format. (Ex. 2515 at MOTM_WASH1823_0608878 ("in the past four quarters, the H.264 format went from 31 percent of all videos to 66 percent, and is now the largest format by far."); Ex. 2747 at MOTM_WASH1823_0610702, 704; 11/20 (Dansky) Tr. at 15:16-16:23, 17:15-18:2.)

426. H.264 is used in applications ranging from mobile services to video conferencing to IPTV (Internet Protocol TV), HDTV (High Definition TV), and HD video storage. (Ex. 574 at 134-35; Ex. 2747 at MOTM_WASH1823_0610702, 704.)

427. H.264 has been widely adopted for use in digital broadcast television, satellite television and cable television. (Ex. 2747 at MOTM_WASH1823_0610704; Ex. 2739 at MS-MOTO_1823_00000944792; 11/13 (DeVaan) Tr. at 51:10-25; Ex. 3399 at MOTM_WASH1823_0612362-364; 11/14 (Orchard) Tr. 153:2-17.)

1. Core Features of the H.264 Standard

428. Three core features of the H.264 Standard are adaptive frame/field ("AFF") coding, prediction, and transform/quantization. (11/19 (Drabik) Tr. at 26:23-27:4; 11/14 (Sullivan) Tr. 31:21-32:14; 11/14 (Orchard) Tr. at 109:10-15 (prediction, transform, and quantization are "core video coding components of the H.264 standard"); Ex. 424 (Sullivan paper) at 566-71; Ex. 574 at 136-38; Ex. 421 at 4 (0.6.2), 24-25 (6.3), 26 (6.4.2), 129-181.)

429. The basic idea of AFF coding is to be able to switch between frame coding (which is typically preferred when the video scene contains limited motion) and field coding (which typically works better when there is fast picture-to-picture motion). (Ex. 421 at 4; Ex. 424 (Sullivan paper) at 566-68.)

430. To provide high coding efficiency, H.264 includes two AFF coding techniques. In *picture adaptive frame/field* ("PAFF"), the frame coding or field coding is adaptively selected on a picture-by-picture basis. In *macroblock adaptive frame/field* ("MBAFF") coding, the frame or field coding is done on a more localized basis within a coded frame for each vertical pair of

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macroblocks (16×32 luma region). (Ex. 424 (Sullivan paper) at 566-68; Ex. 574 at 137; Ex. 575 at 27; 11/14 (Sullivan) Tr. at 25:19-27:10, 27:23-28:10.)

431. The basic idea of prediction is to eliminate redundancy from picture to picture in order to reduce the number of bits that need to be transmitted or stored. There are two types of prediction: intra prediction and inter prediction. In intra prediction, a prediction is created from spatial extrapolation of neighboring image samples from within the same picture frame. In inter prediction, blocks are predicted using blocks from different pictures, called reference pictures. Inter prediction is a way to perform motion compensation, i.e., to exploit the high correlation between successive pictures of a video stream that represents moving objects. (Ex. 424 at 568-70; Ex. 574 at 137-38; Ex. 421 at 4 (0.6.3).)

432. The basic idea of transform is to convert pixel values into frequency coefficients. The frequency coefficients are easier to compress than the pixel values themselves. The basic idea of quantization is to reduce the number of bits required to represent each coefficient. After the frequency coefficients are quantized, they are scanned. During encoding, the frequency coefficient scan scans the frequency coefficients from locations in two dimensions and repositions them in one dimension for the next coding step. (Ex. 424 at 570-71; Ex. 574 at 138-39; Ex. 421 at 4 (0.6).)

2. Profiles and Levels of the H.264 Standard

433. The H.264 Standard refers to "profiles." A "profile" is a package of features that must be supported by all decoders conforming to that profile. (Ex. 421 at 286 ("Each profile specifies a subset of algorithmic features and limits that shall be supported by all decoders conforming to that profile."); 11/14 (Sullivan) Tr. at 59:21-60:3; Ex. 424 at 573; 11/19 (Drabik) Tr. at 36:21-22.)

434. The Marpe paper illustrates the H.264 profiles. (Ex. 574 at 140; 11/19 (Drabik) Tr. at 36:20-37:4):

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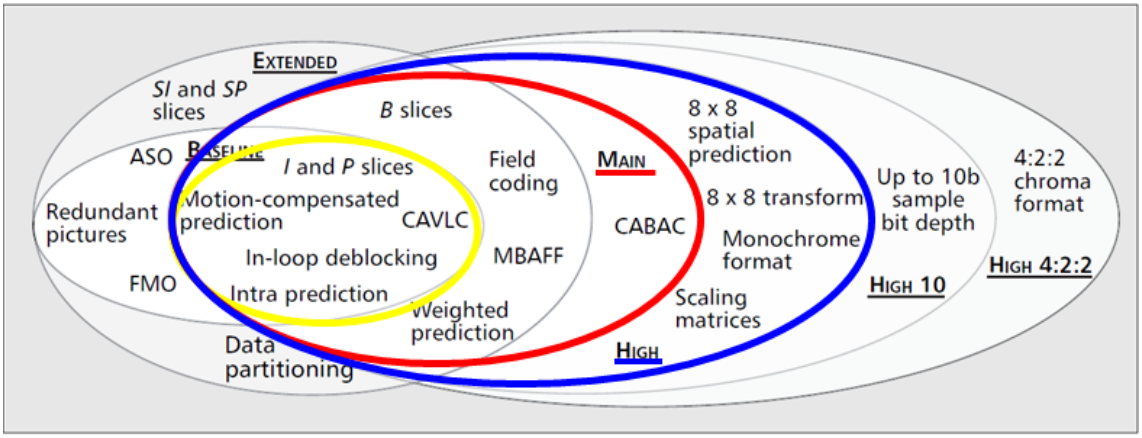

Ex. 574: Marpe et al., *The H.264/MPEG4 Advanced Video Coding Standard and its Applications*, IEEE Communications Magazine, August 2006 ("Marpe"), at 140 (MOTM_WASH1823_0394434)

435. The Constrained Baseline profile (highlighted in yellow) is a package of features that "must be supported by any H.264 decoder." (11/19 (Drabik) Tr. at 36:23-24; Ex. 574 at 140.) The Baseline profile is a superset of the Constrained Baseline profile and adds three additional tools for transport efficiency. Ex. 574 at 140. "'Baseline' refers to a limited functionality version of the technology that would not support, for example, high definition video." (11/13 (Glanz) Tr. at 77:1-3.)

436. The Main profile (highlighted in red) and High profile (highlighted in blue) provide additional coding tools, including field coding, MBAFF, and PAFF. (11/19 (Drabik) Tr. at 36:25-37:4; Ex. 574 at 140.)

437. The Main and High profiles are important profiles because they are commonly used for standard definition ("SD") and high definition ("HD") video. (11/19 (Drabik) Tr. at 36:25-37:4; 11/16 (Luthra) Tr. at 193:21-23; Ex. 574 at 141 ("the High profile . . . has overtaken the Main profile for prospective applications of H.264/MPEG4-AVC in typical SD and HD consumer applications"); Ex. 3399 at MOTM_WASH1823_0612357 (the Main profile was "designed with an emphasis on compression *coding efficiency* capability") (emphasis in original); Ex. 2739 at 17; [redacted]

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438. The H.264 Standard also provides for "levels" within each profile. A "level" is a set of performance capabilities that a decoder must be able to handle. (11/19 (Drabik) Tr. at 37:6-9; Ex. 421 at 286-304.)

439. All decoders conforming to a specific profile and level must support all features included in that profile and level. (Ex. 421 at 286; Ex. 574 at 140; Ex. 424 at 573; Ex. 3399 at MOTM_WASH1823_0612359 ("This scope restriction ensures that all decoders that implement a profile and level can decode all video that is intended for that configuration").)

440. Levels 2.1 to 4.1 are used for SD and HD video. (11/19 (Drabik) Tr. at 31:25-32:3; Ex. 421 at 302; Ex. 3399 at MOTM_WASH1823_0612357 ("'level 4' and 'level 4.1' . . . have HDTV capability").)

441. A decoder that conforms to levels 2.1 to 4.1 of the Main or High profiles must support interlace coding. (Ex. 421 (H.264 Standard, March 2010) at 299 (Table A-4, showing "frame_mbs_only_flag" undefined for levels 2.1 to 4.1); 11/14 (Sullivan) Tr. at 19:24-20:1, 20:8-10; 11/19 (Drabik) Tr. at 37:6-9.)

442. Microsoft's Gary Sullivan stated that, "within the bounds of a particular profile, [one] should get a license to the patents necessary to implement that part of the standard." (11/14 (Sullivan) Tr. at 59:17-60:3.)

I. Motorola's H.264 Essential Patents Are Technologically Valuable

443. There are 16 Motorola U.S. patents, and many foreign counterparts to those patents, that are essential to the practice of the H.264 Standard. These 16 patents are distributed among 6 patent "families." (11/19 (Drabik) Tr. at 25:18-19.)

Family	**U.S. Patent**
1. Krause Family	5,235,419 (Ex. 270)
2. Wu Family	5,376,968 (Ex. 283)
3. Eifrig Family	6,005,980 (Ex. 268)

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4. MBAFF Family	6,980,596 (Ex. 271) 7,310,374 (Ex. 272) 7,310,375 (Ex. 273) 7,310,376 (Ex. 274) 7,310,377 (Ex. 275) 7,421,025 (Ex. 276) 7,477,690 (Ex. 277) 7,817,718 (Ex. 278)
5. PAFF Family	7,769,087 (Ex. 281) 7,660,353 (Ex. 280) 7,839,931 (Ex. 282)
6. Scan Family	7,162,094 (Ex. 266) 6,987,888 (Ex. 265)

444. The 6 families of Motorola H.264 essential patents are directed to core technical features of the H.264 Standard: (a) AFF, (b) prediction, and (c) transform/quantization. The Krause, Wu, and Eifrig Families are directed to prediction. The MBAFF and PAFF Families are directed to AFF and prediction. The Scan Family is directed to transform/quantization. These are important core elements of H.264. (11/19 (Drabik) Tr. at 26:13-27:17.)

445. The 6 families of Motorola H.264 essential patents apply to both progressive and interlaced H.264 video. (11/19 (Drabik) Tr. at 63:12-64:21, 43:4-44:13.)

1. The Krause Patent Family

446. **The Patents.** The Krause Family consists of U.S. Patent No. 5,235,419, and foreign counterparts 2079862 (CA), EP0538667 (GB, GER, FR), 2875117 (JP), and 264507(KR). (Ex. 270; Ex. 2 at 17; 11/19 (Drabik) Tr. at 26:3-19.)

447. The ‘419 patent discloses adaptive video compression using a plurality of motion compensators, in order to more effectively encode video data in which complex movements occur. (Ex. 270 (‘419 patent) at Abstract, FIG. 1.)

448. **Essential Patents.** The Krause Family is “essential” to the H.264 Standard at the Baseline, Main, and High profiles. (11/19 (Drabik) Tr. at 26:3-19, 36:18-37:17.)

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449. At least one claim of the '419 patent covers adaptive motion compensation as described by the H.264 Standard. (*General Instrument Corp. v. Microsoft Deutschland GmbH*, No. 2 O 240/11, at 30-35 (Regional Court of Mannheim, 2nd Div. May 2, 2012) (English translation); Ex. 421 (H.264 Standard, March 2010) at 7 (3.41), 26 (6.4.2, Fig. 6-9), 97 (7.4.5), 150 (8.4), 158 (8.4.1.2.3), 174 (8.5); 11/19 (Drabik) Tr. at 26:3-19.)

450. **Importance to the Standard.** The Krause Family is technically valuable because it is directed to the core feature of prediction. It allows video encoders to encode video more efficiently by adaptively using the block size that results in the most compression of the video data. (11/19 (Drabik) Tr. at 27:22-28:17.) Likewise, it allows video decoders to retrieve a code word that indicates which block size the encoder used, and use that code word to recover motion vectors. (11/19 (Drabik) Tr. at 27:22-28:17.)

451. The '419 patent contributed to the 50% coding gain reported for H.26L (progressive scan sequences only). (11/16 (Luthra) Tr. at 192:25-193:16; Ex. 424 (Sullivan paper) at 574-75.)

452. Every encoder and decoder that processes H.264 video uses the Krause Family. (11/19 (Drabik) Tr. at 28:18-23.)

2. The Wu Patent Family

453. **Patents.** The Wu Family consists of U.S. Patent No. 5,376,968 and foreign counterparts 663671(AU), 2118668(CA), EP0615384 (FR, GER, GB, IRE, NETH, ES, SWED), 2945268(JP), 187606(MX), 311960(NOR), 244827(KR), and NI-084114(TAI). (Ex. 283; Ex. 2 at 19; 11/19 (Drabik) Tr. at 26:3-19.)

454. The '968 patent discloses a system that enables more effective compression of video data, by providing adaptive video compression using a plurality of compression modes. (Ex. 283 ('968 patent) at Abstract, Fig. 1; 11/19 (Drabik) Tr. at 29:3-13.)

455. **Essential Patents.** The Wu Family is "essential" to the H.264 Standard at the Baseline, Main, and High profiles. (11/19 (Drabik) Tr. at 26:3-19, 36:18-37:17.)

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456. At least one claim of the '968 patent covers adaptive compression as described by the H.264 Standard. *General Instrument Corp. v. Microsoft Deutschland GmbH*, No. 2 O 373/11, at 33-39 (Regional Court of Mannheim, 2nd Div. May 2, 2012) (English translation); Ex. 421 (H.264 Standard, March 2010) at 3 (0.6.1), 4 (0.6.3), 7 (3.41), 26 (6.4.2, Fig. 6-9), 105 (7.4.5.2, Table 7-17), 150 (8.4); 11/19 (Drabik) Tr. at 26:3-19.)

457. **Importance to the Standard.** The Wu Family is technically valuable because it is directed to the core H.264 feature of prediction. It provides greater flexibility in adaptively choosing compression modes, which leads to enhanced efficiency. (11/19 (Drabik) Tr. at 29:3-13.) Likewise, it allows video decoders to retrieve overhead data so that the decoder knows the compression mode used by the encoder and can perform the appropriate decompression corresponding to that compression mode. (11/19 (Drabik) Tr. at 29:2-22.)

458. The technology claimed in the '968 patent contributed to the 50% coding gain reported for H.26L (progressive scan sequences only). (11/16 (Luthra) Tr. at 192:25-193:11; Ex. 424 (Sullivan paper) at 574-75.)

459. Every encoder and decoder that processes H.264 video uses the Wu Family. (11/19 (Drabik) Tr. at 29:14-25.)

3. The Eifrig Patent Family

460. **Patents.** The Eifrig Family consists of U.S. Patent No. 6,005,980 and foreign counterparts 2230567(CA), 2702769(CA), and 245861(MX). (Ex. 268; Ex. 2 at 1; 11/19 (Drabik) Tr. at 26:3-19.)

461. The '980 patent is directed to deriving a predictor motion vector ("PMV") for a block based on the motion vectors of that block's three neighboring blocks (left (A), top (B), and top-right (C)), where there is at least one field coded block. (11/19 (Drabik) Tr. at 30:6-16; 11/16 (Luthra) 200:15-201:10.)

462. **Essential Patents.** The Eifrig Family is "essential" to the H.264 Standard at the Main and High profiles, levels 2.1 to 4.1. (11/19 (Drabik) Tr. at 26:3-12, 37:6-9, 37:14-19.)

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463. At least one claim of the '968 patent covers deriving prediction motion vectors as described by the H.264 Standard. (Ex. 421 (H.264 Standard, March 2010) at 9 (3.87), 29-30 (6.4.9, Fig. 6-13), 50-51 (7.3.3), 55 (7.3.4), 104 (7.4.5.1), 152-53 (8.4.1), 161-62 (8.4.1.3.1); 11/19 (Drabik) Tr. at 26:3-19; 11/16 (Luthra) Tr. at 200:15-202:11; Ex. 610 (H.264 Standard, April 2003) at 21.)

464. **Importance to the Standard.** The Eifrig Family is technically valuable because it is directed to the core H.264 feature of prediction. It improves the coding gain over other choices of blocks for motion vector prediction. (11/19 (Drabik) Tr. at 30:4-23; 11/16 (Luthra) Tr. at 200:21-202:11.)

465. During the development of the H.264 Standard, Motorola proposed to the JVT a technique for calculating a prediction motion vector (PMV) for a block based on neighboring blocks, where the blocks are frame or field coded. (Ex. 423 (VCEG-O37) at 8; 11/16 (Luthra) Tr. at 199:10-200:14.)

466. Motorola's '980 patent discloses Motorola's PMV invention—calculating the PMV for a current block based on the motion vectors of the left, top, and top-right neighboring blocks, where one of the blocks is in field mode. (Ex. 268; 11/16 (Luthra) Tr. at 200:15-201:7.)

467. The JVT adopted Motorola's PMV invention into the H.264 Standard. (*See, e.g.*, Ex. 610 (H.264 Standard, April 2003) at 21 (Fig. 6-9); Ex. 421 (H.264 Standard, March 2010) at 31 (Fig. 6-14); 11/16 (Luthra) Tr. at 200:15-201:24.)

