

# DReaM-CAS Intellectual Property Review by Sun Microsystems

December 2006

Sun Microsystems, Inc.  
Santa Clara, CA, USA  
<http://www.sun.com>

## Summary of Sun Patent Review of Project DReaM Specifications

*It is Sun's opinion, based on its review to date of non-Sun (third party) patents, that the DReaM-CAS technical specification (version 1.0) can be practiced as unencumbered and royalty-free. With respect to the ongoing DReaM DRM/MMI study, no formal opinion has been developed yet by Sun, but we anticipate that there may be certain DReaM architectural or sequencing configurations that are deemed "safe" (i.e., fall outside the scope of third party patent claims) for DReaM implementations, and others having certain features that may be possibly impacted by identified IP encumbrances. Importantly, though, it is not currently expected that such constraints will affect the DReaM-CAS or DReaM-MMi specifications themselves. It is important to acknowledge, however, that an implementation of IP encumbrance-free DReaM architecture specifications can become subject to intellectual property rights (IPR) concerns as a function of the surrounding implementation.<sup>1</sup>*

## 1 Introduction to Project DReaM and DReaM-CAS

Project DReaM is a Sun Microsystems, Inc. (Sun) led initiative to develop rights management technologies focusing on open, standards-based technology. The scope of Project DReaM spans conditional access to full digital rights management (DRM) along with paths for interoperability with existing DRM technologies. This paper will focus on DReaM-CAS (DReaM for conditional access systems (CAS) version 1.0, hereafter referred to as DReaM-CAS) technology and does not address other modes of Project DReaM. Researchers at Sun Labs (Sun's research wing) believe that today's rights management applications only scratch the surface of the possibilities, and that the market for this technology is heavily constrained by the lack of open, fully specified, scalable and dynamically adaptable solutions. Additionally, Sun researchers believe that a royalty-free DReaM-CAS solution may be realized. This paper describes the process, analysis and results of IPR investigations by Sun.

---

<sup>1</sup>*The above reflects Sun's opinion as of the date this paper is issued and Sun encourages you to carefully evaluate the assumptions and methodology described in this paper and to assess Sun's conclusions in the process of developing your own independent opinion. Nothing in this paper is intended to promote infringement, misappropriation or other improper use of any intellectual property rights without the consent of the owner. By releasing this paper, Sun does not intend for others to rely on Sun's opinion independent of their own analysis, nor does the paper constitute legal advice or a representation, warranty or indemnification of any kind.*

## **1.1 DReaM-CAS Description**

DReaM-CAS is the specification and the associated open source project implementation of a complete, open CAS solution. Sun proposes royalty-free (unencumbered) DReaM-CAS solutions by utilizing open, fully specified standard technologies for security (e.g., PKI, SSL, TLS, etc.). This is a departure from the current state of interoperability (e.g., Digital Video Broadcasting (DVB)) where various proprietary vendors utilize the standardized MPEG transport without specifying all of the necessary CAS components such as the Entitlement Control Messages (ECM) and Entitlement Management Messages (EMM). By under-specifying in this way, the proprietary vendors ensure that proprietary control of their CAS solution is maintained. Such vendors defend their position by attempting to argue that opening up such details would lead to less secure solutions when in reality the opposite is true and closed systems are in fact vulnerable to breach through lack of open and rigorous security audits.

The DReaM-CAS specification utilizes existing content protection technologies (AES, 3DES). Key protection and management are fully defined. The ECM in MPEG-2 Transport Streams (TS) is fully specified to carry protected content keys. Asymmetric key technology (public key/private key) is used to deliver individually targeted protected keys to unlock the content keys. The EMM format from MPEG-2 TS is optionally used to deliver these individually protected keys.

