

UNITED STATES OF AMERICA  
BEFORE FEDERAL TRADE COMMISSION

In the matter of

CADENCE DESIGN SYSTEMS, INC.,  
a corporation.

Docket No. C-3761

**COMPLAINT**

Pursuant to the provisions of the Federal Trade Commission Act and the Clayton Act, and by virtue of the authority vested in it by said Acts, the Federal Trade Commission, having reason to believe that Cadence Design Systems, Inc. proposes to merge with Cooper & Chyan Technology, Inc. in violation of Section 5 of the Federal Trade Commission Act, as amended, 15 U.S.C. § 45, and in violation of Section 7 of the Clayton Act, as amended, 15 U.S.C. § 18, and it appearing to the Commission that a proceeding in respect thereof would be in the public interest, hereby issues its complaint stating its charges as follows:

**I. THE RESPONDENT**

1. Respondent Cadence Design Systems, Inc. ("Cadence") is a corporation organized, existing, and doing business under and by virtue of the laws of the State of Delaware, with its office and principal place of business located at 2655 Seely Road, San Jose, California 95134. Cadence has annual worldwide sales of approximately \$741 million, nearly all of which is attributable to electronic design automation products and services, and more than \$70 million of which is attributable to sales of integrated circuit layout environments.

2. At all times relevant herein, the respondent has been, and is now, a corporation as "corporation" is defined in Section 4 of the Federal Trade Commission Act, 15 U.S.C. § 44; and at all times relevant herein, the respondent has been, and is now, engaged in commerce as "commerce" is defined in Section 4 of the Federal Trade Commission Act, 15 U.S.C. § 44, and Section 1 of the Clayton Act, 15 U.S.C. § 12.

**II. THE PROPOSED MERGER**

3. Cooper and Chyan Technology, Inc. ("CCT") is a corporation organized, existing, and doing business under the laws of Delaware. CCT has annual worldwide sales of approximately \$37.6 million, of which approximately \$13 million is attributable to integrated circuit routing tools and related services, with the balance attributable to printed circuit board routing tools and related services.

4. Pursuant to an Agreement and Plan of Merger and Reorganization dated October 28, 1996, Cadence plans to acquire control of CCT by exchanging Cadence voting securities for the outstanding voting securities of CCT in a transaction valued at more than \$400 million (the "Proposed Merger").

### **III. THE RELEVANT MARKETS**

5. Research, development, and sale of constraint-driven, shape-based integrated circuit routing tools constitute one relevant line of commerce within which to analyze the competitive effects of the Proposed Merger. A constraint-driven, shape-based integrated circuit routing tool is software used to automate the determination of the connections between the electronic components within an integrated circuit. An integrated circuit is a complex electronic circuit that consists of as many as five million or more miniature electronic components — such as transistors, resistors, capacitors, and diodes — on a piece of semiconductor material smaller than a postage stamp.

6. There are no acceptable substitutes for constraint-driven, shape based integrated circuit routing tools. Routing tools based on other technology cannot accommodate unique problems that arise at deep submicron scales of integrated circuit design (less than .35 micron). Furthermore, at deep submicron scales of design, it is not commercially feasible to route integrated circuit designs without automation. Given the sheer complexity and density of deep submicron integrated circuit designs, as well as the intense time-to-market pressures faced by semiconductor companies in today's fast-paced electronics industry, hand routing is not an alternative for the timely and accurate design of integrated circuits.

7. Integrated circuit layout environments also constitute a relevant line of commerce in which to analyze the competitive effects of the Proposed Merger. Integrated circuit layout environments are software infrastructures within which integrated circuit designers access integrated circuit layout tools, including constraint-driven, shape-based routing tools. Integrated circuit layout tools and integrated circuit layout environments are used during the physical design stage of the integrated circuit design process. The physical design stage is distinct from, and occurs after, the logical design stage of the integrated circuit design process.

8. The relevant geographic market within which to analyze the Proposed Merger is worldwide.

#### **IV. CONCENTRATION**

9. CCT is currently the only firm with a commercially viable constraint-driven, shape-based integrated circuit routing tool. At least one other firm with constraint-driven, shape-based routing technology is in the process of developing a constraint-driven, shape-based integrated circuit routing tool.