4. The MBAFF Patent Family

468. **Patents.** The MBAFF Family consists of U.S. Patent Nos. 6,980,596, 7,310,374, 7,310,375, 7,310,376, 7,310,377, 7,421,025, 7,477,690, and 7,817,718 and foreign counterparts 2468087(CA), 10182726.9(EP), 10182629.5(EP), 10182686.5 (EP), 10182624.6(EP), 10182654.3(EP), 2804054.1(EP), 2009-244955(JP), 2008-234061(JP), 244982(MX), 20042544 (NOR), 10-2004-7007762(KR). (Exs. 271-278; Ex. 2 at 2-17; 11/19 (Drabik) Tr. at 26:3-19.)

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469. The '596 patent is directed to AFF coding on a group of neighboring macroblocks, for example on a pair of macroblocks (a 16 pixel wide by 32 pixel high luma region). (Ex. 271 ('596 patent) at 7:32-8:6, FIG. 7.) This is referred to as macroblock adaptive frame/field ("MBAFF") coding in the H.264 Standard. (*See, e.g.*, Ex. 421 (H.264 Standard, March 2010) at 13, 29.)

470. The '374, '375, '376, '377, '025, '690, and '718 patents are directed to the fundamental MBAFF technique combined with other prediction techniques such as intra prediction, inter prediction, macroblock skipping, and bi-prediction. (Ex. 272 ('374 patent) at 9:9-14:36 (inter); Ex. 273 ('375 patent) at 9:11-17, 14:41-17:2 (intra); Ex. 274 ('376 patent) at 8:3-20 (horizontal or vertical scan path); Ex. 275 ('377 patent) at 9:11-16:63 (intra and inter); Ex. 276 ('025 patent) at 7:18-8:36 (smaller portions with a size that is a multiple of a pair of macroblocks); Ex. 277 ('690 patent) at 12:38-65, 13:58-14:13 (skipped macroblock); Ex. 278 ('718 patent) at 12:56-13:47 (bi-prediction).)

471. **Essential Patents.** The MBAFF Family is "essential" to the H.264 Standard at the Main and High profiles, levels 2.1 to 4.1. (11/19 (Drabik) Tr. at 26:3-19, 31:22-32:3, 37:6-19.)

472. At least one claim of each of the MBAFF patents covers the MBAFF and prediction techniques described by the H.264 Standard. (Ex. 421 (H.264 Standard, March 2010) at 24-25 (6.3, Fig. 6-8), 26 (6.4.2, Fig. 6-9), 129 (8.3), 150 (8.4); 11/19 (Drabik) Tr. at 26:3-19; 11/16 (Luthra) Tr. at 210:4-11.)

473. **Importance to the Standard.** The MBAFF Family is technically valuable because it is directed to the core H.264 features of AFF coding and prediction. It provides substantial coding gain through the use of macroblock pairs, which permit prediction on all seven block sizes in frame and field mode. (11/19 (Drabik) Tr. at 30:24-32:3; Ex. 424 (Sullivan 2003 paper) at 566-568; Ex. 574 (Marpe) at 136-37 (describing MBAFF as a "main innovative feature" of H.264); 11/14 (Sullivan) Tr. at 27:23-28:6, 28:22-29:4, 31:21-32:14.)

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474. The substantial coding gain achieved by Motorola's MBAFF invention is documented in contribution documents submitted to the JVT by Motorola and third parties during the development of the H.264 Standard. Motorola submitted its first proposal regarding MBAFF for the January 2002 meeting in Geneva, Switzerland. (Ex. 2209 (JVT-B106) at 3 ("Super MB is therefore introduced as follows. Input frame is divided into super MB consisting of 2 MBs of 16x16, as shown in Fig. 4. A super MB of 32x16 can be coded as two frame MBs of 16x16, or one top-field MB of 16x16 and one bottom-field MB of 16x16. For frame coding, a super MB is coded as two frame MBs and each of two MBs can be further divided into one of seven modes (Fig. 2). For field coding, a super MB is first split into one top-field MB and one bottom-field MB, as shown in Fig. 5. The top-field, or the bottom-field, MB is further divided into one of seven block patterns (modes 1a – 7a), as shown in Fig. 5. The block size in the seven modes can be 16x16, 16x8, 8x16, 8x8, 8x4, 4x8 or 4x4, —the same as for frame MB (Fig. 2)."); 11/16 (Luthra) Tr. at 205:1-207:12.)

475. At the JVT meeting in Geneva, Motorola presented test results on its MBAFF invention. The graph in Figure 11 of Motorola's JVT-B106 submission shows a "20 percent improvement with MB pair AFF in comparison to picture AFF". (Ex. 2209 at 10; 11/16 (Luthra) Tr. at 205:1-206:22.) In JVT-B106, Motorola compared MBAFF to PAFF because it was "generally comparing to the current state of the standard." (11/16 (Luthra) Tr. at 206:23-207:5, 197:25-198:13 ("[g]enerally the benchmark was the current state of the standard at that stage" because "[a] key goal of the standard was to improve the coding efficiency. And for the committee to be able to understand whether to adopt a proposal or not, a key criteria was whether it improves the coding efficien[cy] or not. So that's why generally we use the current state of the standard, so we could show that a given proposal improved the coding efficiency in comparison to that.").)

476. Dr. Luthra testified that, "When [Motorola] described our MB pair AFF proposal the committee liked it very much, and they enthusiastically embraced it." (11/16 Tr. at 207:6-

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12.) The JVT concluded that Motorola's MBAFF proposal "[s]hows good potential for the sequences where the pictures have mixed motion types." (Ex. 2216 at 28.)

477. In May 2002, Motorola presented additional MBAFF test results in JVT-C139 for the JVT meeting in Fairfax, Virginia. Consistent with the B106 results, these test results demonstrated improved coding efficiency by up to 18% over the PAFF technique in the draft standard: "MB/picture level adaptive coding provides the best performance (up to about 18% savings in the bit rate over current technology in WD2r8 [6])." (Ex. 674 (JVT-C139) at 1; 11/16 (Luthra) Tr. at 207:20-208:12; *see also* Ex. 424 (Sullivan Paper) at 568 ("During the development of the standard, MBAFF was reported to reduce bit rates in the range of 14 to 16% over PAFF for ITU-R 601 resolution sequences like "Mobile and Calendar" and "MPEG-4 World News.").)

478. Following Motorola's proposals, third party video coding experts verified the improved efficiency gains provided by Motorola's MBAFF invention and recommended MBAFF for adoption into the H.264 Standard. Sony stated: "We regard this feature [MBAFF] important for developing SDTV/HDTV applications with JVT coding technology. This contribution provides supportive information of MB-level field/frame adaptive coding. We reccomend [sic] the proposal be adopted." (Ex. 2274 (JVT-D081) at 1; 11/16 (Luthra) Tr. at 208:13-209:11.) VideoTele stated: "Our simulation results support that macroblock-level frame/field adaptive coding is a useful technique in the JVT standard, giving a bit rate savings of 11% to 18% on the two sequences tested." (Ex. 2227 (JVT-E067) at 4; 11/16 (Luthra) Tr. at 209:12-210:3.)

479. The JVT adopted Motorola's proposed MBAFF technique into the H.264 Standard. (*See e.g.*, Ex. 610 (H.264 Standard, March 2003) at 16; Ex. 421 (H.264 Standard, March 2010) at 25; 11/16 (Luthra) Tr. at 210:4-8.)

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5. The PAFF Patent Family

480. **Patents.** The PAFF Family consists of U.S. Patent Nos. 7,769,087, 7,660,353, and 7,839,931 and foreign counterparts 2468086(CA), 200910254137.9(CN), 200910254136.4(CN), 200910254135.X(CN), ZL02827402.4(CN), 200910254134.5(CN), 10182595.8(EP), 10182605.5(EP), 10182643.6 (EP), 10183042(EP), 2804044.2(EP), 2003-548552(JP), MX/a/2008/001309(MX), MX/a/2008/001308(MX), MX/a/2008/001311(MX), MX/a/2008/001312(MX), 253886(MX), 20042543(NOR), 10-2010-7006173(KR), and 10-2004-7007734(KR). (Exs. 280-82; Ex. 2 at 20-23; 11/19 (Drabik) Tr. at 26:3-19.)

481. The '087 patent is directed to deciding, on a picture-by-picture basis, whether to code a bi-predicted picture in a frame mode or in a field mode, where the picture has two motion vectors, which can both point in the forward or backward direction (*i.e.*, can both refer to earlier or later pictures/fields). (Ex. 281 ('087 patent) at Abstract, Fig. 11.)

482. The '353 patent is directed to deciding, on a picture-by-picture basis, whether to code a bi-predicted picture in frame mode or in field mode, where the picture has two motion vectors, the second of which is encoded as an offset of the first. (Ex. 280 ('353 patent) at Abstract, Fig. 11.)

483. The '931 patent is directed to deciding, on a picture-by-picture basis, whether to code a picture in frame mode or in field mode, where the reference pictures are indexed. (Ex. 282 ('931 patent) at Abstract, Fig. 11.)

484. **Essential Patents.** The PAFF Family is "essential" to the H.264 Standard at the Main and High profiles, levels 2.1 to 4.1. (11/19 (Drabik) Tr. at 26:3-19, 31:22-32:22, 37:6-19.)

485. At least one claim of each of the PAFF patents covers the PAFF techniques described by the H.264 Standard. (11/19 (Drabik) Tr. at 26:3-19; 11/16 (Luthra) Tr. at 212:17-22; Ex. 421 (H.264 Standard, March 2010) at 4 (0.6.2), 87 ("field_pic_flag"), 152 (8.4.1), 160 (Equations 8-197, 8-198, 8-201, 8-202, Figure 8-2), 171-78 (8.4.2.3.1, Equation 8-275).)

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486. **Importance to the Standard.** The PAFF Family is technically valuable because it is directed to the core features of AFF coding and prediction. It provides substantial coding gain by applying PAFF to "bi-predicted" pictures (pictures having two motion vectors), through flexibility not found in prior PAFF methods. (11/19 (Drabik) Tr. at 32:7-22; 11/16 (Luthra) Tr. at 210:12-212:16.)

487. During the development of the H.264 Standard, Motorola submitted written proposals to the JVT regarding its improved PAFF inventions. (Ex. 654 (JVT-B071) at 5 (Fig. 3); 11/16 (Luthra) Tr. at 210:12-212:16.)

488. Motorola's test results demonstrated that PAFF improved coding efficiency by up to 20-30% over the frame and field coding in the draft standard. (Ex. 654 (JVT-B071) at 1 ("[PAFF] guarantees a performance over frame and field coding"), 5, Fig. 23; 11/16 (Luthra) Tr. at 210:12-212:5; Ex. 424 (Sullivan paper) at 567 ("During the development of the H.264/AVC standard, PAFF coding was reported to reduce bit rates in the range of 16% to 20% over frame-only coding mode for ITU-R 601 resolution sequences like 'Canoa,' 'Rugby', etc."); 11/14 (Sullivan) Tr. at 28:7-18.)

489. Motorola's PAFF inventions further improved coding efficiency because being able to choose two reference pictures in the future or two reference pictures in the past provided more flexibility than being limited to choosing one reference picture in the future and one in the past. (11/16 (Luthra) Tr. at 210:12-212:22; 11/19 (Drabik) Tr. at 32:4-22.)

490. The JVT adopted Motorola's proposed improved PAFF techniques into the H.264 Standard. (11/16 (Luthra) Tr. at 212:17-19.)

6. The Scan Patent Family

491. **Patents.** The Scan Family consists of U.S. Patent Nos. 7,162,094 and 6,987,888. (Exs. 265-66; Ex. 2 at 18; 11/19 (Drabik) Tr. at 26:3-19.)

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492. The '094 patent discloses as an embodiment of the invention, FIG. 6, which shows a preferable scanning pattern for a 4×4 pixel block's frequency coefficient array. (Ex. 266 ('094 patent) at 8:42-54, 9:12-45, FIG. 6.)

493. The '888 patent discloses as an embodiment of the invention, FIG. 9, which shows a preferable scanning pattern for a 8×8 pixel block's frequency coefficient array. (Ex. 265 ('888 patent) at 8:44-54, 11:24-12:35, FIG. 9.)

494. **Essential Patents.** The '094 patent is "essential" to the H.264 Standard at the Main and High profiles, levels 2.1 to 4.1. (11/19 (Drabik) Tr. at 26:3-19, 37:6-19.) The '888 patent is "essential" to the H.264 Standard at the High profile, levels 2.1 to 4.1. (11/19 (Drabik) Tr. at 26:3-19, 37:6-19; 11/16 (Luthra) Tr. at 214:18-25.)

495. At least one claim of the '094 patent covers the 4×4 field scan described by the H.264 Standard. (Ex. 421 (H.264 Standard, March 2010) at 179-80 (8.5.6, Fig. 8-8(b), Table 8-13); 11/19 (Drabik) Tr. at 26:3-19; 11/16 (Luthra) Tr. at 214:12-25; Ex. 610 (H.264 Standard, April 2003) at 135.) At least one claim of the '888 patent covers the 8×8 field scan described by the H.264 Standard. (11/19 (Drabik) Tr. at 26:3-19; 11/16 (Luthra) Tr. at 214:18-25; Ex. 421 (H.264 Standard, March 210) at 180-81 (8.5.7, Fig. 8-9(b), Table 8-14).)

496. **Importance to the Standard.** The Scan Family is technically valuable because it is directed to the core features of transform and quantization. (11/19 (Drabik) Tr. at 32:23-33:18.) The claimed 4×4 and 8×8 scan patterns improve coding efficiency. (11/19 (Drabik) Tr. at 32:23-33:18; 11/16 (Luthra) Tr. at 213:14-214:11.) The H.264 Standard applies these scan patterns to any field-coded material, whether it is progressive or interlaced as initially captured. (11/19 (Drabik) Tr. at 32:23-33:18.)

497. During the development of the H.264 Standard, Motorola submitted written proposals to the JVT regarding its 4×4 and 8×8 scans. (Ex. 675 (JVT-C140); 11/16 (Luthra) Tr. at 213:2-19.)

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498. Motorola's test results demonstrated that its scans improved coding efficiency by up to 7% over the zig-zag scan in the draft standard: "Preliminary results with alternate scanning patterns have shown bitrate savings of up to about 7%." (Ex. 675 (JVT-C140) at 1; *see also* 11/16 (Luthra) Tr. at 213:2-19.)

499. Third party video coding experts from Samsung and Sony verified the improved efficiency gains provided by Motorola's 4×4 scan, and recommended it for adoption in the H.264 Standard. Samsung et al. stated: "The computer simulation carried out using the current JM2.1 codec with CVLC demonstrated that additional bit rate reduction (BDBR) of up to 8.64% and 6.15% on average is possible." (Ex. 2281 (JVT-D073) at 5; *see also* 11/16 (Luthra) Tr. at 213:20-214:3.) Sony stated: "The simulation results show that by employing the proposed method coding efficiency gain by up to 3% will be obtained." (Ex. 710 (JVT-E118) at 2; *see also* 11/16 (Luthra) Tr. at 214:4-11.)

500. The JVT adopted Motorola's proposed scans into the H.264 Standard. (Ex. 610 (H.264 Standard, April 2003) at 135 (8.5.4, Fig. 8-8(b), Table 8-12); Ex. 421 (H.264 Standard, March 2010) at 179-81 (8.5.6 and 8.5.7, Figs. 8-8(b) and 8-9(b), Tables 8-13 and 8-14); 11/16 (Luthra) Tr. at 214:12-25.)

501. Microsoft asserted that Motorola's Eifrig, MBAFF, PAFF and Scan Patent Families are limited to "interlaced" video. (11/14 (Orchard) Tr. at 98:13-19.) However, none of Motorola's patents have claim limitations to "interlaced." Motorola's Eifrig, MBAFF, PAFF, and Scan Families are optimized for interlaced video, but can also be used on progressive video. (11/19 (Drabik) Tr. at 43:4-44:13, ("interlaced coding or field coding of progressive content has compression advantages."), 63:12-64:21; 11/14 (Sullivan) Tr. at 27:11-22 ("Q. [C]an an H.264 encoder code a progressive frame as two separate fields? A. The standard does not – whether the video is interlaced or progressive is outside the scope of the standard. . . . Q. So someone could take a progressively captured video and code it in field mode in accordance with the standard? A. In the profiles that have the field coding feature, yes.").)

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502. Microsoft asserted that Motorola's Eifrig, MBAFF, PAFF and Scan Patent Families are not relevant to modern digital video because computers typically have progressive displays. (11/13 (DeVaan) Tr. at 37:21-38:3; 11/14 (Orchard) Tr. at 104:1-105:4.) However, whether a display is progressive or interlaced is irrelevant. If the video being decoded was encoded using interlaced coding tools, then a decoder must use interlaced coding tools to decode it, even if the decoded video is subsequently deinterlaced and displayed on a progressive display. (Ex. 421 at 286.)

503. Microsoft also asserted that Motorola's proposals were late in the H.264 development process. (11/13 (Sullivan) Tr. at 216:5-12.) However, the exact timing of the adoption of Motorola's technology into the Standard is irrelevant. (11/16 (Luthra) Tr. at 192:25-16.) Two of Motorola's Families (Krause and Wu) were incorporated early in the H.264 development process, as fundamental techniques were adopted from prior standards. (11/16 (Luthra) Tr. at 192:25-11.) Four of Motorola's Families (Eifrig, MBAFF, PAFF and Scan) were adopted later in the H.264 development process. (11/16 (Luthra) Tr. at 192:25-16.) As Dr. Luthra testified, "a key criteria was whether it improves the coding efficien[cy] or not." (11/16 (Luthra) Tr. at 198:7-10.) Each of Motorola's Families met that criterion. (11/19 (Drabik) Tr. at 27:22-33:18; 11/16 (Luthra) Tr. at 200:21-202:11, 205:10-206:22, 208:9-12, 209:22-3, 211:8-212:5, 213:6-214:11.)

