REPLACING OBSOLETE FIELD PROGRAMMABLE GATE ARRAYS (FPGAs) WHEN DESIGN SOURCE IS NOT AVAILABLE

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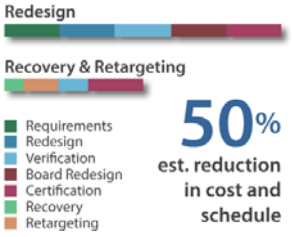
For more information on logic device design recovery and retargeting solutions from MacB, contact us via email at FPGA@macb.com or phone 540.777.4296.

MacAulay-Brown, Inc. (MacB) is a category 1A Microelectronics Trusted Source accredited by the Defense Microelectronics Activity (DMEA)

MacAulay-Brown, Inc. (MacB) offers design recovery and retargeting as an alternative to redesign for obsolete programmable logic components in aging U.S. Department of Defense (DoD) systems. With a unique capability, we translate a binary programming file of a digital logic device into a human readable, retargetable circuit description. This automated process helps to reduce cost, schedule and risk by offering a simple path from an obsolete part to a maintainable component in critical systems. MacB focuses these services on the Commercial-Off-The-Shelf (COTS) logic-bearing integrated circuit, known as the Field Programmable Gate Array (FPGA), and the case where the design source or tools may not be available.

Modern electronic systems can take years to plan, develop and certify, and they often remain operational in the field for decades. As systems and devices age, periodic updates as illustrated in Figure 1, may be needed to keep the system operational. Replacement of obsolete or hard-to-find parts with newer available integrated circuits may become necessary, and methods to replace or recover functional and electrical parameters from the original microelectronic device are needed. Original technical data, such as source, may not be available, and these data losses obligate electronic systems providers to consider costly options, such as redesign of the component, board and/or system from requirements, as highlighted in red in Figure 1, or last time buys of nearly obsolete microelectronic parts to temporarily extend the lifetime of aging systems. These approaches are in direct conflict with the rapid lifecycles and cost-benefits of COTS devices.

Traditional redesign efforts can't compete on cost and schedule with MacB Design Recovery and Retargeting



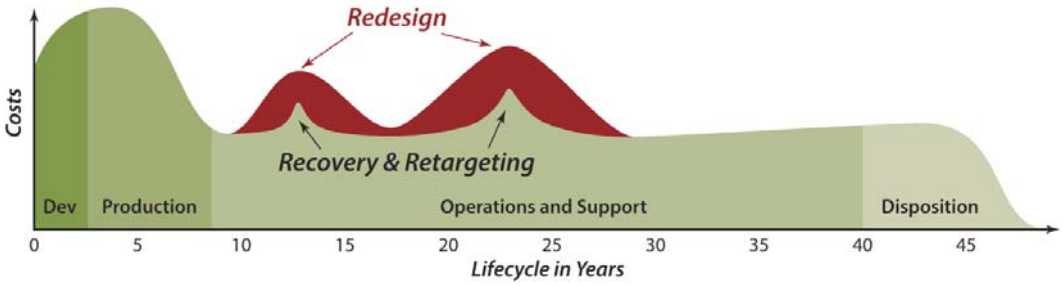


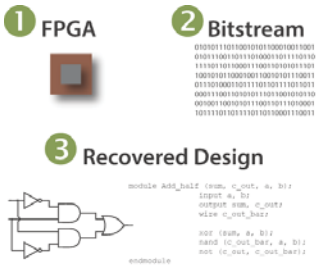
Figure 1. *MacB Design Recovery and Retargeting Beats Redesign for Lifecycle Operations and Support Activities*

MacB's total obsolescence solution includes Footprint Conversion Adapters that match form, fit and function of the original part. This allows placement of a new logic device without redesigning the existing board

MacB has developed FPGA translation technology that has the unique ability to recover a digital logic design from its programmed binary data format or bitstream. This technology automatically translates design data from an FPGA bitstream into a standard Verilog Hardware Description Language (HDL) format, and its associated implementation details. With the recovered design information, engineers can modify, retarget, emulate, simulate or otherwise evaluate the design to demonstrate its complete functionality, using industry standard and commercially available electronic design automation (EDA) tools.

Our automated binary translation technology supports a wide range of device technologies including FPGAs, CPLDs, micro-sequencers and other programmable logic devices. It works with multiple families and vendors, and our portfolio of supported devices is continuously growing. The translation technology also has the proven ability to reproduce the identical binary file. Designers start with the recovered netlist, use industry standard design tools to generate a new binary programming file, and verify that the new file matches the original programming file.

MacB's recovery process extracts the bitstream and translates the binary design to a standard Hardware Description Language



Applying the new FPGA translation capability to aging system components, we accelerate the redesign cycle by automating the process of migrating from an old FPGA technology to a new FPGA technology, thus extending the lifespan of the FPGA-driven hardware. Given a bitstream recovered from an existing system, the translation software will automatically generate a structural HDL netlist that details the function of the original design. With the recovered design in an industry-standard Verilog format and derived constraints, we execute the retargeting process. In HDL format, the design can be targeted to any available technology, including other FPGAs and application-specific integrated circuits (ASICs), using commercially available electronic design automation tools. After retargeting a design to a new device, an additional verification step ensures that new design is functionally equivalent to its original. Through careful analysis of the bitstream format, leveraging formal methods for equivalence checking, and matching timing constraints, we provide customers with confidence that the original FPGA bitstream and its new reimplementation are functionally identical.

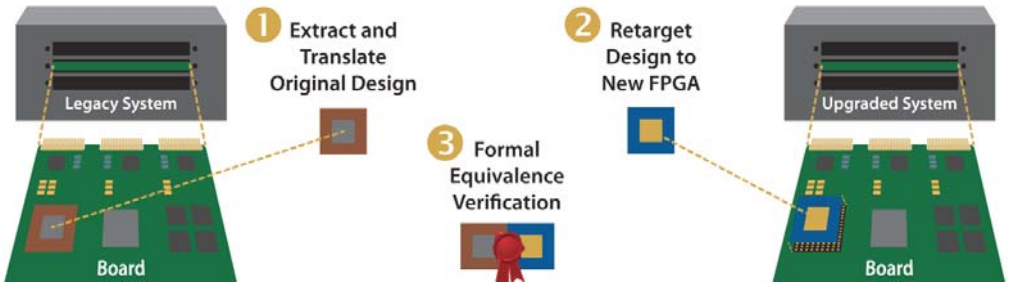


Figure 2. *MacB Design Recovery and Retargeting Service*

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Design recovery and retargeting is a service available today. The information needed for this process is the design in binary format and the target device, package and platform information. Any additional information, such as datasheets, specifications or board information may be provided to simplify the process, and we can verify that any available original source was indeed used to produce the original FPGA bitstream. The result of our design migration process includes: the bitstream for the target platform, recovered Verilog source code, and design and verification reports. These design reports show the new device utilization and package details, while the verification reports show that the retargeted design is equivalent to the original, and that timing equivalence of critical paths has been achieved. As all of these constraints are verified and met, the resultant bitstream is delivered and ready for use in the system. In addition to the standard migration process, we also offer a path to customers requiring exact form, fit, and function replacements. The MacB design migration services are flexible and easily customized to meet demands of each individual customer.