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Digital Cinema Initiatives, LLC

Background

This memorandum provides inputs from Digital Cinema Initiatives, LLC (DCI) regarding the Draft Special Publication 800-131, *Recommendation for the Transitioning of Cryptographic Algorithms and Key Sizes*.

Digital Cinema Initiatives, LLC was created in March 2002 and is a joint venture of Disney, Fox, Paramount, Sony Pictures Entertainment, Universal and Warner Bros. Studios. DCI's primary purpose is to establish and document voluntary specifications for an open architecture for Digital Cinema (DCinema) that ensures a uniform and high level of technical performance, reliability, security and quality control.^a As a vehicle to provide DCinema requirements from the view of the above member companies, DCI developed and published the *Digital Cinema System Specification (DCSS)*.^b

Working closely with the Society of Motion Picture and Television Engineers (SMPTE), DCI has also assisted in codifying a number of specifications that define an open standard for DCinema, which have been subsequently adopted by the International Standards Organization (ISO), and together act as the sole formally standardized distribution method for DCinema throughout the world. A critical feature of this standard is assuring the security of motion picture content, and a key component of security within the standard is the physical and logical security surrounding a device in the projection booth referred to as a "Media Block." The Media Block performs content decryption, integrity validation for security messaging and content, and the provisioning of secure forensic (log) data.

The DCSS mandates that the Media Block be compliant and certified to FIPS 140-2. It has taken the industry several years to position itself to become compliant to the overall set of DCinema requirements, and in particular, FIPS 140-2 requirements. The industry is in the beginning stages of widespread adoption and rollout of the new DCinema standard, and the associated new generation of digital equipment. There is now a concern that certain changes as described in SP800-131 will disrupt this rollout, and force equipment vendors into redesign and recertification of existing products, none of which have experienced a security breach.

Cryptographic Concerns

There appear to be three issues in SP800-131 that are of concern:

1. Random number generation – The DCSS currently specifies ANSI X9.31 for symmetric content key generation (content is AES-128 encrypted for distribution).

^a See <http://www.dcinovies.com/>

^b See <http://www.dcinovies.com/specification/>

2. Dual key usage – SMPTE specifications use the Media Block’s private key for both content Key Delivery Message (KDM) decryption and log data record message signing.

Additionally, a Message Integrity Code (MIC) used for content integrity validation is derived within the Media Block from the decrypted content key. DCI would like to see NIST continue to discourage the use of a single key for multiple functions, but not disallow it.

3. Retirement of SHA-1 – DCinema employs both SHA-1 and SHA-256 for a variety of specified functions. DCI would like to see continuance of the restricted use of SHA-1 as currently permitted.

The DCinema environment implements a multifaceted distribution chain that includes content generation, packaging, distribution/capture, and playout. And even though the only FIPS 140-2 certified device in the chain is the Media Block, the above cryptographic concern areas impact the entire end-to-end chain, and a broad scope of entities that touch various processes along the chain. This means that many aspects of DCinema security will be impacted, as well as many globally published SMPTE specifications, in addition to the DCSS.

Discussion

DCI estimates that becoming compliant to SP800-131 in the above concern areas would take two to three years to complete. Since equipment is presently being certified and installed under FIPS 140-2, an equally critical issue is that existing and changing cryptographic constraints are not backwards compatible, given the nature of the DCinema processing chain. This presents an interoperability issue, again on a global scale. Full compliance to SP800-131 would require the modification of the DCSS, modification of standards in both SMPTE and ISO, modification of the DCI *Compliance Test Plan* (CTP)^a, redesign and production by manufacturers, recertification of all equipment, and global industry agreement on a change-over implementation period.

DCinema product manufacturers have further expressed concern over the cost of recertification at a time when significant costs have been expended in becoming initially compliant to this new set of world standards. Thus, DCI is currently of the mind that unless the existing requirements can be allowed to survive an additional two to three years beyond the pending sunset dates (end of 2010 for FIPS certification), we believe our only path is to internalize the current FIPS specifications, and devise a method to use them for the next several years.

DCI understands and supports the evolution of cryptographic processes and functions over time to maintain the necessary security advantage over potential threats. However, it is our belief that altering the DCinema specifications, standards, and tests to adhere to these three items in SP800-131 will result in undue cost, disruption, and delay at a moment when global adoption is just starting, without providing a concrete security

^a See <http://www.dcinovies.com/compliance/>

benefit. For these reasons, we are seeking a way to modify or delay these SP800-131 changes, at least for the next couple of years.

We appreciate the opportunity to provide these inputs. We would be happy to provide other contacts to DCinema industry manufacturers and participants who are just now becoming aware of SP800-131, should that be useful to your review of SP800-131 comments.