504. Dr. Orchard's own analysis confirms that timing of adoption into the Standard is irrelevant. Dr. Orchard evaluated the importance of Microsoft's patents, without evaluating when Microsoft technologies were adopted in the Standard. Dr. Orchard did not show that any of Microsoft's technology was included in the VCEG H.26L design as it existed in the summer of 2001. (11/19 (Orchard) Tr. at 66:17-20.)

505. Microsoft also asserted that Motorola's patents are small in number compared to the total number of H.264 patents. However, Dr. Orchard did not analyze any of the claims of

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the third party H.264 patents as to their validity or scope. (11/14 (Orchard) Tr. at 162:14-163:10.)

J. There Are No Comparable Alternatives to Motorola's Patents

1. The Krause Patent Family

506. Microsoft has not shown that there was a comparable alternative to the Krause Family at the time the H.264 Standard was adopted. There were no alternative approaches to the technologies covered by the Motorola Krause patents that have been shown to have been actually considered for implementation in the H.264 Standard. Nor has Microsoft shown how any purported alternative would or could have been implemented in the Standard. Even if this could be shown, the purported alternatives would perform worse than the technologies covered by the Motorola Krause patents. (11/19 (Drabik) Tr. at 25:23-24, 44:15-45:22.)

507. Microsoft has not shown that U.S. Patent No. 5,144,423 was a comparable alternative. The '423 patent discloses an encoding process that fills a bit budget with as much detailed information as possible by sending 32×16 and 8×8 motion vectors. (Ex. 1477 at 10:50-62.) The technology disclosed in the '423 Patent would perform worse than the Krause '419 patent because motion vectors are sent for both block sizes and no optimum is determined—resulting in more bits. (Ex. 1477 at 10:50-62; 11/19 (Drabik) Tr. at 44:15-25.)

508. Microsoft has not shown that the Sullivan Thesis was a comparable alternative. The Sullivan Thesis discloses coding only square block sizes. (Ex. 618 at 72-73.) The Sullivan Thesis would perform worse than the '419 patent because coding only square blocks requires more motion vectors than rectangular blocks. (Ex. 618 at Fig. 3.11(a); 11/19 (Drabik) Tr. at 45:1-9.)

509. Microsoft has not shown that CCITT #453 was a comparable alternative. CCITT #453 discloses the use of full block signaling with no flag to indicate the presence of sub-macroblock motion compensation. (Ex. 462 at MS-MOTO_1823_00004071642.) CCITT #453 would perform worse than the '419 patent because it does not compare a plurality of motion

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compensators and select the one yielding the most compression. (Ex. 462 at MS-MOTO_1823_00004071642; 11/19 (Drabik) Tr. at 45:10-15.)

510. Microsoft has not shown that the Puri Paper was a comparable alternative. The Puri Paper discloses making adaptation decisions on the basis of motion detection. (Ex. 632 at MOTM_WASH1823_0602838-839; 11/19 (Drabik) Tr. at 45.) The Puri Paper would perform worse than the '419 patent because there is no comparison of a plurality of motion compensators on the basis of best compression. (Ex. 632 at MOTM_WASH1823_0602838-839; 11/19 (Drabik) Tr. at 45:16-22.)

2. The Wu Patent Family

511. Microsoft has not shown that there was a comparable alternative to the Wu Family at the time the H.264 Standard was adopted. There were no alternative approaches to the technologies covered by the Motorola Wu patents that have been shown to have been actually considered for implementation in the H.264 Standard. Nor has Microsoft shown how any purported alternative would or could have been implemented in the Standard. Even if this could be shown, the purported alternatives would perform worse than the technologies covered by the Motorola Wu patents. The same analysis applies to the Wu Family as applied to the Krause Family. (11/19 (Drabik) Tr. at 45:23-46:5.)

512. Microsoft has not shown that the Sullivan Thesis was a comparable alternative. The Sullivan Thesis discloses coding only square block sizes. (Ex. 618 at 72-73.) The Sullivan Thesis would perform worse than the '968 patent because coding only square blocks requires more overhead data than rectangular blocks. (Ex. 618 at Fig. 3.11(a); 11/19 (Drabik) Tr. at 45:1-9, 45:23-46:5.)

513. Microsoft has not shown that the Puri Paper was a comparable alternative. The Puri Paper discloses making adaptation decisions on the basis of motion detection. (Ex. 632 at MOTM_WASH1823_0602838-839; 11/19 (Drabik) Tr. at 45:16-22.) The Puri Paper would perform worse than the '968 patent because it does not select one of multiple compression modes

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yielding the most compression. (Ex. 632 at MOTM_WASH1823_0602838-839; 11/19 (Drabik) Tr. at 45:16-46:5.)

514. Microsoft has not shown that specifying blocks as entries in a single list as shown in US Patent 5,227,878 was a comparable alternative. The '968 patent does not require that the overhead data occur at any particular level of the syntax. (Ex. 283 ('968 patent) at claim 19.)

3. The Eifrig Patent Family

515. Microsoft has not shown that there was a comparable alternative to the Eifrig Family at the time the H.264 Standard was adopted. Microsoft has not shown that passing each field separately as a picture into the H.263 encoder of ITU-T Draft Recommendation H.263, May 2, 1996, § 6.1.1 (Ex. 611) was a comparable alternative. The H.263 Draft Recommendation does not disclose how a picture can be coded using frame blocks where frame blocks are more efficient and using field blocks where field blocks are more efficient. (Ex. 611 at MS-MOTO_1823_00004056204 ("Source format" – "The source coder operates on non-interlaced pictures"); (11/19 (Drabik) Tr. at 55:12-56:9.)

516. Microsoft has not shown that using three different neighboring blocks to calculate a prediction motion vector was a comparable alternative. Using the left (A), top (B) and top-left (D) neighboring blocks is not as efficient as the left (A), top (B) and top-right (D) neighboring blocks, because the neighboring blocks A, B, and C identified in the Eifrig Family provide better information about the surrounding area. (11/16 (Luthra) Tr. at 199:10-202:11.)

4. The MBAFF Patent Family

517. Microsoft has not shown that there was a comparable alternative to the MBAFF Family at the time the H.264 Standard was adopted. Microsoft has not shown that AFF coding on single macroblocks was a comparable alternative. VCEG-N57r2 proposed using a single macroblock AFF technique in H.26L, but does not provide results. (Ex. 782 at 4 ("We propose to experiment before the next meeting with [single macroblock AFF] for H.26L and bring results showing whether they should be included.").) VCEG-N76 discloses the prior art single

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macroblock AFF technique that only had five block sizes (excluding 16×16 and 8×16) available in field mode. (Ex. 785 at 3.)

518. The prior art single macroblock AFF technique was proposed by Motorola and others to the JVT before Motorola submitted its MBAFF proposal. (Ex. 782 (VCEG-N57r2); Ex. 785 (VCEG-N76); Ex. 423 (VCEG-O37).) The JVT abandoned the single macroblock AFF proposals in favor of Motorola's MBAFF proposal. (11/16 (Luthra) Tr. at 203:7-14, 207:6-12; Ex. 3382 at 7 ("MB adaptive [in VCEG-O37] needs more work").) This was because the coding gain for single macroblock AFF was not as good as for macroblock pair AFF. (11/16 (Luthra) Tr. at 203:7-204:5, 207:6-12.) The block sizes of 16×16 and 8×16 were not available for AFF coding on single macroblocks in field mode. (Ex. 271 ('596 patent) at 7:38-43; 11/16 (Luthra) Tr. at 203:20-204:5 (". . . we realized that the key reason the performance of MBAFF for single macroblock was not efficient was because when you split them into two regions you lose the capability to do 16-by-16 and 8-by-16 base processing, which is very important when you are compressing high resolution video that you see in standard definition and high definition. So it was very important to have the capability where you can include those regions as well. Otherwise, you are kind of tying the hands behind the back for field coding."); 11/19 (Drabik) Tr. at 31:4-16 ("The big block sizes are very important, because there is a lot of image content that has uniform and smoothly-moving regions. Such image content is efficiently encoded using large block sizes. So if you give that up, and you use, for example, single macroblock adaptive frame/field coding, then you take a big hit in coding efficiency."); Ex. 424 (Sullivan paper) at 567 ("Note that, unlike in MPEG-2, the frame/field decision is made at the macroblock pair level rather than within the macroblock level. The reasons for this choice are to keep the basic macroblock processing structure intact, and to permit motion compensation areas as large as the size of a macroblock.").)

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519. After Motorola proposed macroblock pair AFF, it was clear that it out performed single macroblock AFF. The JVT "enthusiastically embraced" macroblock pair AFF, and the concept of single macroblock AFF was dropped. (11/16 (Luthra) Tr. at 207:8-12.)

520. Microsoft asserted that a comparison of the test results in JVT-B106 (Ex. 656) and VCEG-O37 (Ex. 423) support its argument that "paired macroblock AFF does not provide any notable gain over single macroblock MBAFF." (MSPFF 445.) However, this is not a proper comparison because the test results in JVT-B106 and VCEG-O37 are on different sequences, on different versions of the reference code, and under different test conditions. (*Compare* Ex. 656 at 8 *with* Ex. 423 at 9.)

5. The PAFF Patent Family

521. Microsoft has not shown that there was a comparable alternative to the PAFF Family at the time the H.264 Standard was adopted. Microsoft has not shown that PAFF as it existed before Motorola's contribution was a comparable alternative. PAFF as it existed before Motorola's contributions was different and disclosed a less flexible technique for adaptively coding at the picture level. (11/16 (Luthra) Tr. at 211:4-212:16; Luthra Dep. Tr. at 96:15-24.)

522. Microsoft has not shown that PAFF as it existed in MPEG 2 Part 2 was a comparable alternative. PAFF as it existed in MPEG 2 Part 2 does not disclose a suitable alternative to the '087 patent, because it did not permit the additional flexibility of how motion is estimated and motion vectors are compressed that Motorola's PAFF inventions provided, and therefore had worse efficiency. (11/16 (Luthra) Tr. at 211:4-212:16.)

523. Microsoft has not shown that the single macroblock AFF technique that was used in MPEG-2 was a comparable alternative. VCEG-N76 discloses the prior art single macroblock AFF technique that only had five block sizes (excluding 16×16 and 8×16) available in field mode. (Ex. 785 at 3.) AFF coding on a single macroblock as in VCEG-N57r2 and VCEG-N76 does not disclose a suitable alternative to Motorola's PAFF inventions, because the block sizes

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of 16×16 and 8×16 are not available for a single macroblock in field mode, and therefore would result in less efficient compression. (Ex. 785 at 3.)

524. Microsoft asserted that the test results in VCEG-O37 (Ex. 423) support its argument that "single macroblock MBAFF offers better coding than PICAFF." (MSPFF 457.) However, the test results provided in VCEG-O37 are irrelevant to Motorola's improved PAFF inventions. The test results in VCEG-O37 were on prior art PAFF, not Motorola's improved PAFF. (11/16 (Luthra) Tr. at 203:7-18; Luthra Dep. Tr. at 95:12-23 ("one has to be careful what we are comparing").) And, VCEG-O37 contains no test results for single macroblock AFF using bi-predicted pictures, which is an element of Motorola's PAFF patent claims. (Ex. 423 at 10-11 (under "Results for I, P and B," VCEG-O37 states: "Simulations on MB and picture levels are still in progress.").)

6. The Scan Patent Family

525. Microsoft has not shown that there was a comparable alternative to the Scan Family at the time the H.264 Standard was adopted. Microsoft has not shown that the 4×4 field scan proposed by Sony in JVT-B068 was a comparable alternative to Motorola's 4×4 scan claimed in the '094 patent. (Ex. 653.)

526. The 4×4 field scan proposed by Sony in JVT-B068 was not a comparable alternative. Sony's proposed scan was more complex than Motorola's scan. (11/16 (Luthra) Tr. at 215:1-14 ("This scan looks a lot more complex to me, compared to Motorola's scan.").)

527. The JVT concluded for Sony's JVT-B068 proposal that: "Need to demonstrate larger gain for acceptance." (Ex. 2216 (JVT-B001d5) at 28; *see also* 11/16 (Luthra) Tr. at 215:15-216:22.)

528. Motorola demonstrated to the JVT that its proposed scans improved coding efficiency by up to about 7% over the zig-zag scan in the draft standard. (Ex. 675 (JVT-C140) at 1; *see also* 11/16 (Luthra) Tr. at 213:12-19.)

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529. Third party Samsung tested Motorola's 4×4 scan and got consistent results of 8.64% and 6.15% improved coding efficiency. (Ex. 2281 (JVT-D073) at 5 ("The computer simulation carried out using the current JM2.1 codec with CVLC demonstrated that additional bit rate reduction (BDBR) of up to 8.64 % and 6.15 % on average is possible."); *see also* 11/16 (Luthra) Tr. at 213:20-214:3.)

530. The JVT adopted Motorola's 4×4 scan into the H.264 Standard. (*See e.g.*, Ex. 610 (H.264 Standard, April 2003) at 135 (Fig. 8-8(b)); 11/16 (Luthra) Tr. at 214:15-17.)

531. Microsoft has not shown that the 8×8 field scan used in MPEG-2 was a comparable alternative to Motorola's 8×8 scan claimed in the '888 patent.

532. The JVT considered and rejected the 8×8 field scan used in MPEG-2, as proposed by Sony in JVT-B068. (Ex. 653 at 1-2; Ex. 2216 (JVT-B001d5) at 28 ("Need to demonstrate larger gain for acceptance").)

533. The JVT adopted Motorola's 8×8 field scan into the H.264 Standard. (*See e.g.*, Ex. 421 (H.264 Standard, March 2010) at 181 (Fig. 8-9(b)); 11/16 (Luthra) Tr. at 214:18-22.)

K. Motorola's H.264 SEPS Are Important to Microsoft's Products

1. Microsoft's H.264-Compliant Products Use Motorola's H.264 Patents

534. The 6 families of Motorola H.264 essential patents are directed to important core aspects of the H.264 Standard that are necessarily used by Microsoft's H.264-compliant products. (11/19 (Drabik) Tr. at 25:21-23, 33:19-38:6.)

535. The following Microsoft products comply with specific profiles/levels of the H.264 Standard and therefore use Motorola's H.264 essential patent portfolio: Windows Vista (from February 2011 and after), Windows 7, Windows 8, Windows Server 8, Windows Home Server (some FY11 and FY12 versions), Windows Storage Server (some FY12 versions), Xbox 360S, [redacted] Windows Phone 7 (and 7.5), Windows Phone 8, Skype (some versions), Surface Tablet, Visual Studio (some FY10-FY12 versions), Silverlight (version 3 and later), Microsoft Media Pack for Moonlight (versions 3 and 4), Zune for Windows and

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Expression (versions 2, 3, and 4), Windows Embedded (Microsoft AVC decoder in some FY11 and FY12 versions), Windows Embedded (Adobe AVC decoder in some versions of CE 6 and Embedded 7), and Lync W15 / O15. (Ex. 2082; [redacted] 11/13 (DeVaan) Tr. at 40:5-41:8, 42:1-43:20; 11/19 (Drabik) Tr. at 25:21-23, 33:19-38:6.)

a. Microsoft's Xbox products use Motorola's H.264 patents

536. Microsoft's Xbox products have an H.264 decoder. [redacted]; 11/15 (Del Castillo) Tr. at 19:9-11, 34:4-35:11; Ex. 937 at MOTM_WASH1823_0602056.)

537. Microsoft's Xbox 360 console supports the Baseline, Main, and High profiles of the H.264 Standard, up to level 4.1 (Ex. 937 at MOTM_WASH1823_0602056 ("The Xbox 360 console supports the following for H.264: Video Profiles: Baseline, main and high (up to level 4.1)"); 11/19 (Drabik) Tr. at 34:10-21; 11/15 (Del Castillo) Tr. at 40:14-18.)

538. The Xbox's HD DVD player accessory supports the Main and High profiles of the H.264 Standard, up to level 4.1. (11/15 (Del Castillo) Tr. at 36:1-14; [redacted].)

539. Microsoft's Xbox products use at least the following 16 Motorola H.264 essential U.S. patents: 5,235,419 (Krause), 5,376,968 (Wu), 6,005,980 (Eifrig), 7,162,094 (Scan), 6,987,888 (Scan), 6,980,596 (MBAFF), 7,310,374 (MBAFF), 7,310,375 (MBAFF), 7,310,376 (MBAFF), 7,310,377 (MBAFF), 7,421,025 (MBAFF), 7,477,690 (MBAFF), 7,817,718 (MBAFF), 7,769,087 (PAFF), 7,660,353 (PAFF), and 7,839,931 (PAFF). (11/19 (Drabik) Tr. at 37:20-38:4.)

