Case ID:M11-059P

Published: 7/5/2011

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Improved SRAM Circuits for Integrated Circuit Identification Using Mismatch Fingerprint

There is a continuing need for high-level device security to transfer information on penetrable channels, track the device and data, and encrypt valuable data, whether for national security purposes, intellectual property, or company and individual privacy. Obtaining a unique signature for an integrated circuit can be an excellent tool to achieve these objectives, but the current techniques to extract one are difficult to implement and not effective enough. To have a successful fingerprint, an integrated circuit must be algorithmically unpredictable, be consistent under all applied conditions, and have an ID length sufficient for precise identification. The existing techniques lack these essential criteria and also require costly circuit area.

Researchers at Arizona State University have created an improved method to extract the hardware fingerprint using SRAM transistors. The technique takes advantage of the inherent differences in circuit composition created during the manufacturing process, utilizing the unique, consistent response reproduced as precise voltages are applied to the circuit.

Potential Applications

- Extra hardware layer in a multi-level security (MLS) network
- Authentication for business or federal-owned technologies in VPN access
- Use with RFID tags on valuable products for inventory
- Tag encrypted data with IC fingerprint for tracking in data transfer

Benefits and Advantages

- No dedicated circuitry required, simply small modifications to circuit
- Does not impede functionality or SRAM access time
- Can be integrated into any embedded component
- Improved security with fingerprint precision and SRAM random key generation
- IC cannot be tampered with physically after production because it would discontinue functioning
- Allows testing at other times than startup providing a more precise method for extracting fingerprints

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