

# Standards, Intellectual Property Disclosure, and Patent Royalties: The *Rambus* Cases



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April 2011

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# Outline

- Standards Setting in DRAMs
- The FTC and EC Cases Against Rambus (and their outcomes)
- Mixed Signals and Potential Consequences
- Deviations from the Competitive Benchmark Resulting from Nondisclosure Strategies
  - Ex ante negotiations as the competitive benchmark
  - Patent ambush/anticompetitive holdup
  - Are “FRAND” remedies adequate to deter future bad acts?
- An Extension: Allowing for Path-Dependent Technological Change
  - Nondisclosure strategies can lead to the “wrong” technologies being adopted in the future as well as in the near term
  - Remedies and deterrence revisited
- Further Reading

# Standard-Setting in DRAMs

- Dynamic random access memories (DRAMs) are integrated circuits used as the temporary “memories” of personal computers and other electronic devices
- Standardization allows OEMs to more cheaply design and implement electronic devices that rely on DRAMs
  - This arises, among other things, from economies of scale and reduced learning costs for systems designers
- In the early-to-mid 1990s, the Joint Electron Device Engineering Council (JEDEC) developed standards for DRAMs
- The U.S. Federal Trade Commission and, later, the European Commission, found that Rambus had anticompetitively distorted this process by withholding information about its patent holdings, allowing it to charge supra-competitive royalties for its SDRAM-related technologies

# The Federal Trade Commission's Allegations

- JEDEC had required participants to disclose any holdings of intellectual property that might be included in its standards
- Rambus failed to disclose its existing and pending patents
- Alternatives existed to the Rambus technologies that were ultimately included in JEDEC's DRAM standards
- Rambus disclosed its intellectual property holdings only after users were "locked in" to those standards
- Had Rambus disclosed its IP holdings prior to the establishment of the standard, JEDEC's members would instead have been able to
  - Negotiate "reasonable" license fees with Rambus, or
  - Employ alternative technologies (to avoid becoming locked in to the Rambus technologies)
- Rambus's behavior allowed it to engage in anticompetitive holdup by demanding excessive license fees

## According to Rambus:

- Neither JEDEC's rules nor prevailing antitrust standards required Rambus to disclose its pending patent applications or intentions to seek patents
- Its failure to disclose was justified by its need to protect trade secrets
- Rambus was no longer a member of JEDEC when it adopted its DRAM standard
- Rambus's technologies would have been included in the JEDEC standard even if it had disclosed its patent interests
- JEDEC's members were aware of Rambus's patent holdings when the subsequent DDR2 SDRAM standard, again incorporating Rambus technologies, was adopted

# The FTC's Remedy Order

- For the three year period that would have started at the date of the FTC's Remedy Opinion, the maximum royalty rates as a percentage of net sales that Rambus would have been permitted to impose were:
  - 0.25% for JEDEC-Compliant SDRAM
  - 0.5% for JEDEC-Compliant DDR SDRAM
  - 0.5% for JEDEC-Compliant Non-DRAM products that comply with SDRAM standards
  - 1.0% for JEDEC-Compliant Non-DRAM Products that comply with DDR SDRAM products
- At the end of the three year period, the maximum allowable royalty rates for JEDEC-Compliant DRAM Products and JEDEC-Compliant Non-DRAM products would have been reduced to zero
- There were no limits on royalty rates for DDR2 and subsequent versions of Rambus's DDR technology

## Decision of the Court of Appeals for the DC Circuit

- The Court reversed the Federal Trade Commission's Decision and Order, holding that
  - JEDEC's rules failed to provide "clear guidance" and did not "define clearly what, when, how, and to whom the members [of an SSO] must disclose"
  - Rambus's alleged deception cannot be said to have had an effect on competition in violation of the antitrust laws if JEDEC would have standardized the very same technologies even if Rambus had disclosed, a possibility that the FTC did not rejectand
  - JEDEC's loss of an opportunity to seek favorable licensing terms is not, as such, an antitrust harm
- The U.S. Supreme Court denied *certiorari*

# The European Commission's Statement of Objections

According to the European Commission,

- Rambus engaged in intentional deceptive conduct in the context of the standard-setting process, for example by not disclosing the existence of the patents which it later claimed were relevant to the standards that were adopted
- Rambus subsequently claimed “unreasonable” royalties for the use of those relevant patents
- Without its “patent ambush,” Rambus would not have been able to charge these unreasonable royalty rates