540. Microsoft's Xbox products have been found to infringe Motorola H.264 essential patents in the Krause, Wu, MBAFF and Scan Families. A German Court adjudicated that the Xbox 360 infringes claim 19 of Motorola's EP 0538667 (Krause) and claim 17 of EP 0615384 (Wu). (*General Instrument Corp. v. Microsoft Deutschland GmbH*, No. 2 O 240/11, at 26 (Regional Court of Mannheim, 2nd Div. May 2, 2012) (English translation) (English translation); *General Instrument Corp. v. Microsoft Deutschland GmbH*, No. 2 O 373/11, at 28 (Regional Court of Mannheim, 2nd Div. May 2, 2012) (English translation).)

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541. The Administrative Law Judge in International Trade Commission Investigation No. 337-TA-752 determined that the Xbox 360 infringes claims 1 and 2 of Motorola's '596 (MBAFF) patent and claims 7, 8, and 10 of the '094 (Scan) patent. (*In the Matter of Certain Gaming and Entertainment Consoles, Related Software, and Components Thereof*, Inv. No. 337-TA-752, Initial Determination (April 25, 2012) at 115-129, 171-187, 330-331.)

b. Microsoft's Windows products use Motorola's H.264 patents

542. Microsoft's Windows products have an H.264 codec (*i.e.*, an H.264 encoder and H.264 decoder). (11/13 (DeVaan) Tr. at 42:9-20; Ex. 2082.) Microsoft's Windows products use the Windows Media Foundation H.264 decoder to decode H.264 video. (11/13 (DeVaan) Tr. at 42:9-20; Ex. 2082.)

543. Microsoft's Windows H.264 decoder supports the Baseline, Main, and High profiles of the H.264 Standard up to level 5.1. (Ex. 2042 at MOTM_WASH1823_0601505 ("The Media Foundation H.264 video decoder is a Media Foundation Transform that supports the decoding of Baseline, Main, and High profiles, up to level 5.1."); 11/19 (Drabik) Tr. at 34:21-24; 11/13 (DeVaan) Tr. at 43:1-20.)

544. Microsoft's Windows products (Windows 7, Windows 8 and Windows Vista) use at least the following 16 Motorola H.264 essential U.S. patents: 5,235,419 (Krause), 5,376,968 (Wu), 6,005,980 (Eifrig), 7,162,094 (Scan), 6,987,888 (Scan), 6,980,596 (MBAFF), 7,310,374 (MBAFF), 7,310,375 (MBAFF), 7,310,376 (MBAFF), 7,310,377 (MBAFF), 7,421,025 (MBAFF), 7,477,690 (MBAFF), 7,817,718 (MBAFF), 7,769,087 (PAFF), 7,660,353 (PAFF), and 7,839,931 (PAFF). (11/19 (Drabik) Tr. at 37:20-38:4.)

545. Microsoft's Windows products have been found to infringe Motorola H.264 essential patents in the Krause and Wu Families. A German Court adjudicated that Windows 7, Internet Explorer 9 and Windows Media Player 12 infringe claim 19 of Motorola's EP 0538667 (Krause) patent and claim 17 of EP 0615384 (Wu) patent. (*General Instrument Corp. v. Microsoft Deutschland GmbH*, No. 2 O 240/11, at 26 (Regional Court of Mannheim, 2nd Div.

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May 2, 2012) (English translation); *General Instrument Corp. v. Microsoft Deutschland GmbH*, No. 2 O 373/11, at 28 (Regional Court of Mannheim, 2nd Div. May 2, 2012) (English translation).)

c. Microsoft's Windows Embedded products use Motorola's H.264 patents

546. Microsoft's Windows Embedded products support the Baseline, Main and High Profiles of the H.264 Standard. (Ex. 1489 at MOTM_WASH1823_0602988; 11/19 (Drabik) Tr. at 34:21-35:1.)

547. Microsoft's Windows Embedded products use at least the following 16 Motorola H.264 essential U.S. patents: 5,235,419 (Krause), 5,376,968 (Wu), 6,005,980 (Eifrig), 7,162,094 (Scan), 6,987,888 (Scan), 6,980,596 (MBAFF), 7,310,374 (MBAFF), 7,310,375 (MBAFF), 7,310,376 (MBAFF), 7,310,377 (MBAFF), 7,421,025 (MBAFF), 7,477,690 (MBAFF), 7,817,718 (MBAFF), 7,769,087 (PAFF), 7,660,353 (PAFF), and 7,839,931 (PAFF). (11/19 (Drabik) Tr. at 37:20-38:4.)

d. Microsoft's Zune for Windows and Expression product uses Motorola's H.264 Patents

548. Microsoft's Zune for Windows and Expression supports "H.264 . . . Baseline and Main profiles, all bitrates and resolutions." (Ex. 640 at MOTM_WASH1823_0603283; 11/19 (Drabik) Tr. at 34:21-35:3.)

549. Microsoft's Zune for Windows and Expression uses at least the following 15 Motorola H.264 U.S. essential patents: 5,235,419 (Krause), 5,376,968 (Wu), 6,005,980 (Eifrig), 7,162,094 (Scan), 6,980,596 (MBAFF), 7,310,374 (MBAFF), 7,310,375 (MBAFF), 7,310,376 (MBAFF), 7,310,377 (MBAFF), 7,421,025 (MBAFF), 7,477,690 (MBAFF), 7,817,718 (MBAFF), 7,769,087 (PAFF), 7,660,353 (PAFF), and 7,839,931 (PAFF). (11/19 (Drabik) Tr. at 37:20-38:4.)

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e. Microsoft's Windows Phone products uses Motorola's H.264 patents

550. Microsoft's Windows Phone supports the Baseline, Main, and High Profiles of the H.264 Standard, level. 3.1 (for phones using the Qualcomm 8x50 and 8x55 processors). (Ex. 936 at MOTM_WASH1823_0601732; 11/19 (Drabik) Tr. at 34:21-35:3.)

551. Microsoft's Windows Phone uses at least the following 16 Motorola H.264 essential U.S. patents: 5,235,419 (Krause), 5,376,968 (Wu), 6,005,980 (Eifrig), 7,162,094 (Scan), 6,987,888 (Scan), 6,980,596 (MBAFF), 7,310,374 (MBAFF), 7,310,375 (MBAFF), 7,310,376 (MBAFF), 7,310,377 (MBAFF), 7,421,025 (MBAFF), 7,477,690 (MBAFF), 7,817,718 (MBAFF), 7,769,087 (PAFF), 7,660,353 (PAFF), and 7,839,931 (PAFF). (11/19 (Drabik) Tr. at 37:20-38:4.)

f. Microsoft's Lync, Skype and Silverlight products use Motorola's H.264 patents

552. Microsoft's Lync supports Constrained Baseline, Constrained High, and Scalable Constrained High profiles of the H.264 Standard up to level 3.1. (Ex. 641 at 6-8; 11/19 (Drabik) Tr. at 34:21-35:3.)

553. Microsoft's Skype supports the Constrained Baseline profile of the H.264 Standard, level 3.1 at minimum. (Ex. 2176 at 8; 11/19 (Drabik) Tr. at 34:21-35:3.)

554. Microsoft's Silverlight "Supports H.264 . . . Base, Main, and High Profiles" for "only progressive (non-interlaced) content." (Ex. 2174 at MOTM_WASH1823_0602898; 11/19 (Drabik) Tr. at 34:21-35:3.)

555. Microsoft's Lync, Skype, and Silverlight products use at least the following 2 Motorola H.264 essential U.S. patents: 5,235,419 (Krause) and 5,376,968 (Wu). (11/19 (Drabik) Tr. at 37:20-38:6.)

g. Microsoft's Surface products uses Motorola's H.264 patents

556. Microsoft's Surface supports the H.264 Standard. (11/13 (DeVaan) Tr. at 40:23-41:8.)

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557. Microsoft's Surface uses at least the following 16 Motorola H.264 essential U.S. patents: 5,235,419 (Krause), 5,376,968 (Wu), 6,005,980 (Eifrig), 7,162,094 (Scan), 6,987,888 (Scan), 6,980,596 (MBAFF), 7,310,374 (MBAFF), 7,310,375 (MBAFF), 7,310,376 (MBAFF), 7,310,377 (MBAFF), 7,421,025 (MBAFF), 7,477,690 (MBAFF), 7,817,718 (MBAFF), 7,769,087 (PAFF), 7,660,353 (PAFF), and 7,839,931 (PAFF). (11/19 (Drabik) Tr. at 38:1-6; Ex. 2042 at MOTM_WASH1823_0601505.)

2. Microsoft's Products Play Progressive and Interlaced H.264 Video

558. Microsoft's H.264 compliant products use Motorola's essential H.264 patents when they process and play H.264 video, including progressive and interlaced video. (11/19 (Drabik) Tr. at 25:17-21, 26:13-4, 33:19-28:6.)

a. Microsoft's Xbox products play progressive and interlaced H.264 video

559. **Internet Explorer**. Microsoft's Xbox uses the Internet Explorer browser to play progressive and interlaced H.264 video from the Internet. For example, using Internet Explorer running on the Xbox, Dr. Drabik accessed a website called http://www.findthatfile.com/ and played interlaced H.264 video clips (both MBAFF encoded and PAFF encoded) from that website. (11/19 (Drabik) Tr. at 40:21-41:19.)

560. Microsoft's General Manager of the Xbox, Leonardo Del Castillo, originally testified that Xbox's Internet Explorer browser did not support interlaced H.264 video. (11/15 (Del Castillo) Tr. at 22:23-23:4.) However, Microsoft recanted Mr. Del Castillo's statement in a letter to the Court: "After Dr. Drabik's testimony to the contrary, we went back to Mr. Del Castillo, and he checked with internal Microsoft resources and tried the search Dr. Drabik identified. *Mr. Del Castillo determined that he had been misinformed. Xbox's Internet Explorer browser will play interlaced-coded H.264 video from the Internet if it encounters such content.* Microsoft wanted to inform the Court and correct the record." (Ex. 3448 (emphasis added); 11/20 (Dansky) Tr. at 21:21-22:21.)

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561. **Xbox Live**. Microsoft's Xbox plays progressive and interlaced H.264 video through applications available on Xbox Live. Microsoft's technical expert, Michael Orchard, testified that "no interlace is supported by Xbox Live." (11/14 (Orchard) Tr. at 145:7-10.) However, Mr. Del Castillo, admitted that "*there may be interlaced content*" supported by Xbox Live. (11/15 (Del Castillo) Tr. at 32:3-15.) He cited two examples from Microsoft's entertainment partners—BSkyB and Canal+. (11/15 (Del Castillo) Tr. at 32:3-15.); Ex. 2161 at MOTM_WASH1823_0601774. These companies broadcast HD content in H.264. (Ex. 2739 at 4-5.)

562. **Windows Media Center**. Microsoft's Xbox plays progressive and interlaced H.264 video using Xbox as an extender to Windows Media Center. Windows Media Center allows users to send recorded TV, video, and photos from their PC to television with an extender, such as the Xbox 360. (11/15 (Del Castillo) Tr. at 42:4-7; Ex. 2738 at 1; Ex. 1408 at 490-91.)

563. Dr. Drabik used the Xbox as an extender to Windows Media Center and played progressive and interlaced H.264 videos on the Xbox. (11/19 (Drabik) Tr. at 40:6-12.)

564. **AT&T U-verse.** Microsoft has partnered with AT&T U-Verse to deliver progressive and interlaced H.264 video to the Xbox as a set-top-box. (Ex. 2161 at MOTM_WASH1823_0601773-74; 11/15 (Del Castillo) Tr. at 23:12-15, 40:7-13; 11/14 (Orchard) Tr. at 157:20-159:14; 11/19 (Drabik) Tr. at 61:9-16.)

565. Dr. Drabik played an AT&T U-verse video on the Xbox and verified that it contained interlaced H.264 content (MBAFF encoded). (11/19 (Drabik) Tr. at 40:17-20.)

566. Microsoft asserted that AT&T U-verse on the Xbox is not a popular service among Xbox users. (11/15 (Del Castillo) Tr. at 23:20-24:5.) However, approximately 11,000 users make use of AT&T's U-verse service through their Xbox. (11/15 (Del Castillo) Tr. at 40:4-6.) Dr. Sukumar's Xbox survey results show that approximately 7.7% of surveyed respondents use the Xbox as an AT&T U-Verse set-top box. (*See* Ex. 2399.)

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567. **USB ports.** Microsoft's Xbox plays progressive and interlaced H.264 video through the Xbox's USB ports. Users can plug a USB drive into one of the USB ports to play back files on that drive. (11/15 (Del Castillo) Tr. at 42:1-3; 11/14 (Orchard) Tr. at 159:15-160:5.)

568. Dr. Drabik inserted a USB drive containing interlaced H.264 video (MBAFF encoded) into an Xbox and played the video content. (11/19 (Drabik) Tr. at 40:6-16.)

569. **DVDs.** Microsoft's Xbox plays progressive and interlaced H.264 video that has been burned to a DVD. (11/14 (Orchard) Tr. at 159:21-160:1.)

570. Dr. Sukumar confirmed that Xbox owners use their consoles to watch video, including progressive and interlaced video. Dr. Sukumar presented survey results showing that approximately 30.3% of surveyed respondents use the Xbox to watch interlaced video, and approximately 16% of surveyed respondents use the Xbox to watch MBAFF video. (11/19 (Sukumar) Tr. at 186:3-187:22; Ex. 3034 at Exhibit A2 at 15; Ex. 2399.)

b. Microsoft's Windows products play progressive and interlaced H.264 video

571. The Windows H.264 codec processes and plays progressive and interlaced H.264 content in a variety of ways and from a variety of sources, including the Internet, TV, local disks, and camcorders. (Ex. [redacted]; Ex. 2738 at 1; Ex. 1408 at 412; 11/14 Tr. (Orchard) at 153:2-154:2, 159:15-23.)

572. **Internet Explorer.** Microsoft's Windows products play progressive and interlaced H.264 video from the Internet with Internet Explorer. (11/13 (DeVaan) Tr. at 43:21-44:2.) Microsoft's Internet Explorer 9 uses the Media Foundation API in Windows to decode H.264 video. (11/13 (DeVaan) Tr. at 43:1-44:2.)

573. **Windows Media Center.** Microsoft's Windows products also play and record progressive and interlaced H.264 video from broadcast or cable TV using Windows Media Center. (Ex. 1408 at 14, 463, 482-83; 11/13 (DeVaan) Tr. at 43:1-20.) Microsoft advertises

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Windows Media Center as being "a whole PC entertainment system within Windows 7." (Ex. 2738 at 1.)

574. Microsoft advertises on its website that Windows Media Center allows the user to "Watch, pause, and record HDTV. Watch DVDs. . . . enjoy online shows. All in one place. That place is Windows Media Center—a whole PC entertainment system within Windows 7. Is it any wonder critics call it the hidden gem of Windows?" (Ex. 2738 at MOTM_WASH1823_0610575.) "[W]hen you use Windows Media Center to . . . watch a video, Windows Media Player is actually doing the work in the background." (Ex. 1408 at 413.)

575. Microsoft further advertises that "With Windows Media Center plus broadcast or cable TV and a TV tuner, you can watch, pause, and record live TV—even HDTV . . . Windows Media Center now supports more global TV standards and tuners, including digital and HD, further widening your choices. It also plays more popular audio and video formats, including . . . AVCHD, MPEG-4, WMV, and WMA." (Ex. 2738 at 1.)

576. Microsoft's internal specification for Windows 7 states that the decoder will "provide full support of broadcast video content as well as providing full support [for] major network operators, including: DirecTV, BskyB, . . . [and] Canal+," all of which provide HD content in H.264. (Ex. 2739 at 3-5; 11/13 (DeVaan) Tr. at 49:21-50:12, 51:10-25.) Such sources of digital television that use H.264 generally support interlaced content. (11/14/2012 (Orchard) Tr. at 153:5-21; 11/16 (Luthra) 193:21-23; Ex. 2342 ("In current television production, 1080i (60 and 50 Hz) systems are in widespread use around the world.").)

577. **Windows Media Player.** Microsoft's Windows products play progressive and interlaced H.264 video using Windows Media Player. (11/13 (DeVaan) Tr. at 43:1-20, 44:3-45:19; *see* Ex. 1408 at 13.) Microsoft's Windows Media Player uses the Media Foundation API in Windows to decode H.264 video. (11/13 (DeVaan) Tr. at 43:1-20, 44:3-8.) Microsoft's "Windows 7 Inside Out" book states that Windows Media Player 12 "now directly supports the most common high-definition formats, especially those that use the H.264 video compression

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codec." Ex. 1408 at 408-09. Microsoft's Media Player 12 supports the AVCHD and MP4 file types, which "typically use the H.264 video compression codec." (11/13 (DeVaan) Tr. at 44:9-45:19; Ex. 1408 at 408-09.) Window Media Player 12 has the ability to stream media between devices on a Windows network. (Ex. 1408 at 14.)

