

INTERNATIONAL STANDARD

IEC 62265

First edition
2005-07

IEEE 1603™

**Advanced Library Format (ALF)
describing Integrated Circuit (IC) technology,
cells and blocks**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ADVANCED LIBRARY FORMAT (ALF) DESCRIBING INTEGRATED CIRCUIT (IC) TECHNOLOGY, CELLS AND BLOCKS

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IEEE Std	FDIS	Report on voting
1603 (2003)	93/215/FDIS	93/221/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives.

The committee has decided that the contents of this publication will remain unchanged until 2008.

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IEEE Standard for an Advanced Library Format (ALF) Describing Integrated Circuit (IC) Technology, Cells, and Blocks

Sponsor

Design Automation Standards Committee
of the
IEEE Computer Society

Approved 11 September 2003

IEEE-SA Standards Board

Approved 29 December 2003

American National Standards Institute

Abstract: ALF is a modeling language for library elements used in IC technology. ALF enables description of electrical, functional, and physical models in a formal language suitable for electronic design automation (EDA) application tools targeted for design and analysis of an IC. This standard provides rules that describe ALF and how tool developers, integrators, library creators, and library users should use it.

Keywords: behavioral, block, cell, derate, EDA, electrical, format, functional, gate-level, integrated circuit, language, layout, library, modeling, physical, power, RTL, signal integrity, technology, timing

IEEE Introduction

The purpose of ALF is to provide a modeling language and semantics for the functional, physical, and electrical performance description of technology-specific libraries for cell-based and block-based design. Without a standard, EDA tools would be left to use tool-specific and fragmented library descriptions. The semantics would be defined by tool implementations only, which are subject to change and prone to misinterpretation. Therefore, ALF is proposed to create a consistent library view suitable as a reference for library creators and users, as well as for electronic design automation (EDA) tool developers and integrators.

IEEE Std 1603-2003 is based on the work of Open Verilog International (OVI) and its successor organization, Accellera.

The ALF standard began as the OVI Power & Synthesis Technical Steering Committee (PS-TSC) early in 1996, with the charter to define a standard library data format for synthesis, power analysis, and optimization. As the committee grew in membership, with the addition of experts in other fields such as design for test, it became clear that such a format could be easily extended to cover other design tools. Furthermore, the benefit to both silicon and EDA vendors of having a single, flexible format that would fully describe the functional, electrical, and physical performance of a technology library in an accurate and unambiguous fashion was widely recognized.

ALF was announced at the occasion of the OVI/VI-sponsored HDL conference in March 1997, where a trial version of the standard was released. Among the pioneers of proving the feasibility of ALF was the European CAD Standardization Initiative, sister organization of VSIA, who demonstrated an ALF-based ASIC implementation flow in 1997. In November 1997, OVI approved and released ALF version 1.0.

In 1998, the ASIC Council, under the auspices of the Silicon Integration Initiative (SI2), selected ALF as a complementary description of library elements within the open library architecture (OLA), which builds upon the IEEE 1481™-1999 standard for a delay calculation system. This endorsement triggered the initial adoption of ALF libraries by major ASIC vendors and the development of ALF version 1.1, which was approved and released by OVI in April 1999.

In June 1999, the ASIC council encouraged the ALF workgroup to include layout modeling. Consequently, deep submicron (DSM) issues, such as on-chip interconnect modeling, signal integrity, and reliability, became a major focus for ALF. The work culminated in the release of ALF version 2.0 in December 2000, under the auspices of the OVI/VI successor organization Accellera.

ALF version 2.0 became the foundation for this IEEE standard. An IEEE study group was formed in February 2001. The study group became the IEEE P1603 Working Group in June 2001. The name ALF has been retained due to already existing name recognition. By that time, the ALF had already set a standard for the industry, which can be measured by direct adoption and the influence on existing vendor-proprietary library formats. Major EDA vendors also made the specification of their existing proprietary library formats available to the industry and allowed the user community to extend those formats and strive for compatibility with ALF.

Although IEEE is now the legal owner of ALF, Accellera continues to foster and promote ALF. As a result, ALF has gained the attention of other national and international standardization bodies, such as JEITA in May 2002 and the IEC in October 2003.

From its inception, the goal for ALF has been to provide a solid foundation for library modeling within a continuously evolving application space. ALF has been designed to be more general in scope and purpose than a particular tool-oriented format. At the same time, care has been taken to make ALF easily adoptable