*Unlike the FTC, which had made available a lengthy and detailed public record of the basis for its decision and remedies, the EC disclosed only summary information bearing on its case and its formal remedy order (“Commitment”).*

## Rambus's Commitments to the European Commission

Rambus must, among other things,

- Make the SDRAM and DDR SDRAM technologies originally at issue available to licensees at a royalty rate of zero
- Cap its royalty rates for subsequent versions of its technologies at 1.5% of a chipmaker's selling price for DRAMs embodying Rambus's technologies
  - This rate is considerably lower than the 3.5% that Rambus had previously demanded for its original SDRAM and DDR SDRAM technologies
- Adhere to a most-favored-customer provision
  - Any licensee with “similar terms, conditions and business circumstances” will obtain the “lowest per unit rate” obtained by such customers

*These terms apply to all relevant Rambus transactions worldwide.*

## Mixed Signals and Potential Consequences

- The decision of the Court of Appeals for the DC Circuit sets a precedent that failure to disclose IP holdings to an SSO may not be anticompetitive
- The European Commission's acceptance of Rambus's commitments suggests, but does not prove, that European law would condemn such conduct
- Economic analysis suggests that failures to disclose can significantly distort the outcomes of the standards-setting process, to the detriment of consumers, giving rise to
  - Higher royalty rates
  - Industry adoption of the “wrong” technologies
- It is unclear whether the current legal standards will prevent such outcomes going forward

# Some Economic Considerations

- The Competitive Benchmark
  - Ex ante negotiations under full disclosure
  - Relationship of outcomes to “fair and reasonable” royalties
- Nondisclosure Facilitates Ex Post Opportunism
  - The “patent ambush”/anticompetitive hold-up problem and supra-competitive royalty rates
  - Potential for distorted technology choices
  - Remedies and deterrence
    - Are forward-looking “FRAND” royalty requirements sufficient?
- Effects of Nondisclosure when Technologies Improve over Time
  - Path dependence and effects of intertemporal lock-in
  - The competitive importance of open-source or public domain technologies

# The Basic Economics of Technology Choice in Ex Ante “Auctions”: Assumptions in the Simplest Case

- All users (e.g., DRAM manufacturers) would incur the same costs of production assuming that all use the same, standardized, technology
- All competing technologies are equally capable of performing the desired function but the cost of manufacturing differs depending on which technology is employed
- Technology sponsors and users are distinct groups
  - *Example: Rambus develops DRAM technologies but does not make DRAMs*
- Research and development has been completed so the technologies cannot be further “refined”
  - This implies that all development costs have already been “sunk”
- There is no uncertainty
- Sponsors disclose their intellectual property holdings and license fee demands prior to the choice of the standard by an SSO, whose only members are users
- The royalty rates agreed to as the result of this “auction” process are contractually binding going forward

## The Basic Economics of Technology Choice in Ex Ante “Auctions”: Outcomes

- The winning sponsor is the one whose technology is associated with the lowest manufacturing costs for downstream products
- The maximum per-unit license fee that can be earned by the winning sponsor is the difference in manufacturing costs between its (lowest cost) technology and the second-lowest-cost technology
- Example:
  - Sponsor “A” develops technology “A”; Sponsor “B” develops technology “B”
  - Per unit manufacturing cost to licensees using technology A is \$10
  - Per unit manufacturing cost to licensees using technology B is \$12
  - Outcome: A “wins” at a license fee of  $\leq$  \$2 per unit
- The economics literature has suggested that royalties resulting from such ex ante negotiations/auctions processes are “fair” and “reasonable” (in the sense of “FRAND” or “RAND” royalties)

## Allowing for “Patent Ambush”

- Suppose instead that:
  - The sponsor of the winning technology had *not* disclosed its ownership rights prior to selection
  - As a result of non-disclosure, the “winning” technology was assumed by users to be in the public domain; hence it still “wins” (albeit at an expected royalty of zero)
  - Users incur standard-specific fixed costs once the standard is adopted (e.g., costs of designing DRAMs incorporating the technology; specialized training of employees; specialized tooling; etc.)
- Users are “locked in” to the winning technology in that they must incur additional costs to switch to a different technology
- This makes users susceptible to “hold-up” by the owner of the winning technology