578. On a machine running Windows 7, Dr. Drabik played an interlaced H.264 video that was downloaded from the Internet. (11/19 (Drabik) Tr. at 38:7-40:5.) The video was of a Katy Perry performance that came from the BBC. (11/14 (Orchard) Tr. at 154:3-14; 11/19 (Drabik) Tr. at 38:7-39:8.) The website from which the Katy Perry video was downloaded states that the video is "format: AVC . . . Scan type: MBAFF." (Ex. 2230 at MOTM_WASH1823_0420085; 11/19 (Drabik) Tr. at 38:7-39:15.) Using a software tool called Elecard StreamEye, Dr. Drabik analyzed the Katy Perry video and confirmed that it is H.264 interlaced (MBAFF). (11/19 (Drabik) Tr. at 38:7-40:5.) He identified pictures in the video stream that had both frame and field content. He then generated screenshots that show pictures from the video contain macroblock pairs. (11/19 (Drabik) Tr. at 38:10-40:5; Ex. 2183 at MOTM_WASH1823_0601474; *see also* 11/14 (Orchard) Tr. at 154:3-19.)

579. Microsoft's Windows products play progressive and interlaced H.264 video generated by consumer camcorders. (Ex. 1408 at 409 ("[I]f you have a digital camera that records video to a flash memory card in the . . . AVCHD format[], you can now play those files directly in Windows without installing third-party software.") ("AVCHD Video" – "High-definition video container format used by many portable video recorders. It typically uses the H.264 video compression codec"); 11/14 (Orchard) Tr. at 159:15-20.)

580. Microsoft's Windows products also play progressive and interlaced H.264 video from USB drives, CDs, DVDs, and other storage media. (Ex. 1408 at 412.)

581. Microsoft asserted that third-party software programs are used to decode H.264 content. (11/13 (DeVaan) Tr. at 36:4-12.) However, during the design of Windows, Microsoft found that third party codecs were "not delivering the quality, safety, and seamlessness that the

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end-user really expected." (11/13 (DeVaan) Tr. at 47:24-48:13.) Microsoft put support for H.264 in Windows "to relieve the end-user from having to go to the hassle and risk of installing H.264 from a third party." (11/13 (DeVaan) Tr. at 48:14-49:3.) Microsoft *discourages* the use of third party codecs. (11/13 (DeVaan) Tr. at 45:24-46:14.) Microsoft warns users who install third party codecs that, "[y]ou do so at your own risk—a buggy codec can cause the Player to crash, freeze, or suffer reduced performance." (Ex. 1408 at 410; 11/13 (DeVaan) Tr. at 46:5-14.)

582. Microsoft also asserted that a computer would use a hardware decoder instead of the Windows H.264 software decoder to perform H.264 decoding functionality. (11/13 (DeVaan) Tr. at 35:23-25.) However, when DirectX Video Acceleration (a program developed by Microsoft) is available on a computer, the Windows H.264 decoder must communicate with the graphics hardware in the computer to decode the H.264 video. (Ex. 591 at 5, 10; 11/14 (Sullivan) Tr. at 35:21-36:21, 11/13 (Sullivan) Tr. at 207:20-24.) Some of the decoding operations are implemented by the Windows H.264 decoder and some are implemented by the DirectX Video Acceleration. (Ex. 591 at 5, 10; 11/14 (Sullivan) Tr. at 36:2-21.) When Windows Media Foundation cannot locate the hardware accelerator or when hardware acceleration is disabled, Media Foundation will use the Windows H.264 software decoder. (11/13 (DeVaan) Tr. at 52:4-10.)

583. Microsoft further asserted that interlaced H.264 content on the Internet "is very rare." (11/14 (Orchard) Tr. at 147:13-15.) However, Microsoft acknowledges that much of the video content available on the Internet is "user-generated." For example, a Windows 8 planning document states that in 2012, "[c]ommercial content on the PC will largely be internet-based, and much of the content will be free (ad-supported, user-generated or pirated)." ([redacted]) Prof. Orchard admitted that there are camcorders that generate interlaced H.264 content, and that there is content out there recorded by consumers who might want to upload that content to the Internet that has been recorded in interlaced form. (11/14 (Orchard) Tr. at 159:15-20, 160:6-161:20.)

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584. Prof. Orchard testified that he considered Motorola's H.264 patents to be "very unimportant" to Microsoft's Xbox 360 and Windows. (11/14 (Orchard) Tr. at 151:21-23.) However, he failed to consider several functions related to Windows Media Center in reaching his opinions. For example, he was not familiar with Windows Media Center. (11/14 (Orchard) Tr. at 156:7-15 ("Q. So you are not familiar with Windows Media Center; is that correct? A. I don't use it. I don't have it.").) He was not aware that Windows Media Center allows a user to send recorded TV shows or other video from their PC to their Xbox. (11/14 (Orchard) Tr. at 156:23-157:15 ("Q. Are you familiar with the fact that Windows Media Center allows user[s] to send recorded TV shows or other video from their PC to their Xbox? A. No, I was not aware of that, and I don't know how that is done.").) He was not aware that Xbox can be set up as a Windows Media Center extender, so the content can be streamed from a computer from one room to other rooms in the house. (11/14 (Orchard) Tr. at 157:12-15 ("Q. Were you aware that an Xbox can be set up as a Windows Media Center extender, so the content can be streamed from a computer from one room to other rooms in the house? A. No, I was not.").)

3. Microsoft's H.264 Compliant Products Use Motorola's H.264 Patents to Satisfy Consumer Demand

a. Microsoft's Xbox products use Motorola's H.264 patents to satisfy consumer demand

585. Microsoft added H.264 support to Xbox in response to consumer demand to play H.264 video. Since the introduction of the Xbox 360 in 2005, Microsoft has pushed for the Xbox to do more than games and designed it to serve as a digital media hub. (Ex. 2572 at 2 ("Microsoft is pitching the 360 as more than just a games console. It can also serve as a digital media hub.").)

586. When the Xbox was first introduced, it had limited video playback functions and lacked H.264 capability. (Ex. 2572 at 3 ("Microsoft has crippled the video playback functions of the 360, so it will only run video coming from a Windows Media Center PC. While the 360

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makes for a halfway decent media hub, it is not the machine that fulfils[sic] all of the needs of the digital junkie."); Ex. 2724 at MOTM_WASH1823_0610520.)

587. This limited video playback capability raised concern for some users. (*See* 11/20 (Dansky) Tr. at 14:13-15:14; Ex. 2572 at MOTM_WASH1823_0609646.)

588. However, once Microsoft added H.264 to the Xbox, it was applauded as a true competitor in the market—being recognized "at the head of the pack." (Ex. 2724 at MOTM_WASH1823_0610520 ("This puts Microsoft at the head of the pack in the Apple TV vs [Sony] PS3 vs Xbox 360 video battle royale.").)

589. The Xbox first supported H.264 with its HD DVD accessory player. (11/15 (Del Castillo) Tr. at 34:4-7.) The HD DVD player supports both progressive and interlaced H.264 video. (11/15 (Del Castillo) Tr. at 34:8-37:15.)

590. H.264 was mandatory for the Xbox HD DVD player. ([redacted].)

591. The Xbox 360 HD DVD player had a retail price of $199, reflecting the market value Microsoft placed on being able to play high-definition H.264 video. (Ex. 3347 at MOTM_WASH1823_0612156-59; 11/15 (Del Castillo) Tr. at 35:15-22, 38:10-39:20.)

592. [redacted]; 11/15 (Del Castillo) Tr. at 34:4-35:22.)

593. [redacted]

594. [redacted]

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[redacted]

595. Microsoft wanted to fulfill the customer's desire to have H.264 functionality. When Microsoft introduced the Xbox HD DVD player, Peter Moore, Microsoft's corporate vice president of the Interactive Entertainment Business in the Entertainment and Devices Division, explained that adding the HD DVD player was in response to consumers. (Ex. 3347 at MOTM_WASH1823_0612158 ("The reviews, the word of mouth and the consumer response have all been crystal clear — HD DVD is the format of choice. We're not forcing movie technology on game players but are instead letting them choose how to personalize their experiences. If they want HD DVD, there's no better value out there."); 11/15 (Del Castillo) Tr. at 38:10-39:20.)

596. Microsoft has continued its efforts to make the Xbox an all-in-one entertainment hub capable of providing television content and video. (11/15 (Del Castillo) Tr. at 54:7-1356:10-15; 11/19 Tr. 217:10-218:4; Ex. 2265, [redacted]

597. Microsoft CEO Steve Ballmer explained that: "[t]he living room is very important" to Microsoft, [i]t's a place where there's a high volume of consumption of digital goods and services. So Xbox is very important." (Ex. 2265 at 2; 11/15 (Del Castillo) Tr. at 54:23-56:1.)

598. Today, normal uses of the Xbox include things like video consumption and other sources of entertainment besides game play. (11/15 (Del Castillo) Tr. at 56:10-13.)

599. Consumer video consumption has continued to grow on the Xbox. In the spring of 2012, "for the first time, subscribers to Xbox's Live online service in the U.S. spent more time consuming video and music than multiplayer games. Globally, the hours spent on Xbox Live

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have grown 30% year over year, including gaming and entertainment, while video consumption has risen 140%." (Ex. 2265 at 2-3; 11/15 (Del Castillo) Tr. at 56:2-57:5.)

600. Video playback is also important to Microsoft's future products. [redacted]

601. [redacted]

b. Microsoft's Windows products use Motorola's H.264 patents to satisfy consumer demand

602. Microsoft added H.264 support to Windows in response to consumer demand to play H.264 video. Microsoft's Vice President of Development for Windows division, Jon DeVaan, testified that Microsoft "tr[ies] to support all the popular formats so that people using the computer get the results they expect, which is click on the video and it plays." (11/13 (DeVaan) Tr. at 34:8-10, 48:14-21; Ex. 2739 at 4; Ex. 2373 at MS-MOTO_1823_00000939603.)

603. Top-level themes for Microsoft's Windows products are known as "pillars." (11/13 (DeVaan) Tr. at 49:9-14.) "[O]ne of the key pillar of the Windows 7 vision" was "enabling Microsoft to provide to customers an **in box solution** to view both the playback of broadcast video content as well as live broadcast video content." (Ex. 2739 at 4 (emphasis in original); 11/13 (DeVaan) Tr. at 49:9-51:9.) "Playback of new file types (AAC, H.264)" was a "key success metric" for this feature. (Ex. 2739 at 4.)

604. Another pillar for Windows is "Optimized for Entertainment." (Ex. 2373 at MS-MOTO_1823_00000939603.)

605. Windows 7 was the first time that Microsoft incorporated H.264 into Windows. (11/13 (DeVaan) Tr. at 47:24-48:1.) Before Windows 7, H.264 support was provided by third-party add-on, which is an additional program that someone would install. (11/13 (DeVaan) Tr. at

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48:2-7.) Microsoft found that "third-party add-ons were not delivering the quality, safety and seamlessness that the end user really expected." (11/13 (DeVaan) Tr. at 47:24-48:13.)

606. Having codecs like H.264 built into Windows could provide "a premium SKU feature. . . . End users just want playback to work. They expect that clicking on a file should play it, without the trials of obtuse error messages, failed codec download attempts, and audio with no video (or vice versa) that they experience." (Ex. 2373 at MS-MOTO_1823_00000939603; 11/13 (DeVaan) Tr. at 47:24-48:17.)

607. During the design phase, Microsoft's view was that "customers needed to be able to rely on playing high definition video reliably." (11/13 (DeVaan) Tr. at 31:20-32:6, 48:18-21.)

608. When Microsoft went about building H.264 in Windows 7, it determined that "two things were happening. High definition camcorders were coming to the market, and streaming of video on the internet was popular. . . . And what we were interested in is finding and picking the right standard formats to implement, to achieve the philosophy that . . . when a person using a computer is just on the internet or connects up their camcorder, it works as they expect, the video plays." (11/13 (DeVaan) Tr. at 34:20-35:5.)

609. H.264 "was important from the Handycam high-definition video market in terms of consumers having home videos off of a high-definition Handycam." (7/31 DeVaan Depo. Tr. at 42:19-22.) These camcorders, or Handycams, generate H.264 content, including interlaced content. (11/14 (Orchard) Tr. at 159:15-23.)

610. In 2007, Microsoft knew that "[f]or Windows 7 to be a success in media playback, it is essential that a strategic subset of popular non-Windows Media codecs are provided in the box." (Ex. 2373 at MS-MOTO_1823_00000939601.) H.264 was included in that subset. (7/31 DeVaan Depo. Tr. at 59:7-16.)

611. Similarly, Microsoft recognized that "[t]o be competitive, Windows Media Player (WMP) must be able to play most common formats from associated common containers. . . . In addition, lack of native support for popular and emerging formats such as MPEG-4 variants

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(H.264/AVC . . .) often lead end users to install free codec packs to reduce their frustration experienced when unable to play content they have or receive from others. These codec packs are usually of dubious quality, show significant percentages of OCA hits, and sometimes include spyware." (Ex. 2373 at MS-MOTO_1823_00000939601.)

612. During development of Windows 7, Microsoft's consumer research found that consumers highly valued HD video playback. [redacted]; 7/31 DeVaan Depo. Tr. at 80:12-25, 82:8-21.) "H.264 is the standard [Microsoft] chose for HD video playback" so that it could fulfill consumer demand. (7/31 DeVaan Depo. Tr. at 84:8-11.) Microsoft included H.264 as a standard for playing high-definition content and "to relieve the end user from having to go to the hassle and risk of installing H.264" themselves. (11/13 (DeVaan) Tr. at 48:18-49:3; 7/31 DeVaan Depo. Tr. at 59:13-16.)

613. When developing the H.264 decoder for Windows 7, Microsoft identified multiple customer "scenarios" for H.264 in Windows 7. (Ex. 2373 at MS-MOTO_1823_00000939605; Ex. 2739 at MS-MOTO_1823_00000944791.)

614. One scenario was "Toby pulls down many community videos encoded in H.264. With his Vista PC, he would install a codec pack to be able to play the content. About once a week his player would crash while watching a video, and twice his whole machine was corrupted and he had to reinstall. He bought a new Windows 7 desktop, and was happy to find that it played his videos right out of the box with no crashes or other problems." (Ex. 2373 at MS-MOTO_1823_00000939605.)

615. In another scenario, "Abby has DirecTV at home with the Windows 7 edition of Media Center…. [M]ost of the high definition channels are H.264. With the unified video decoder in Windows 7, Abby can watch all of her favorite channels and seamlessly switch between different channels." (Ex. 2739 at 4.)

616. Broadcasters around the world such as DirecTV, BskyB, and Canal+ provide HD in H.264. (Ex. 2739 at 5.)

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617. Upon release of Windows 7 in 2009, H.264 allowed Microsoft to deliver the seamless experience of access to content for Windows. (7/31 DeVaan Depo. Tr. at 82:24-83:3; *see* Ex. [redacted]

618. Today, a key feature in Microsoft's Windows products is the ability to process and play digital media. The book "Windows 7 Inside Out," which acknowledges Jon DeVaan as a contributor and supporter, has three chapters that are devoted to digital media. (Ex. 1408 (chapters 12, 13, and 14); 11/13 (DeVaan) Tr. at 44:18-20.) Those chapters highlight Windows' support for the H.264 video compression codec. (11/13 (DeVaan) Tr. at 44:18-45:23; Ex. 1408 at xii.)

619. H.264 remains important to Microsoft's relationship with its consumers.

[redacted]

4. Interlaced Video Is Ubiquitous and Important to Microsoft's Products

620. In 2001 and 2002, Motorola and third parties recognized that: "it is important to make sure that H.26L has adequate syntax to support the interlace needs for video." (Ex. 782 at 1; Ex. 653 at 1 ("In particular, except for movies nearly all entertainment video delivered to home televisions originates in interlaced form."); 11/14 (Sullivan) Tr. at 16:12-19:7; 11/16 (Luthra) Tr. at 199:2-9; Ex. 2271.) It was shown at that time that substantial improvement in coding efficiency can be achieved through the inclusion of interlaced coding tools. (Ex. 2271 at MOTM_WASH1823_0209996-997 (Figs. 15 and 16); 11/14 (Sullivan) Tr. at 16:12-18:23.)

621. As recently as July 2012, representatives from NBC, HBO, CBS, CBC, MMI, Comcast, and Cable Labs submitted to MPEG that: "interlaced scan formats remain ubiquitous in

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the worldwide television ecosystem." (Ex. 2342 at MOTM_WASH1823_0603553; Trial Tr. at 11/16 (Luthra), 194:2-18; 11/20 (Dansky) Tr. at 20:6-14.)

622. The industry representatives further stated that "[i]n current cable, satellite and telco distribution systems, 1080i, 480i and 576i formats are in widespread use around the world" and that "in order to achieve commercial success, new compression standards should continue to efficiently support interlaced formats for the foreseeable future." (Ex. 2342 at MOTM_WASH1823_0603554.)

623. They explained that if interlaced is converted to progressive prior to distribution, several problems and issues can arise including unacceptable degradation in picture quality. (Ex. 2342 at MOTM_WASH1823_0603554; 11/16 (Luthra) Tr. at 195:6-196:2.)

624. Furthermore, as recently as 2009, the industry requested that interlaced coding tools be included in the Stereo High Profile extension of the H.264 Standard. (Ex. 3398 at MOTM_WASH1823_0612350; 11/14 (Sullivan) Tr. at 20:11-17, 22:7-21.)

625. The first profile of the H.264 Standard designed for multiview coding was the Multiview High Profile extension. (Ex. 3398 at MOTM_WASH1823_0612350.)