## **1.2 Scope of DReaM-CAS Investigation**

The IPR investigation for DReaM-CAS has been limited to the scope defined by the DReaM-CAS client technical specification. In the DReaM-CAS technical specification document, the focus of the work was to specify an approach to CAS which would allow for vendor and platform specific adaptations which could achieve interoperability through a rigorous certification and conformance program. Topics specifically in-scope included the following: one specific transport distribution format, description of EMM and ECM formats as well as selection of specific ciphers. Topics specifically out-of-scope included the following: codecs, ciphers themselves, client service interfaces and robust client execution environments.

## **1.3 CAS Versus DRM**

The electronic distribution of content offers new types of services for customers and provides new business opportunities for content providers. The acceptance of these new distribution models may depend on robust mechanisms to protect the interests of the various stakeholders in the value chain, including content owners, service providers, device manufacturers, application developers and users. Additionally, there are multiple models that depend on how the digital service is being delivered (e.g., broadcast, download, or on-demand). CAS is intended to handle limited content access scenarios where the consumption is immediate with no content storage by the user. By contrast, DRM protects the content during its entire lifetime with the user. In many ways, CAS is a simplistic form of DRM. Occasionally, people refer to Rights Management Systems (RMS) as something separate from DRM or CAS. RMS has been associated with the protection and management of other content types such as documents and data files aside from media data types. RMS may be as simple as CAS insofar as allowing viewing or not, or as complex as DRM where more complicated rights are enforced, such as restricted access to certain parts of the document/data, disallow modification, printing, transferring to other users or devices, or copying of data out of the files.

## **2 Strategy Behind Patent Review Work**

### **2.1 Project Goals and Organizational and Legal Context**

Project DReaM began as an internal Sun research effort and transitioned to a community project with the objective of driving open, royalty free standards and implementations for managing digital content when Sun announced the Open Media Commons (OMC) initiative in August 2005 (see [openmediacommons.org](http://openmediacommons.org)). The goal of OMC is to encourage community participation in the development of CAS and DRM/"Mother May I" (DRM-MMI) specifications and open source reference implementations based on Sun's initial contributions from Project DReaM. To expedite the development process and minimize the need for up front formal standards body organizational structures, the specifications were initially drafted by Sun and made available to interested parties who registered with OMC. Simultaneously, open source reference implementations by Sun were made available under Sun's Common Development and Distribution License (CDDL).

Sun welcomes feedback and contributions through the online OMC public forum from the community that shares the common objective of developing open, royalty free DRM standards. This paper is part of the effort to engage in an open, transparent dialog with this community about the IPR status of the CAS and DRM/MMI specifications to encourage participation and IPR commitments by others with IP interests in this technology area and adoption by a wide range of implementers. By describing the methodology Sun used to develop its opinion regarding the IPR status of these specifications, Sun hopes others will carefully consider the approach Sun adopted, independently assess Sun's conclusions and join in the community discussion of how IPR risks in this area can be further reduced and confidence built in the feasibility of achieving open, royalty free DRM standards (e.g., through the public vetting of certain IP risks and the possible joint issuance of reciprocal patent non-assertion covenants to create a "patent commons" in this area). Sun is also open to suggestions on how to make this goal a reality by potentially establishing a more formal organizational structure and legal framework for participation in this standards setting initiative or leveraging off of other standards development efforts in the community that share the OMC's objectives and focus.

### **2.2 IPR and Patent Review Goals**

DReaM technology can be described from four intellectual property perspectives:

- DReaM-CAS
- DReaM-MMI
- DReaM architecture
- DReaM implementations.

DReaM-CAS and DReaM-MMI are the principal functional components of DReaM, and they are relatively narrow in scope. The DReaM-CAS specification defines methods for content encryption and associated key distribution. Architecturally, DReaM-CAS is modeled after the Digital Video Broadcasting's (DVB) conditional access standards from the mid 1990's, which in turn were developed based upon CAS methods dating from the early 1980's.

DReaM-MMI specifies a method for approving and relating content access rules such that a media player can obey access constraints specified for a given piece of content.