## Patent Ambush in Our Example

- In our example, ex ante royalty determination with full disclosure would allow the winner to earn a royalty of no more than \$2 per unit
- As a result of “patent ambush,” once users are locked into sponsor A’s technology, sponsor A can demand, and receive, a royalty fee in excess of \$2 per unit
  - This means that the marginal costs of production of users will be higher than otherwise, perhaps significantly so
  - This will cause prices of downstream products that employ DRAMs, e.g., personal computers, to increase

## Patent Ambush in Our Example (Cont'd)

- The royalty will be limited by users' costs of *switching* to the next-lowest-production cost technology B, not by the *availability* of technology B as such
- More generally, the royalty paid to the winner, and thus downstream product costs and prices, will be higher than if the winning technology had been selected under full disclosure
- In contrast, under full disclosure, customers could engage in negotiations with sponsors that take into account the availability of substitute technologies

## Remedial Royalties

- One might imagine that the remedy for such conduct would be to restrict the royalty payments received by the winner to those that would have emerged from an ex ante auction under full disclosure
  - This might be viewed as restoring FRAND pricing going forward
- However, this would be insufficient to deter future bad acts
  - This conclusion applies most strongly to forward-looking remedies
  - This conclusion will be true even when the remedies that are imposed reduce the winner's profits from past sales to levels consistent with FRAND, or competitive, royalties

## Remedial Royalties (Cont'd)

- To deter “patent ambush”/anticompetitive holdup, royalties should be set *below* those that would have been agreed to in full-disclosure ex ante auctions. This would send a signal that the expected profits from opportunistic conduct are negative
- In our example, royalty fees should be set below \$2 per unit because
  - The probability that Sponsor A’s conduct will be found to be anticompetitive is  $< 1$
  - Failure to disclose imposes costs in the form of reduced information about competitive alternatives

## Longer-Term Harms

- Our earlier analysis assumed away the potential for improvements to the competing technologies
- When such improvements are possible, however, nondisclosure strategies may lead the SSO to adopt the “wrong” technology, *i.e.*, a technology that *would not* have been chosen by users under full disclosure\*
- Nondisclosure therefore can harm users and ultimate customers because
  - The “right” technology is chosen, but is made available at supra-competitive royalties; or
  - The “wrong” (*i.e.*, higher-cost) technology is chosen, again increasing users’ marginal costs and so the prices of downstream products

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\* In our one-period model, nondisclosure will not cause the “wrong” technology to be selected. Even a zero royalty for a competing technology will be insufficient to prevent the lowest manufacturing-cost technology from “winning”. This is obvious when the lowest cost technology is in the public domain, and so itself commands a zero royalty. Moreover, when the lowest manufacturing cost technology is proprietary, its owner will, under our assumptions, always find it profitable to set a (positive) royalty rate that is low enough to “win.”

# Allowing for Technological Improvements: A Second Example

## Assumptions:

- Suppose that, in terms of manufacturing costs alone, the two lowest-cost alternatives are a proprietary technology (A) and a public domain alternative (B)
- Technology A (proprietary):
  - Period 1 per unit manufacturing cost = \$10
  - Period 2 per unit manufacturing costs = \$2
- Technology B (non-proprietary)
  - Period 1 per unit manufacturing cost = \$12
  - Period 2 per unit manufacturing costs = \$6

# Allowing for Improvements in Technology

## A Second Example (Cont'd)

- Equal production in both periods
- No discounting
- Lock-in to the technologies of sponsor A extends beyond Period 1, creating “durable monopoly power”
  - The improved version of Technology B will be unable to compete in Period 2 because users will find it too costly to switch
  - This could be due to incremental costs of learning, production processes, etc. that exceed the benefits of switching to Technology A
- Sponsor A can appropriate the full value of the manufacturing cost improvement associated with its technology if it “wins” in Period 1
  - Because of lock-in, the next best alternative is A’s older technology, which is associated with a manufacturing cost that is \$8 higher per-unit

## Licensees' Realized Per-Unit Costs Under Each Technology (royalties plus manufacturing costs), *Assuming Sponsor A fails to disclose its IP rights*