626. Microsoft's Gary Sullivan reported in a technical paper that "One key restriction imposed in the design of the Multiview High profile was that the pictures could not be coded as individual fields or using macroblock-adaptive frame-field coding." (Ex. 3398 at MOTM_WASH1823_0612350.) The restriction referred to as the inability to code pictures as individual fields refers to lack of picture-level frame/field adaptivity, also known as PICAFF or PAFF. (11/14 (Sullivan) Tr. at 21:15-22:6.)

627. The Stereo High Profile extension was developed after the design of the Multiview High Profile, in response to industry requests "for an additional profile targeted specifically for stereo video applications and supporting the interlaced coding tools." (Ex. 3398 at MOTM_WASH1823_0612350.) It was finalized at the end of 2009/ beginning of 2010 and includes the interlaced coding tools of H.264. (Ex. 3398; 11/14 (Sullivan) Tr. at 22:7-21.)

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628. Microsoft admits that interlaced is important. As recently as August 2012, Microsoft stated on its Windows support web site that "interlaced" is a "feature . . . of increasing importance" for content sent to "DVD players, set-top boxes and other home electronics." (Ex. 2768 at MOTM_WASH1823_0603981; 11/20 (Dansky) Tr. at 18:11-22.)

629. Microsoft also states on its Windows media web site that "[i]nterlaced video content is widely used in television broadcasting." (Ex. 2249 at MOTM_WASH1823_0604041; 11/20 (Dansky) Tr. at 19:3-12.)

630. Microsoft added interlaced coding tools to its own video codec (Windows Media Video 9) submitted for standardization as the VC-1 standard. (11/14 (Sullivan) Tr. at 23:1-4, 23:23-24:2.)

631. Microsoft stated that: "The main goal of VC-1 development and standardization is to *support the compression of interlaced content* without first converting the content to progressive. This support makes VC-1 more attractive to broadcast and video industry professionals." (Ex. 3381 at MOTM_WASH1823_0612246 (emphasis added).)

5. Microsoft's Revenue for H.264 Compliant Products

632. [redacted]

L. The Krause and Wu Patents Are Not Limited to Hardware Decoders

633. One of ordinary skill in the art reading the '419 patent specification would understand that the "decoder apparatus" could be implemented in hardware or software. (11/19

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(Drabik) Tr. at 41:20-42:2 ("Krause and Wu use the term 'algorithm' in their specifications."); Ex. 270 at col. 2, lns. 57-60.)

634. One of ordinary skill in the art reading the '968 patent would understand that the "decoder apparatus" could be implemented in hardware or software. (11/19 (Drabik) Tr. at 41:20-42:2 ("Krause and Wu use the term 'algorithm' in their specifications."); Ex. 283 at col. 7, lns. 3-6.)

635. Even if the Krause and Wu patents were limited to decoders that use hardware for decoding functions, they would be important to Microsoft. Microsoft developed the specification for DirectX Acceleration to enable Windows based PCs to use hardware acceleration to perform decoding functions. (11/14 Sullivan) Tr. at 35:21-36:21; Ex 591.)

M. Motorola's H.264 Essential Patents Are Not Invalid

1. The Krause Patent Family

636. Microsoft has not shown that the alleged prior art references disclose each and every element of the claims of the '419 patent. Microsoft has not shown that the U.S. Patent No. 5,144,423 qualifies as prior art under 35 U.S.C. § 102. Microsoft has not shown that the '423 patent discloses each and every element of claim 20 of the Krause '419 patent. For example, Microsoft has not shown that the '423 patent discloses '419 patent claim 20, element 1: "means for receiving blocks of encoded video data, provided by different motion compensators depending on which motion compensator meets a selection criteria for a particular region of a video image defined by each block." (Ex. 270 at claim 20.)

637. For the same reason, Microsoft has not shown that the '423 patent discloses '419 patent claim 20, element 4: "means responsive to said motion vector and common to data blocks provided by any of said different motion compensators for recovering current video image data from data provided by a current data block and at least one prior data block." (Ex. 270 at claim 20.)

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638. Microsoft has not shown that the Sullivan Thesis was publicly available prior to October 24, 1991, or that it qualifies as prior art under 35 U.S.C. § 102. The Sullivan Thesis is not a printed publication. There is no evidence that the Sullivan Thesis was distributed to the relevant public prior to the filing of the '419 patent on October 24, 1991. There is no evidence that the Sullivan Thesis was publically available from the UCLA library prior to October 24, 1991. (11/14 (Sullivan) Tr. at 41:3-42:8.) Dr. Sullivan "handed out some copies of it" and "turned it in to the library one of the last days of August or very early in September." (11/14 (Sullivan) Tr. at 41:3-42:8.) But he was "not aware precisely what [the library] did." (11/14 (Sullivan) Tr. at 41:3-42:8.) No library records or other evidence were presented.

639. Microsoft has not shown that the Sullivan Thesis discloses each and every element of claim 20 of the '419 patent. For example, Microsoft has not shown that the Sullivan Thesis discloses '419 patent claim 20, element 2: "means coupled to said receiving means for retrieving, from each received data block, a code work [sic] representative of a motion compensator from which the block is received." (Ex. 270 at claim 20.)

640. Microsoft has not shown that the Puri Paper was publicly available or that it qualifies as prior art under 35 U.S.C. § 102. There is no evidence that the Puri Paper document was published or publicly available prior to October 24, 1991. The document on its face has no date and Microsoft has not established its publication. (Ex. 632.)

641. Microsoft has not shown that the Puri Paper discloses each and every element of claim 20 of the '419 patent. For example, Microsoft has not shown that the Puri Paper discloses '419 patent claim 20, element 2: "means coupled to said receiving means for retrieving, from each received data block, a code work [sic] representative of a motion compensator from which the block is received." (Ex. 270 at claim 20.)

642. Microsoft has not shown that CCITT #453 qualifies as prior art under 35 U.S.C. § 102. Microsoft has not shown that CCITT #453 discloses each and every element of claim 20 of the Krause '419 patent. For example, Microsoft has not shown that CCITT #453 discloses '419

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patent claim 20, element 1: "means for receiving blocks of encoded video data, provided by different motion compensators depending on which motion compensator meets a selection criteria for a particular region of a video image defined by each block." (Ex. 270 at claim 20.)

2. The Wu Patent Family

643. Microsoft has not shown that the alleged prior art references disclose each and every element of the claims of the '968 patent. Microsoft has not shown that the Sullivan Thesis discloses each and every element of claim 19 of the Wu '968 patent. For example, Microsoft has not shown that the Sullivan Thesis discloses '968 patent claim 19, element 2: "means coupled to said receiving means for retrieving, from each received superblock, one of: first overhead data . . . second overhead data . . . and third overhead data . . . . " (Ex. 283 at claim 19.)

644. Microsoft has not shown that the Puri Paper discloses each and every element of claim 19 of the Wu '968 patent. For example, Microsoft has not shown that the Puri Paper discloses '968 patent claim 19, element 5: "means responsive to said third overhead data for identifying the compression mode used to compress each individual block in the received superblock and for decoding the received superblock using a decompression mode for each of said individual blocks that corresponds to the compression mode used to compress the block." (Ex. 283 at claim 19.)

645. Microsoft has not shown that U.S. Patent No. 5,227,878 qualifies as prior art under 35 U.S.C. § 102. Microsoft has not shown that U.S. Patent No. 5,227,878 discloses each and every element of claim 19 of the Wu '968 patent. For example, Microsoft has not shown that the '878 patent discloses '968 patent claim 19, element 5: "means responsive to said third overhead data for identifying the compression mode used to compress each individual block in the received superblock and for decoding the received superblock using a decompression mode for each of said individual blocks that corresponds to the compression mode used to compress the block." (Ex. 283 at claim 19.)

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646. Microsoft has not shown that the '423 patent discloses each and every element of claim 19 of the Wu '968 patent. For example, Microsoft has not shown that the '423 patent discloses '968 patent claim 19, element 2c: "third overhead data indicating that the individual blocks contained in the received superblock were compressed using a plurality of different compression modes." (Ex. 283 at claim 19.)

647. Microsoft has not shown that CCITT #453 discloses each and every element of claim 19 of the Wu '968 patent. For example, Microsoft has not shown that CCITT #453 discloses '968 patent claim 19, element 5: "means responsive to said third overhead data for identifying the compression mode used to compress each individual block in the received superblock and for decoding the received superblock using a decompression mode for each of said individual blocks that corresponds to the compression mode used to compress the block." (Ex. 283 at claim 19.)

3. The Eifrig Patent Family

648. Microsoft has not shown that the alleged prior art references anticipate or render obvious the claims of the Eifrig Family. Microsoft has not shown that the H.263 Draft Recommendation qualifies as prior art under 35 U.S.C. § 102. For example, Microsoft has not shown that the H.263 Draft Recommendation discloses '980 patent claim 13, element 5: "at least one of said first, second and third candidate blocks and said current block is field coded." (Ex. 268 at claim 13; Ex. 611 at MS-MOTO_1823_00004056204 ("Source format" – "The source coder operates on non-interlaced pictures").)

649. Microsoft has not shown that the H.263 Draft Recommendation qualifies as prior art under 35 U.S.C. § 103. H.263 does not disclose the use of the same three neighboring blocks in a context in which one of the blocks can be field-coded. (11/19 (Drabik) Tr. at 55:12-56:9.) A person having ordinary skill in the art would not have found it obvious implement Motorola's Eifrig invention in view of the H.263 Draft Recommendation. (11/19 (Drabik) Tr. at 55:12-56:9

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("It requires innovation to implement . . . combining those things is the novelty and actually the difficult part.").)

4. The MBAFF Patent Family

650. Microsoft has not shown that the alleged prior art references anticipate the claims of the MBAFF patents. The MBAFF Family is not invalid in view of the asserted single macroblock AFF references. In single macroblock AFF coding, the same seven block sizes were not available in frame mode and field mode. (Ex. 271 at 7:22-49; 424 (Sullivan Paper) at 567; 11/19 (Drabik) Tr. at 31:3-16; 11/16 (Luthra) Tr. at 203:17-204:5.)

651. In ITC Investigation No. 337-TA-752, the Administrative Law Judge determined that claim 2 of the '596 Patent is not invalid. Specifically, the ALJ considered single macroblock AFF references, including VCEG-N76, and determined that the '596 patent claim 2 is not anticipated by such references. (*In the Matter of Certain Gaming and Entertainment Consoles, Related Software, and Components Thereof*, Inv. No. 337-TA-752, Initial Determination (April 25, 2012) at 191 ("Microsoft has not shown by clear and convincing evidence that each of the references [Puri Paper], ['878 patent], and [VCEG-N76], anticipates claim 2 of the '596 patent").)

652. Microsoft has not shown that VCEG-N57r2 qualifies as prior art under 35 U.S.C. § 102. Microsoft has not shown that VCEG-N57r2 discloses '596 Patent, claim 2: "wherein said frame or field macroblocks can be divided into blocks, and each of said block comprises 16×16, 16 by 8 pixels, 8 by 16 pixels, 8 by 8 pixels, 8 by 4 pixels, 4 by 8 pixels, or 4 by 4 pixels." (Ex. 271 at claim 2; Ex. 782 at MS-MOTO_1823_00003703160 (proposing to experiment in H.26L with adaptive field/frame macroblock coding as done in MPEG-2).)

653. Microsoft has not shown that VCEG-N76 qualifies as prior art under 35 U.S.C. § 102. Microsoft has not shown that VCEG-N76 discloses '596 Patent, claim 2: "wherein said frame or field macroblocks can be divided into blocks, and each of said block comprises 16×16,

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16 by 8 pixels, 8 by 16 pixels, 8 by 8 pixels, 8 by 4 pixels, 4 by 8 pixels, or 4 by 4 pixels." (Ex. 271 at claim 2; Ex. 785 at 3 (Figure 2 lacks the 16×16 and 8×16 block sizes in field mode).)

654. Microsoft has not shown that MPEG-2 anticipates or renders obvious the MBAFF patent claims under 35 U.S.C. §§ 102 or 103. In particular, Microsoft admits that the single macroblock adaptive frame/field coding of MPEG-2 is different than MBAFF in H.264. (Ex. 424 (Sullivan paper) at 567 ("Note that, unlike in MPEG-2, the frame/field decision is made at the macroblock pair level rather than within the macroblock level. The reasons for this choice are to keep the basic macroblock processing structure intact, and to permit motion compensation areas as large as the size of a macroblock.").)

5. The PAFF Patent Family

655. Microsoft has not shown that the alleged prior art references invalidate the claims of the PAFF patents. The PAFF patents claim the benefit of priority from 8 provisional applications. (Ex. 280 ('353 patent) at MS-MOTO_1823_00004035404); Ex. 281 ('087 patent) at MS-MOTO_1823_00004035421); Ex. 282 ('931 patent) at MS-MOTO_1823_00004074779.) There is no evidence to suggest that any alleged prior art reference anticipates or renders obvious the claims of the PAFF patents.

656. Microsoft has not shown that MPEG-2 Part 2 renders obvious the claims of the PAFF patents. Microsoft has not shown that MPEG-2 Part 2 can be combined with other prior art to invalidate the PAFF patents.

6. The Scan Patent Family

657. Microsoft has not shown that the alleged prior art reference anticipates or renders obvious the claims of the '094 and '888 patents. Microsoft has not shown that JVT-B068 discloses each and every element of claim 7 of the '094 patent. For example, Microsoft has not shown that JVT-B068 discloses '094 patent, claim 7, element 5: "assigning the two dimensional frequency coefficient located at n=0 and m=2 a value of the one dimensional frequency coefficient located at p=3." (Ex. 266 at claim 7.)

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658. Microsoft has not shown that the 8×8 field scan used in MPEG-2 and proposed by Sony in JVT-B068 discloses each and every element of claim 7 of the '888 patent. For example, Microsoft has not shown that the 8×8 field scan used in MPEG-2 discloses '888 patent, claim 8, element: "assigning the two dimensional frequency coefficient located at n=1 and m= 0 a value of the one dimensional frequency coefficient located at p=3." (Ex. 265 at claim 7.)

659. Nor has Microsoft shown the Scan Family is obvious in view of JVT-B068. In ITC Investigation No. 337-TA-752, the Administrative Law Judge determined that claims 7, 8, and 10 of the '094 patent are not invalid. Specifically, the ALJ considered the JVT-B068 reference and determined that the '094 patent claims were not obvious in view of such reference. (*In the Matter of Certain Gaming and Entertainment Consoles, Related Software, and Components Thereof*, Inv. No. 337-TA-752, Initial Determination (April 25, 2012) at 131 ("Microsoft seeks to invalidate the '094 patent under 35 U.S. C. § 103 based on two combinations of references: RX-297 ('MPEG 91/228') in combination with RX-299 ('JVT-B068'); and RX-293 (MPEG-2 Standard) in combination with RX-299. . . . Microsoft has not shown by clear and convincing evidence that the asserted claims of the '094 patent are invalid.").)

N. Microsoft's Alleged H.264 Essential Patents

660. Motorola's portfolio is as valuable, or slightly more valuable, as a technical matter, than Microsoft's portfolio asserted to be H.264 essential. (11/19 (Drabik) Tr. at 25:24-26:2.)

1. Two Of Microsoft's Patents Are Not Essential

661. Two of Microsoft's patents are not essential to the H.264 Standard. (11/19 (Drabik) Tr. at 46:10-18.)

662. Microsoft's U.S. Patent Nos. 7,773,671 (Ex. 855) and 7,003,035 (Ex. 890) are not essential to the H.264 Standard because "[f]or example, one of them makes use of an aggregation

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or combination of prediction modes, which isn't in the standard, and another calls out some specific arithmetic procedures, which are not in the standard." (11/19 (Drabik) Tr. at 46.)

2. Fifteen of Microsoft's Patents Are Optional

663. "15 of Microsoft's patents are directed to things that are optional, that need not be practiced by any H.264 encoder -- or decoder." (11/19 (Drabik) Tr. at 46:10-21.)

a. Annex B.3

664. Microsoft has one patent that applies to Annex B.3, an informative section of the standard that does not express a requirement of the H.264 Standard. Some sections in the H.264 Standard are labeled as informative and do not express a requirement of the standard, but rather just provide information. (11/14 (Sullivan) Tr. at 44:23-45:17 ("Q. Now, I'd like to ask you a couple questions about the standard itself. There are some sections in it that are labeled as informative, is that right? A. Yes. Q. And those sections are not expressive a requirement of the standard, rather they're just providing information, correct? A. Officially speaking, yes. Formally speaking, that's correct.").)

665. Annex B.3, to which U.S. Patent No. 7,248,740 (Ex. 895) applies, is marked as informative. (11/14 (Sullivan) Tr. at 45:6-17; *see* 11/19 (Drabik) Tr. at 46:19-21.) Annex B.3 of the H.264 Standard explains: "This subclause does not form an integral part of this Recommendation | International Standard. Many applications provide data to a decoder in a manner that is inherently byte aligned, and thus have no need for the bit-oriented byte alignment detection procedure described in this subclause." (Ex. 421 at 306.)

b. Annex C – Hypothetical Reference Decoder (HRD)

666. Microsoft has two patents that apply to Annex C, which is directed to a hypothetical reference decoder. U.S. Patent Nos. 7,646,816 and 7,593,466 are directed to reference decoders. (Ex. 833 at Abstract; Ex. 1669 at Abstract.)

