

**Semiconductors
Research**

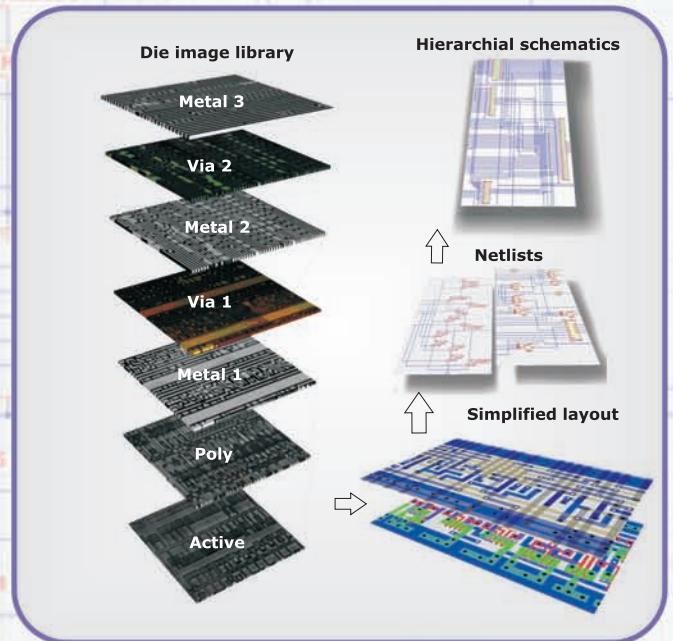
Reverse engineering service

of OEM cartridge chips
for aftermarket chip manufacturers

Semiconductors Research Inc. holds the proprietary hardware and software tools that allows us to reverse engineer (RE) sophisticated ASICs containing high-level secure authentication systems.

We possess the highly specialized skill sets and well mastered sequence of RE operations:

1. De-capsulation and de-layering of chip.
2. Photo-imaging and stitching of large high resolution photographs.
3. Extractions of layout file from photographs.
4. Layout editing, SPICE (transistor level) netlist extraction.
5. Setup of gate and block level schematics, structural analysis.
6. Extraction of critical data from chip memory by employing test circuits embedded in the chip; microprobing; chip modification using FIB and etc.
7. Behavioral analysis - simulation of chip: deciphering of communication protocol; encryption/decryption algorithm; full set of executable commands and etc.
8. Design of new, fully compatible RTL level netlist suitable for implement in silicon.



Items 2-5: our proprietary software

Only complete knowledge of chip authentication scheme and encryption keys guarantees a successful emulation of OEM's chip.

Simulation results are checked to completely match real communication data.

100% functionality but unique circuit and firmware design compared to OEM chips for Intellectual Property protection.

Chip design based on such reverse engineering process is capable of providing functionality, data exchange and communications parameters equivalent to the OEM chip. Both current mode of the printer firmware and firmware's future potential extended capabilities are supported, even though these capabilities are not presently activated in the current firmware version.

Our service quality was proved by successful reverse engineering of Canon, Lexmark and HP cartridge chips.

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