- Technology A
  - Assume (for simplicity) zero first period royalties  
*[i.e., Sponsor A neither discloses nor exercises its IP rights in Period 1]*
  - Average cost (per unit):  
= (Period 1 mfg. cost + (Period 2 mfg. cost + Period 2 royalty))  
*[Period 2 royalty is assumed to equal to cost advantage of A's Period 2 technology over A's Period 1 technology]*  
= [ $\$10 + (\$2 + \$8)$ ]/2 = \$10 per unit
- Technology B
  - Average cost:  
= (Period 1 mfg. cost + Period 2 mfg. cost) *[Royalty = 0 because B is in public domain]*  
=  $(\$12 + \$6)$ /2 = \$9 per unit

## Implications of Our Example

- When sponsor A does not disclose, users will *expect* an average cost (over the two periods) of  $(\$10+\$2)/2 = \$6$  if its technology is adopted
  - This is substantially less than the \$9 per unit they will expect with Technology B
  - Nondisclosure thus will cause Technology A to be adopted
- The ability of Sponsor A to engage in Period 2 “hold-up” allows it *actually* to charge a Period 2 royalty of \$8
  - This causes users to incur greater average costs than if they had used Technology B in both periods
  - This will be true even if Sponsor A charges a zero royalty in Period 1 (in this case, users incur an average cost of \$10 per unit over the two periods)
  - This is despite the fact that Technology A is associated with lower manufacturing costs in both periods

## Implications of Our Example (Cont'd)

### *Ex post:*

- The average per-unit cost of using Technology A could be higher than that of Technology B even if we had assumed that A's sponsor would capture only some of the value of the improvement.
- Technology B is more likely to have lower average per unit cost the larger the proportion of the value of the manufacturing cost improvement that is captured by A's sponsor
- Technology B is more likely to have lower average per unit cost the smaller is the *Period 1* cost difference

## Implications of Our Example (Cont'd)

### *Ex ante:*

- Non-disclosure can lead to the choice of the “wrong” technology
  - In our example, this is the higher-cost Technology A. Technology B would have been chosen under full disclosure, because users would have been able to anticipate the potential for hold-up in Period 2
- Taking into account the potential for next-generation hold-up, it may be rational for an SSO to choose what appears ex ante to be a higher cost non-proprietary technology

## Remedial Royalties Required for Deterrence

- *Average* royalties over both periods must be set below \$3 per period if users' per-unit costs are to be lower when Technology A is adopted
- Sponsor A will therefore not be deterred from a strategy of nondisclosure unless it anticipates remedies sufficient to cause its expected average royalties to be less than \$3 per period
- Note that remedies limiting Sponsor A's Period 1 royalty to its Period 1 manufacturing cost advantage may be insufficient unless its Period 2 royalties are also restricted
- More generally, this implies the need for limits on royalties for "later" generations of A's technology

## Remedial Royalties Required for Deterrence (Cont'd)

- The EC limited royalties for later generations of Rambus's technologies to 1.5% of a chipmaker's selling price for DRAMs embodying those technologies
  - This rate is considerably lower than the 3.5% rate that Rambus had previously required for the original SDRAM and DDR SDRAM technologies
  - But is this low enough to deter future wrongdoing?
- The FTC did *not* propose to limit royalties for DDR2 or later generations of the Rambus technology, weakening deterrence
  - The majority could not conclude that Rambus had gained durable monopoly power
  - In her dissent, Commissioner Harbour argued for limits on DDR2 royalties, because, among other things,
    - “... such a remedy would enhance the deterrent effect of the Commission's enforcement action by sending a forceful message: companies will not be allowed to profit from monopoly power obtained by hijacking a standard-setting organization” (Harbour Dissent at 4.)

## More from S. M. Besen and R. J. Levinson

“Standards, Intellectual Property Disclosure, and Patent Royalties after *Rambus*,”  
***North Carolina Journal of Law & Technology***, Spring 2009

“Lessons from *FTC v. Rambus*,” ***Icarus***, Communications & Digital  
Technology Industries Committee, American Bar Association Section of Antitrust  
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“Economic Remedies for Anticompetitive Hold-up: The *Rambus* Cases,” ***The  
Antitrust Bulletin*** (forthcoming)

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