667. Hypothetical reference decoder parameters are discussed in Annex C of the H.264 Standard. (Ex. 421 at 307.)

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668. Annex C does not require a compliant decoder to receive or process multiple sets of reference decoder parameters from the bitstream. (Ex. 421 at 308 ("All sequence parameter sets and picture parameter sets referred to in the VCL NAL units, and corresponding buffering period and picture timing SEI messages shall be conveyed to the HRD, in a timely manner, either in the bitstream (by non-VCL NAL units), or by other means not specified.").)

c. Annex D - Supplemental Enhancement Information (SEI)

669. Microsoft has 11 patents that apply to Annex D, which is directed to Supplemental Enhancement Information. Supplemental enhancement information, or SEI, is information that can be included in a bitstream but a decoder is not necessarily required to use most SEI data. (11/14 (Sullivan) Tr. at 45:22-47:7; *see* 11/19 (Drabik) Tr. at 46:19-21.)

670. Annex D of the H.264 Standard, to which U.S. Patent Nos. 7,024,097 (Ex. 818), 7,142,775 (Ex. 823), 7,167,633 (Ex. 824), 7,171,107 (Ex. 825), 7,248,779 (Ex. 822), 7,242,437 (Ex. 830), 7,633,551 (Ex. 831), 7,271,849 (Ex. 829), 7,274,407 (Ex. 828), 7,286,189 (Ex. 827), and 7,149,247 (Ex. 870) apply, explains that SEI messages are not required. (Ex. 421 at 322; *see* 11/19 (Drabik) Tr. at 46:19-21.)

671. Annex D explains: "This annex specifies syntax and semantics for SEI message payloads. SEI messages assist in processes related to decoding, display or other purposes. However, SEI messages are not required for constructing the luma or chroma samples by the decoding process. Conforming decoders are not required to process this information for output order conformance to this Recommendation | International Standard (see Annex C for the specification of conformance)." (Ex. 421 at 322.)

d. Annex E - Video Usability Information (VUI)

672. Microsoft has one patent that applies to Annex E, which is directed to Video Usability Information. The H.264 Standard does not require Video Usability Information, or VUI, parameters relating to color description be included in a conforming bitstream. (11/14 (Sullivan) Tr. at 47:14-18 ("Q. And the H.264 standard does not require VUI parameters relating

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to color description to be included in a conforming bitstream, correct? A. That's correct. The syntax allows that to either be present or not present.").)

673. Annex E of the H.264 Standard, to which U.S. Patent No. 7,155,055 (Ex. 868) applies, explains that VUI is optional. (Ex. 421 at 372; *see* 11/19 (Drabik) Tr. at 46:19-21.)

674. Annex E explains: "This annex specifies syntax and semantics of the VUI parameters of the sequence parameter sets. VUI parameters are not required for constructing the luma or chroma samples by the decoding process. Conforming decoders are not required to process this information for output order conformance to this Recommendation | International Standard (see Annex C for the specification of conformance)." (Ex. 421 at 372.)

3. There Were Comparable Alternatives to Microsoft's 5 Transform Patents and 2 Start Code Emulation Prevention Patents

675. For at least seven of the Microsoft patents, there were alternatives available at the time of the adoption of the H.264 Standard that offered comparable performance. (11/19 (Drabik) Tr. at 47:6-13.)

676. Microsoft's U.S. Patent Nos. 7,266,149 (Ex. 846), 6,882,685 (Ex. 848), 7,881,371 (Ex. 854), 7,106,797 (Ex. 856), and 7,839,928 (Ex. 857) are directed to transform. (11/14 (Orchard) Tr. at 142:10-13; 11/19 (Drabik) Tr. at 47:6-13.)

677. There were comparable alternatives to Microsoft's five transform patents. For example, FastVDO submitted an alternative transform to the JVT in JVT-B103. (Ex. 2216 at 20.) The JVT meeting report from the Geneva meeting concluded that in complexity there was "Not significant difference" from other transforms. (Ex. 2216 at 21.) Similarly, for quality the JVT concluded "No difference demonstrated." (Ex. 2216 at 21.) Although, FastVDO's transform/quantization proposal was not adopted, the JVT stated that, "[f]urther study of the family approach proposed in JVT-B103 is considered not incompatible with [the decision to adopt another proposal], and further such investigation is recommended." (Ex. 2216 at 22.)

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678. Microsoft's U.S. Patent Nos. 7,505,485 (Ex. 869) and 7,839,895 (Ex. 884) are directed to start code emulation prevention. (*See* 11/19 (Drabik) Tr. at 47:6-13.)

679. There were comparables to Microsoft's two start code emulation prevention patents. (11/19 (Drabik) Tr. at 47:6-13.) For example, the Background of the '485 and '895 patents explains that in prior video coding standards including H.261, MPEG-2, H.263 and MPEG-4, "the video syntax format within the data payload has been designed to avoid start code emulation" using a bit-level inspection process. (*See, e.g.*, Ex. 869 at 2:38-3:3, 3:11-48.)

4. Five of Microsoft's Patents Are Directed to Minor Aspects

680. At least five of Microsoft's patents are directed to minor aspects of the H.264 Standard. (11/19 (Drabik) Tr. at 47:6-13.)

681. Microsoft's U.S. Patent Nos. 6,563,953 (Ex. 796), 6,735,345 (Ex. 798), and 7,289,673 (Ex. 800) are directed to coded block pattern, which is a minor aspect. (11/19 (Drabik) Tr. at 47:6-13.) U.S. Patent No. 6,563,953 (Ex. 796) is directed to combining the coded block parameters for luminance and chrominance in a macroblock into a single, combined parameter for a macroblock. (Ex. 796 at 4:15-24, *see also* claims 1, 12, and 19.) U.S. Patent No. 6,735,345 (Ex. 798) is directed to combining the coded block parameters for luminance and chrominance in a macroblock into a single, combined parameter for a macroblock. (Ex. 798 at 4:18-27, *see also* claim 12.) U.S. Patent No. 7,289,673 (Ex. 800) is directed to decoding a code that represents the combining of the coded block parameters for luminance, the coded block parameters for chrominance, and macroblock type information. (Ex. 800 at 7:29-38, *see also* claim 1.)

682. Microsoft's U.S. Patent No. 7,379,607 (Ex. 842) is directed to decoding skipped macroblocks at a layer higher than the macroblock layer, which is a minor aspect. (Ex. 842 at 5:38-56, claim 4; 11/19 (Drabik) Tr. at 47:6-13.)

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683. Microsoft's U.S. Patent No. 7,120,197 (Ex. 847) is directed to adaptively filtering the boundaries between pixels in a reference frame, which is a minor aspect. (Ex. 847 at claims 1, 8 and 15; 11/19 (Drabik) Tr. at 47:6-13.)

5. Three of Microsoft's Patents Relate Only to the Extended Profile, Which is Little Used

684. Microsoft's U.S. Patent Nos. 6,912,584 (Ex. 813), 7,734,821 (Ex. 814), and 7,685,305 (Ex. 815) relate only to the Extended Profile, which is very little used. (*See* 11/19 (Drabik) Tr. at 47:6-13; 11/14 (Orchard) Tr. at 143:5-9 ("many of them are not directly related to the core components"); Ex. 3399 at MOTM_WASH1823_0612357 ("Among [the Baseline, Main and Extended profiles], implementation effort has thus far focused primarily on the Baseline and Main profiles. At the moment, the Baseline profile appears to provide a good solution for its target application area, but the primary interest that initially focused on the Main profile has now shifted to the High profile of FREXt.").)

O. The Value Of Microsoft's H.264 Patents To Motorola's Products

685. Motorola's smartphones, tablets, and set-top boxes include H.264 functionality. (11/20 (Dansky) Tr. at 125:18-126:11.)

686. [redacted]

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VI. SURVEYS ADDRESSING 802.11 AND H.264 USE

687. Dr. Ramamirtham Sukumar conducted two surveys. One, referred to as the "802.11 survey," was designed to assess surveyed respondents' connectivity to the Internet and the other (the "H.264 survey") was designed to assess the kinds of activities that surveyed respondents perform when on-line. (11/19 (Sukumar) Tr. at 185:5-9.)

688. The surveys are independent of each other and standalone. (11/19 (Sukumar) Tr. at 185:10-12.)

689. The surveys were conducted using accepted industry practices and procedures. (11/19 (Sukumar) Tr. at 185:16-18.)

690. Survey results for the 802.11 survey were collected in an Excel file. (11/19 (Sukumar) Tr. at 191:10-18; Ex. 2393.)

691. Survey results for the H.264 survey were collected in an Excel file. (11/19 (Sukumar) Tr. at 187:14-22; Ex. 2399.)

692. Question QH5A1 of the H.264 survey asked respondents to identify whether they have used their Xbox Console to view interlaced video content. (Ex. 3034 at Exhibit A2 at 15.)

693. Survey results show that approximately 30.3% of surveyed respondents have used the Xbox to watch interlaced encoded video. (Ex. 2399[2].)

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[2] Responses to QH5A1 for which survey respondents identified "interlaced" as a response are tabulated at column EZ of Ex. 2399 (those who chose "interlaced" were recorded as a "1"). To determine the overall percentage of respondents who identified "interlaced," tally the number of "1"s from column EZ for which the corresponding value in column C is "Complete." This yields a total of 136 respondents. Sum the corresponding weights from column GA to yield a weighted total of 166.1. To obtain this number using Excel, enter the following formula into a new column at the end of row 2 (e.g., in Row 2, Column GD): "=IF(C2="complete",EZ2*GA2,0)." Repeat this for each subsequent row, using the corresponding row number, e.g., C3, C4, C5, etc. This formula causes Excel to first check if Column C indicates that a respondent completed the survey; if so, for each "1" response recorded in column EZ, the formula returns the corresponding weight from column GA. Next, compute the total number of respondents who've completed the survey and answered question QH5A1 by entering the following formula at the end of row 2 (e.g., in Row 2, Column GE) and repeating for each subsequent row, using the corresponding row number: "=IF(C2="Complete",IF(EZ2=1,GA2,IF(EZ2=0,GA2,0)),0)". This formula causes Excel to

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694. Question QH5A2 of the H.264 survey was made available to a survey respondent only if they identified at least "interlaced" in response to QH5A1. (Ex. 3034 at Exhibit A2 at 15.)

695. Question QH5A2 of the H.264 survey asked respondents to identify whether they have used their Xbox Console to view MBAFF video content. (Ex. 3034 at Exhibit A2 at 15.)

696. Survey results show that approximately 16% of surveyed respondents have used the Xbox to watch MBAFF encoded video. (11/19 (Sukumar) Tr. at 200:1-9.)

697. Question QH1 of the H.264 survey asked respondents to identify which activities or services they access using their Xbox console, including using their Xbox console as an AT&T U-verse set-top box. (Ex. 3034 at Exhibit A2 at 12.)

698. Survey results show that approximately 7.7% of surveyed respondents have used the Xbox as an AT&T U-Verse set-top box. (Ex. 2399[3].)

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determine whether a respondent completed the survey, then whether their response to that question was a "1" or "0". If they did not respond to that question, the respective weight will be "0". If they did respond, the respective weight will be the value in Column GA. Divide 166.1 by the weighted total of respondents who completed the survey and answered question QH5A1 (548.32) to yield 30.3%.

[3] Responses to QH1 for which survey respondents identified "Uses as an AT&T U-Verse set-top box" as a response are tabulated at column CN of Ex. 2399 (those who chose "Uses as an AT&T U-Verse set-top box" are recorded as a "1"). To determine the overall percentage of respondents who identified "Uses as an AT&T U-Verse set-top box," tally the number of "1"s from column CN for which the corresponding value in column C is "Complete." This yields a total of 27. Sum the corresponding weights from column GA to yield a weighted total of 38.1 respondents. To obtain this number using Excel, enter the following formula in a new column at the end of row 2 (e.g., in Row 2, Column GD): "=IF(C2="complete",if(CN2=1,GA2,0),0)". Repeat this for each subsequent row, using the corresponding row number, e.g., C3, C4, C5, etc. This formula causes Excel to first check if Column C indicates that a respondent completed the survey—if so, for each "1" response recorded in column CN, the formula returns the corresponding weight from column GA. Next, compute the total number of respondents who've completed the survey and answered question QH5A1 by entering the following formula at the end of row 2 (e.g., in Row 2, Column GE) and repeating for each subsequent row, using the corresponding row number: "=IF(C2="Complete",IF(CN2=1,GA2,IF(CN2=0,GA2,0)),0)". This formula instructs Excel to determine whether the respondent completed the survey, then whether their response to that question was a "1" or "0". If they did not respond to that question, the

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699. Question QH5A of the H.264 survey asked respondents to identify which activities they have performed on their Xbox Console. (Ex. 3034 at Exhibit A2 at 15.)

700. Survey results show that approximately 46.4% of surveyed respondents have used their Xbox console to download and/or stream content. (Ex. 2399[4].)

701. Question QA13 of the 802.11 survey asked respondents to identify which ways they have connected to the Internet, including using an internal Wi-Fi that connects to the Internet without a wire or adapter. (Ex. 3034 at Exhibit A1 at 9.)

702. Survey results show that approximately 44.45% of surveyed Xbox consumers connect their Xbox to the Internet using an internal Wi-Fi that connects to the Internet without a wire or adapter. (Ex. 2393[5].)

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respective weight will be "0". If they did respond, the respective weight will be the value in Column GA. Divide 38.1 by the weighted total of respondents who completed the survey and answered question QH1 (496.01) to yield 7.7%.

[4] Responses to QH5A for which survey respondents identified "Downloading and/or Streaming Content (such as movies, music or social media)" are tabulated at column EU of Ex. 2399 (those who chose this response were recorded as a "1" in column EU). To determine the overall percentage of respondents who identified "Downloading and/or Streaming Content (such as movies, music or social media)," tally the number of "1"s from column EU for which the corresponding value in column C is "Complete." This yields a total of 141 respondents. Sum the corresponding weights from column GA to yield a weighted total of 254.25. To obtain this number using Excel, enter the following formula in a new column at the end of row 2 (e.g., in Row 2, Column GD): "=IF(C2="complete",EU2*GA2,0)." Repeat this for each subsequent row, using the corresponding row number, e.g., C3, C4, C5, etc. This formula instructs Excel to first check if Column C indicates that a respondent completed the survey—if so, for each "1" response recorded in column EU, the formula returns the corresponding weight from column GA. Next, compute the total number of respondents who've completed the survey and answered question QH5A1 by entering the following formula at the end of row 2 (e.g., in Row 2, Column GE) and repeating for each subsequent row, using the corresponding row number: "=IF(C2="Complete",IF(EU2=1,GA2,IF(EU2=0,GA2,0)),0)". This formula instructs Excel to look at whether the respondent completed the survey, then whether their response to that question was a "1" or "0". If they did not respond to that question, the respective weight will be "0". If they did respond, the respective weight will be the value in Column GA. Divide 254.25 by the weighted total of respondents who completed the survey and answered question QH5A (548.32) to yield 46.4%.

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703. Question QA14 of the 802.11 survey asked respondents to identify whether they use securing settings when connecting their Xbox consoles to the Internet. (Ex. 3034 at Exhibit A1 at 10.)

704. Question QA14a of the 802.11 survey was made available to a survey respondent only if they answered "Yes" or "Do not know" in response to QA14. (Ex. 3034 at Exhibit A1 at 10.)

705. Question QA14a of the 802.11 survey asked survey respondents to identify the network that best describes how their Xbox console connects to the Internet. (Ex. 3034 at Exhibit A1 at 10.)

706. Survey results show that approximately 19.6% of surveyed respondents identified using CCMP when connecting their Xbox consoles to the Internet. (Ex. 2393.[6])

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[5] Responses to QA13 for which survey respondents identified "Using an internal Wi-Fi (connects to the internet without a wire or adapter)" are tabulated at column BI of Ex. 2393 (those who chose this response were recorded as a "1"). To determine the overall percentage of respondents who identified "Using an internal Wi-Fi (connects to the internet without a wire or adapter)," tally the number of "1"s from column BI for which the corresponding value in column C is "Complete." This yields a total of 244 respondents. Sum the corresponding weights from column CK to yield a weighted total of 248.25. To obtain this number using Excel, enter the following formula in a new column at the end of row 2 (e.g., Row 2, Column CM): "=IF(C2="complete",BI2*CK2,0)". Repeat this for each subsequent row, using the corresponding row number, e.g., C3, C4, C5, etc. This formula causes Excel to first check if Column C indicates that a respondent completed the survey—if so, for each "1" response recorded in column BI, the formula returns the corresponding weight from column CK. Next, compute the total number of respondents who've completed the survey and answered question QH5A1 by entering the following formula at the end of row 2 (e.g., in Row 2, Column CN) and repeating for each subsequent row, using the corresponding row number: "=IF(C2="Complete",IF(BI2=1,CK2,IF(BI2=0,CK2,0)),0)". This formula causes Excel to look at whether the respondent completed the survey, then whether their response to that question was a "1" or "0". If they did not respond to that question, the respective weight will be "0". If they did respond, the respective weight will be the value in Column CK. Divide 248.25 by the weighted total of respondents who completed the survey and answered question QA13 (558.54) to yield 44.45%.