The combination of DReaM-CAS and MMI constitutes a technological capability that provides for secure content distribution and rights management – the fundamental essence of what DRM technology requires.

DReaM-CAS is based upon older and publicly available IPR technology. DReaM-MMI is innovative and through creative solutions strives to avoid more contemporary – and potentially patent encumbered -- technologies.

DReaM-CAS and DReaM-MMI exist and operate within a conceptual DReaM architecture, which is partially specified, but is left flexible to be molded to specific applications. The functional agents of DReaM are defined as to their general roles, but definitive data types, data flows, sequences and storage locations may be specific to a given implementation. Much DRM related IP is claimed as a function of such usage-specific architectural issues. Thus, IPR implications for the generalized DReaM architecture, and those for specific DReaM implementations must be distinctly considered. DReaM architectural aspects are largely driven by the combination of DReaM-CAS (provides content security), DReaM MMI (enables rights management) and the DReaM “disintermediation” (D15N) concept (enables interoperability with legacy DRM solutions). But specific implementations against this backdrop are varied, and depend upon the application.

As a result of the above, the overall DReaM IPR landscape is quite broad. In response, the DReaM IPR and patent review process has considered a variety of art and initiatives:

- Available art from expired patents, known older methods and product/systems, and art originally in the public domain
- Active patents
- Leverage off of and cooperate with entities and initiatives having similar royalty free objectives.

Available art from expired patents, older products or methods and other public domain material may provide ‘patent-clear’ paths for DReaM technical specifications and architectural aspects. It may also reveal strategies for appropriately avoiding issues involving patents that may be of questionable novelty or scope. Review of active patents is important for identifying potential ‘patent thickets’ and developing appropriate solutions for avoiding issues they may present. Cooperation initiatives can establish industry support and momentum for DReaM objectives, and provide an opportunity for leveraging existing royalty free standards and cross-licensing where applicable.

## **2.3 IPR and Patent Landscape**

While the main technical focus of DReaM has been the CAS and MMI specifications, the implementation of a complete DRM system requires more than conditional access and rights management functions. Therefore, analysis of the overall DReaM IPR landscape includes consideration of associated technologies such as content packaging, delivery mechanisms and architectural factors. The latter takes into account interactions between functional agents, such as decision-making and content storage devices (e.g., authentication servers and content servers), in addition to issues of data types, data flows and process sequences – all of which are critical aspects of patented DRM art.

To perform a review of third party patents, a comprehensive CAS and DRM key word list was developed. The key word list was used along with selected International Patent Classification (IPC) class codes to research against the full-text of all USPTO-issued patents, both active and expired. The initial round of patents was filtered to reveal particularly prominent listed IP owners, and, together with identified active listed IPR licensors, a secondary search was performed on targeted entities to surface additional patents. Approximately 2000 patents were identified in the initial searches. Eleven fundamental DRM-relevant taxonomy categories were defined, and each patent was then categorized by taxonomy and active versus expired status.

The eleven basic taxonomy areas were further divided in a second tier taxonomy of over three-dozen finer grained technology categories. Each patent was then reviewed for scope and claimed subject matter such that applicable first and second tier mappings could be assigned. Patents were also assigned to a three-level ranking according to DReaM relevance. Of the initial 2000 patents initially identified in the USPTO patent search, approximately 1300 patents were found to appear to be ultimately relevant to DReaM (the rest were judged to be out of scope). Of these 1300 patents, 200 patents are expired, and form a wealth of 'publicly available' IPR subject matter, which is primarily from the early conditional access and pay television art of the 1980s. The remaining 1100 patents typically map over, or have combinations of the various taxonomy areas (i.e. most patents are multi-faceted with respect to taxonomy categories).

## **2.4 Patent Analysis Status**

The taxonomy mappings allowed the patents to be assigned to DReaM-CAS or the general DRM category, the latter of which includes DReaM-MMI. Patents judged to be most relevant according to the above described ranking or classification were each reviewed in detail. Out of this second stage review, approximately 50 patents were identified as requiring a further detailed review that also included a review of the prosecution histories, as appropriate. Of the approximately 50 patents, about 20% were DReaM-CAS-related patents and about 80% were DRM-related patents.