10. Cadence is the dominant supplier of integrated circuit layout environments. Cadence's leading competitor in the supply of integrated circuit layout environments is the Avant! Corporation. Avant! and several of its top executives have been charged criminally with conspiracy and theft of trade secrets from Cadence.

#### **V. ENTRY CONDITIONS**

11. There are substantial barriers to entry in the market for constraint-driven, shape-based integrated circuit routing tools. Constraint-driven, shape-based integrated circuit routing tools are technologically complex and difficult to develop. *De novo* entry takes approximately two to three and a half years for a company that already possesses certain underlying core technology that can be used to develop a constraint-driven, shape-based integrated circuit router (such as shape-based routing technology for printed circuit boards). Entry is likely to take even longer for a company that does not possess such technology.

12. In order to achieve the necessary compatibility between the integrated circuit layout tools that they use, integrated circuit designers select integrated circuit layout tools that have interfaces to a common integrated circuit layout environment.

13. Since Cadence is the dominant supplier of integrated circuit layout environments, a constraint-driven, shape-based integrated circuit routing tool that lacks an interface into a Cadence integrated circuit layout environment is less likely to be selected by integrated circuit designers than a constraint-driven, shape-based integrated circuit routing tool that possesses an interface into a Cadence integrated circuit layout environment.

14. An integrated circuit layout environment is not likely to be selected by integrated circuit designers unless a full set of compatible integrated circuit layout tools is available. A full set of integrated circuit layout tools includes at least placement, routing, and analysis and verification tools, each of which must be able to interface into the integrated circuit layout environment that the integrated circuit designer has selected.

#### **VI. EFFECTS OF THE PROPOSED MERGER ON COMPETITION**

15. It is in Cadence's interest to make available to users of a Cadence integrated circuit layout environment a complete a set of integrated circuit layout tools, because to do so makes the Cadence integrated circuit layout environment more valuable to integrated circuit designers.

Cadence historically has provided access to Cadence integrated circuit layout environments to suppliers of complementary integrated circuit layout tools that Cadence does not supply.

16. Cadence does not, however, have incentives to provide access to a Cadence integrated circuit layout environment to suppliers of integrated circuit layout tools that compete with Cadence products. Cadence historically has been reluctant to provide access to Cadence integrated circuit layout environments to suppliers of integrated circuit layout tools that compete with Cadence products.

17. Prior to the Proposed Merger, Cadence did not have a commercially viable constraint-driven, shape-based integrated circuit routing tool. As a result of the Proposed Merger, Cadence will own the only currently available commercially viable constraint-driven, shape-based integrated circuit routing tool. For this reason, the Proposed Merger will make Cadence less likely to permit potential suppliers of competing constraint-driven, shape-based integrated circuit routing tools to obtain access to Cadence integrated circuit layout environments.

18. Without access to Cadence integrated circuit layout environments, developers are less likely to gain successful entry into the market for constraint-driven, shape-based integrated circuit routing tools.

19. The Proposed Merger will make it more likely that successful entry into the constraint-driven, shape-based integrated circuit routing tool market would require simultaneous entry into the market for integrated circuit layout environments. This need for dual-level entry will decrease the likelihood of entry into the market for constraint-driven, shape-based integrated circuit routing tools.

20. The Proposed Merger may substantially lessen competition or tend to create a monopoly in the market for constraint-driven, shape-based integrated circuit routing tools. The Proposed Merger may, among other things, lead to higher prices, reduced service, and less innovation.

## **VII. VIOLATIONS CHARGED**

21. The Proposed Merger of Cadence Design Systems, Inc. and Cooper & Chyan Technology, Inc., described in paragraph 4, violates Section 5 of the Federal Trade Commission Act, as amended, 15 U.S.C. § 45 and Section 7 of the Clayton Act, as amended, 15 U.S.C. § 18.

WHEREFORE, THE PREMISES CONSIDERED, the Federal Trade Commission on this seventh day of August, 1997, issues its complaint against said respondent.

By the Commission, Commissioner Starek dissenting.

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Donald S. Clark  
Secretary