[6] Responses to QA14 for which survey respondents identified "CCMP (WPA2)" are tabulated at column BR of Ex. 2393 (those who chose this response were recorded as a "1" in column BR). To determine the overall percentage of respondents who identified "CCMP

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707. Survey results show that approximately 12.6% of surveyed respondents identified using TKIP when connecting their Xbox consoles to the Internet. (Ex. 2393.[7])

VII. THE HYPOTHETICAL BILATERAL NEGOTIATION: *GEORGIA-PACIFIC* FACTOR 15

708. *Georgia-Pacific* Factor 15 addresses the amount that a licensor (such as the patentee) and a licensee (such as the infringer) would have agreed upon (at the time the

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(WPA2)," tally the number of "1"s from column CK for which the corresponding value in column C is "Complete." This yields a total of 104 respondents. Sum the corresponding weights from column CK to yield a weighted total of 109.4. To obtain this number using Excel, enter the following formula in a new column at the end of row 2 (e.g., in Row 2, Column CM): "=IF(C2="complete",IF(BR2=1, CK2,0),0)." Repeat this for each subsequent row, using the corresponding row number, e.g., C3, C4, C5, etc. This formula instructs Excel to first check if Column C indicates that a respondent completed the survey—if so, for each "1" response recorded in column BR, the formula returns the corresponding weight from column CK. Next, compute the total number of respondents who've completed the survey by entering the following formula at the end of row 2 (e.g., in Row 2, Column CN) and repeating for each subsequent row, using the corresponding row number: "=IF(C2="Complete",CK2,0)". This formula instructs Excel to look at whether the respondent completed the survey and, if so, then to return the respective weight from column CK; otherwise return a weight of "0". Divide 109.6 by the weighted total of respondents who completed the survey (558.54) to yield 19.6%.

[7] Responses to QA14 for which survey respondents identified "TKIP (WAP)" are tabulated at column BR of Ex. 2393 (those who chose this response were recorded as a "2" in column BR). To determine the overall percentage of respondents who identified "TKIP (WAP)," tally the number of "2"s from column CK for which the corresponding value in column C is "Complete." This yields a total of 62 respondents. Sum the corresponding weight from column CK for each "2" in column BR to yield a weighted total of 70.3. To obtain this number using Excel, enter the following formula in a new column at the end of row 2 (e.g., in Row 2, Column CM): "=IF(C2="complete",IF(BR2=2, CK2,0),0)". Repeat this for each subsequent row, using the corresponding row number, e.g., C3, C4, C5, etc. This formula instructs Excel to first check if Column C indicates that a respondent completed the survey—if so, for each "2" response recorded in column BR, the formula returns the corresponding weight from column CK. Next, compute the total number of respondents who've completed the survey by entering the following formula at the end of row 2 (e.g., in Row 2, Column CN) and repeating for each subsequent row, using the corresponding row number: "=IF(C2="Complete",CK2,0)". This formula instructs Excel to look at whether the respondent completed the survey and, if so, then to return the respective weight from column CK; otherwise return a weight of "0". Divide 70.3 by the weighted total of respondents who completed the survey (558.54) to yield 12.6%.

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infringement began) if both had been reasonably and voluntarily trying to reach an agreement. (Ex. 293 at 681.)

A. Overview of the Negotiation

709. Consistent with Motorola's standard practice and the standard practice in the industry, Motorola and Microsoft would have negotiated for a cross-license to one another's 802.11 and H.264 essential patents. (11/20 (Donohoe) Tr. at 134:2-10, 136:15-137:4, 142:5-9; *see also* 11/20 (Dailey) Tr. at 46:8-20.)

710. The starting point for the hypothetical negotiation between Motorola and Microsoft would have been the 2.25% of the net selling price of covered products, as set forth in Motorola's October 2010 offer letters. (Exs. 1, 2; 11/20 (Dailey) Tr. at 36:12-23; 37:15-38:23; 11/20 (Donohoe) Tr. at 145:8-11.)

711. The Motorola and Microsoft hypothetical negotiators would have defined the field of use for the Motorola and Microsoft products to be licensed equipment and software providing wireless communication functionality (e.g., 802.11) and video decoding capability (e.g., H.264) in compliance with the identified standards. With respect to Motorola's products, the products lines discussed by the hypothetical negotiators would be (1) smartphones, (2) tablets, (3) set-top boxes, and (4) wireless devices (such as modems and access points). With respect to Microsoft's products, the product lines discussed by the hypothetical negotiators would be (1) Windows OS software (such as Windows Vista and Windows 7), (2) Windows Phone 7, and (3) Xbox consoles and certain accessories. (11/20 (Donohoe) Tr. at 142:5-22, 143:4-9, 145:6-7.)

712. Motorola and Microsoft would have used the price of the end product as the royalty base for negotiations, as this is both Motorola's general licensing practice and regularly done in the industry. (11/19 (Schmalensee) Tr. at 152:1-19; 11/20 (Dailey) Tr. at 37:20-23.) For example, as of December 2010, close to half of the 9,000 public and private licensing transactions included in the royalty rates database used by the *Licensing Economics Review: the Royalty Rate Journal of Intellectual Property*, were based on a percentage of sales. (Ex. 2922 at

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125; 11/19 (Schmalensee) Tr. at 153:9-13, 154:20-155:8.) It is not unreasonable to apply a single percentage-based royalty to the end price of various Xbox models, for example, to the extent that the patented technology makes the different modes more or less valuable. (11/19 (Schmalensee) Tr. at 155:14-156:3.)

713. Microsoft receives increased revenue and profits in addition to revenue from console sales based on the sale of other related Xbox products, such as downloadable games and HD content, accessories sales, and makes up revenue on the back end based on, for example, Xbox Live subscription sales. (7/11 Del Castillo Depo. Tr. at 66:6-11.)

714. Microsoft would seek, and Motorola would agree to, a reasonable cap on the amounts paid by Microsoft for its H.264 royalties of between $100 and $125 million annually. (11/20 (Donohoe) Tr. at 145:19-146:4.)

B. Factors Relevant to a Hypothetical Bilateral Negotiation

715. The Motorola and Microsoft hypothetical negotiators would have reached the following factual conclusions with respect to the *Georgia-Pacific* Factors concerning the parties' 802.11 and H.264 portfolios and products:

1. *Georgia-Pacific* Factors 6, 8, 9, and 13

a. Motorola's 802.11 SEPs

716. Microsoft would derive significant value from a license to Motorola's 802.11 portfolio. (11/20 (Dansky) Tr. at 13:17-14:3.) Under *Georgia-Pacific*, the profitability of Windows, the revenue stream generated by the Xbox, and the popularity of Windows and the Xbox would be considered in a hypothetical negotiation. (*See, e.g.*, 11/20 (Dansky) Tr. at 124:16-125:9.) [redacted]

717. [redacted]

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[redacted] Wi-Fi certification "is a key and very important marketing lever we have with our competition and not having the 802.11b/g/n Wi-Fi logo is not an option." (Ex. 3145.)

718. Prior to integrating Wi-Fi functionality in the Xbox 360 console, Microsoft stated that the Xbox 360 would "appear dated" when compared to the competing consoles from Sony and Nintendo, which included integrated Wi-Fi, [redacted] (11/15 Tr. at 42:18-44:22; [redacted])

719. Following the November 2006 launch of the Sony PlayStation 3 and the Nintendo Wii, both of which included integrated 802.11 capability, Microsoft's market share plummeted from a dominant 69% to 26%. (11/19 (Dansky) Tr. at 214:16-24; Ex. 2451.)

720. "[T]he older Xbox [i.e., Xbox] was limited to a wired network connection. Sadly, that hasn't changed on the [new Xbox model, i.e., Xbox 360]." (Ex. 2684.)

721. "[W]ireless connectivity using WiFi was becoming a customer expectation." (11/15 (Del Castillo) Tr. at 46:16-17, 50:7-8.)

722. Microsoft touted integrated 802.11n as a "key product differentiator," where Nintendo and Sony only "have 802.11b/g included in [the console]. (11/15 (Del Castillo) Tr. at 46:1-19; Ex. 2686.)

723. Microsoft sold its wireless adapter, which was directed solely to providing improved wireless functionality for $99.99, despite its cost of goods sold of less than $15. (11/15 (Del Castillo) Tr. at 25:20-25, 50:12-17, 51:7-25, 53:3-14; Ex. 2686, [redacted]

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724. Following launch in 2010 of the Xbox 360 S (with its now-integrated Wi-Fi) and the Omni N adapter, Microsoft regained the top market share. (11/9 (Dansky) Tr. at 214:25-215:5; Ex. 2451.)

725. "[M]ost homes do not have wired networks today. When you go into a home, if they have a connection, it's going to be WiFi, because it's the easiest to set up." (11/15 (Del Castillo) Tr. at 78:2-4.) Without 802.11, it "would probably be difficult" to sell the Xbox 360 today. (5/25 Penello Depo. Tr. at 71:10-14; *see also* Ex. [redacted] 2686.)

726. Microsoft's Surface tablet uses only 802.11, instead of cellular or wired connections, to connect to the Internet. (11/13 (DeVaan) Tr. at 41:9-20, 52:11-18.)

727. Motorola has obtained substantial value from incorporating 802.11 technology, including much of its own, in Motorola Mobility's smartphone, tablet, set top box, and WLAN products, and Motorola Solutions' mobile computer, WLAN router, and access point products. None of this value is related to Microsoft's patented 802.11 technology. (11/16 (Dansky) Tr. at 13:7-14:3.)

728. [redacted]

b. Motorola's H.264 SEPs

729. [redacted]

730. The value to Microsoft of the license to Motorola's identified H.264 patents was (and is) that its strategy to "own the living room" is dependent upon its access and use of the

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Main and High H.264 profile technologies as it incorporates Blu-ray and the ability to play HDTV into its upcoming versions of Xbox, Surface, Windows 8, and Windows Phone 8, and its future roadmap beyond those versions. (11/15 (Del Castillo) Tr. at 54:7-1356:10-15; 11/19 (Dansky) Tr. 217:10-218:4; Ex. 2265, [redacted]

731. [redacted]

2. *Georgia-Pacific* Factor 15

a. Motorola's 802.11 SEPs

732. In the hypothetical negotiation, based comparable licenses, Motorola's portfolio would be given a value of 2.25% of net selling price. (*See* 11/20 (Donohoe) Tr. at 140:24-141:2.)

733. Motorola's 802.11 patent portfolio is considered to have substantial technical and financial value. (11/14 (Ochs) Tr. at 76:21-77:16; 11/20 (Dansky) Tr. at 12:19-13:6.)

734. Microsoft's portfolio, on the other hand, would be allocated a value of between 0.25% and 0.5% based on its relative smaller size and less importance disclosure, as compared to Motorola's portfolio. (11/19 (Williams) Tr. at 100:24-101:14, 101:24-16; 11/20 (Donohoe) Tr. at 142:23-143:25.)

735. These rates were based on the conclusions reached by Mr. Williams regarding the technical value of Motorola's 802.11 SEPs and Mr. Dansky regarding the economic value of those SEPs to Microsoft's products. (11/20 (Donohoe) Tr. at 143:4-7, 143:12-15.)

736. After calculating each party's relative exposure under the other party's 802.11 portfolio, Microsoft would owe royalties in the range of $72 million per year, whereas Motorola would owe between $18 million and $36 million. (11/20 (Donohoe) Tr. at 142:23-143:25.)

737. A running royalty for Xbox could be between $3.00 and $4.50/unit (depending on rate assigned to Microsoft's portfolio strength) or 1.15% and 1.73% of net selling price (same). (11/20 (Donohoe) Tr. at 143:12-144:21.) This rate takes into account the value provided by a

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cross license to Microsoft's portfolio of 802.11 essential patents. (*See* 11/20 (Donohoe) Tr. at 143:12-144:21.)

b. Motorola's H.264 SEPs

738. In the hypothetical negotiation, Motorola's H.264 portfolio would be valued at 2.25% of the net selling price of covered products, based on comparable license agreements. (11/20 (Donohoe) Tr. at 145:8-11.)

739. Motorola's H.264 essential patent portfolio is (as a technical matter) of equal or greater value than the Microsoft H.264 essential patent portfolio. (11/19 (Drabik) Tr. at 25:24-26:2; 11/20 (Dansky) Tr. at 128:3-9; 129:2-16.)

740. [redacted]

741. The agreed-to royalty base for Microsoft's H.264 products would be the net selling price of the Windows software.

742. These rates were based on the conclusions reached by Mr. Drabik regarding the technical value of Motorola's H.264 SEPs and Mr. Dansky regarding the economic value of those SEPs to Microsoft's products. (11/20 (Donohoe) Tr. at 143:4-7, 145:8-11.)

743. After calculating each party's relative exposure under the other party's H.264 portfolios, Microsoft would owe royalties in the range of $326 million per year, whereas Motorola would owe approximately $189 million per year. With these assumptions, Microsoft would owe on the order of $137 million per year. (11/20 (Donohoe) Tr. at 145:19-146:4.)

744. [redacted]

745. A running royalty for Windows could be between $0.51 and $0.63/unit (depending on whether the cap was $100 or $125 million annually) or 0.68% and 0.84% of net selling price (same). (11/20 (Donohoe) Tr. at 146:5-21.)

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VIII. POLICY IMPLICATIONS OF MICROSOFT'S APPROACH TO RAND

746. If implemented, Microsoft's approach to RAND would have drastic policy implications. Companies might not participate in the standards-setting process or contribute their patents to the standard if they believe that they will not receive full and fair value for their patents. (3/27 Turner Depo. Tr. at 76:12-16, 21-25; 77:2-15; 11/13 (Murphy) Tr. at 168:16-20.) Standards may be put at risk and might not be successful if they do not incorporate the best technology possible. (11/13 (Murphy) Tr. at 169:2-5; 3/27 Turner Depo. Tr. at 76:12-16, 76:21-77:15.)

747. If pool rates were held to be the most appropriate RAND royalty rates, then SEP holders with valuable SEPs would be hesitant to participate in standard-setting activities, and might instead try to develop proprietary standards. (11/19 (Schmalensee) Tr. at 146:6-23.) Moreover, since licensing through SSOs under the RAND commitment is at least for some entities an important component of profitability, reducing that component would reduce the incentive to innovate, and thereby slow the pace of innovation in the economy. (11/19 (Schmalensee) Tr. at 146:24-147:3.)

PROPOSED CONCLUSIONS OF LAW

I. THE PARTIES' LOAS

1. Motorola's various IEEE LOAs constitute enforceable contracts between the IEEE and Motorola and incorporate the IEEE's patent policies by reference.

2. Motorola's various ITU LOAs constitute enforceable contracts between the ITU and Motorola and incorporate the ITU's patent policies by reference.

3. Microsoft's various IEEE LOAs constitute enforceable contracts between the IEEE and Microsoft and incorporate the IEEE's patent policies by reference.

4. Microsoft's various ITU LOAs constitute enforceable contracts between the ITU and Microsoft and incorporate the ITU's patent policies by reference.

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5. Under Motorola's ITU LOAs for the H.264 standard, Motorola does not have a RAND commitment unless the potential licensee agrees to cross license its H.264 patents back to Motorola.

II. THE PROPER METHODOLOGY FOR DETERMINING RAND IN THIS CASE

6. A hypothetical negotiation conducted in accordance with the *Georgia-Pacific* factors, modified for the specific circumstances of RAND negotiation generally, and the specific circumstances of the SEPs at issue in this case specifically, is the appropriate methodology for assessing RAND royalties. The hypothetical negotiation assumes that at least some of the Motorola and Microsoft standard essential patents are valid, enforceable and infringed by the respective parties and that at least some are essential to either the 802.11 or the H.264 standards. The hypothetical negotiation will take into account, where known, the real-world business considerations and circumstances of both Motorola and Microsoft. The terms and conditions negotiated will thus reflect the result that would be achieved by reasonable and prudent negotiators in this real-world setting.

7. The most relevant evidence to determining RAND royalty rates using a hypothetical bilateral negotiation is evidence as to the rates negotiated bilaterally under the RAND commitment by the same licensor for the same patents.

8. Pool licenses are not appropriate comparables for a bilaterally negotiated license.

9. A royalty that is based on a percentage of net selling price can be compliant with a party's RAND commitment.

10. The Xbox is the smallest saleable unit for Motorola's 802.11 portfolio.

11. Windows 7 is the smallest saleable unit for Motorola's H.264 portfolio.

12. The Entire Market Value Rule is a limitation on patent damages and is not a limit on how the royalty in patent licenses are structured. A royalty rate can be RAND even if not calculated pursuant to the Entire Market Value Rule.

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13. A numeric proportionality approach to determining a royalty rate is inconsistent with the *ex ante* incremental value measure for RAND.

14. Microsoft has the burden of establishing that Motorola's most recent offer was not RAND.

15. There is no RAND commitment under Motorola's H.264 ITU LOA unless the prospective licensee agrees to license its SEPs back to the prospective licensee.

16. Because the parties agree that a RAND royalty for Motorola's patents should be offset by a RAND royalty for Microsoft's patents essential to the 802.11 and H.264 standards, the Court must also determine the RAND royalty for Microsoft's patents. *See* Dkt 453 No. 3 (Microsoft Proposed Conclusion of Law).

DATED this 14th day of December, 2012.

RESPECTFULLY SUBMITTED,

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CERTIFICATE OF SERVICE

I hereby certify that on this day I electronically filed the foregoing with the Clerk of the Court using the CM/ECF system which will send notification of such filing to the following:

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