### **2.4.1 DReaM-CAS IPR**

The DReaM-CAS patents were reviewed and analyzed for claim scope and interpretation. Additional study was performed in some instances for relevant prosecution history particulars, with the objective of developing opinions about the patent's possible reading on DReaM-CAS.

The findings were compared to the DReaM-CAS technical specification. It is Sun's opinion that each of the patents identified and analyzed to date as part of the DReaM-CAS patent review includes limitations in claims' language and/or prosecution history that would likely render these patents outside the DReaM-CAS technical specification, and/or allow options for technical design-arounds. Thus, it is Sun's opinion that the IPR path forward meets Sun's criteria to consider the patents identified and reviewed to date as non-blocking to DReaM-CAS.

### **2.4.2 DReaM Architecture (including MMI)**

The DRM-related patents are undergoing a similar patent and technical review as was performed for DReaM-CAS. As expected, the patents in this arena are significantly more

complex than CAS patents. The DRM-related patents are also heavily influenced by architectural and implementation aspects as discussed in Section 2.2, and generally have more ‘moving parts’ than do CAS patents. For these reasons, in addition to patent review against the DRM/MMI specification, it will be necessary to run various DReaM DRM/MMI scenarios and use cases against this DRM art to develop opinions about DReaM relevance.

## **2.5 Strategy Going Forward**

DReaM is an ongoing open source project that will continue to evolve and expand over time. The definition of new ecosystems, usage models, rights models and clients (software or hardware) will require that DReaM adapt to those new requirements. In order to maintain the focus on open, royalty free CAS and DRM technologies and to build the confidence required to promote their adoption, Sun is considering various possible strategies for moving DReaM forward and responding to future changes in requirements.

### **2.5.1 Dealing with Future Possible Encumbering Intellectual Property**

While Sun has undertaken an in-depth and detailed analysis of the CAS and DRM patent landscape, those efforts have been targeted at issued US patents. Sun expects that additional DRM-related patents will likely be issued by the USPTO. As appropriate, Sun and others in the DReaM community may evaluate those issued patents to determine whether they possibly pose any IP encumbrance risks to DReaM and under what circumstances. Those patents that are determined not relevant to DReaM may be eliminated from the patent analysis and factored into any updates to this opinion. Those patents/claims which might possibly impact DReaM may be investigated further to determine whether DReaM technical design arounds are possible, whether the owner of the patent would commit to a reciprocal patent non-assertion statement (see Section 2.5.2 – Patent Commons), or whether other technical and legal options may be employed that could further the development and adoption of open, royalty free DReaM specifications.

### **2.5.2 Patent Commons**

One idea being considered by Sun for building confidence in the IP unencumbered state of DReaM is the use of a “Patent Commons” structure to aggregate and document information about encumbered (patented) technology which is pledged to be “royalty-free” through reciprocal patent non-assertion statements by patent holders with respect to fully compliant DReaM implementations. We believe that such patent non-assertion statements would be an effective way of increasing confidence in the long-term goal of enabling the creation of royalty free implementations.

### **2.5.3 DReaM Certification Process and Authority**

It is contemplated that a DReaM Certification Authority (“DReaM-CA”) would be useful in administering the process of certifying DReaM compliance based on satisfactory completion of certification and conformance testing of the open source implementation. These tests will ensure that the certification and robustness rules are met satisfactorily. The DReaM-CA may or may not be a third party entity and the choice of administrator

will depend on whether it has the technical capability to carry out the certification and conformance program.

#### **2.5.3.1 Define Ecosystems**

There are several application domains for which ecosystems will need to be defined for compliance certification purposes:

- Entertainment (video, movies, music)
- Health-care Industry
- Education
- Financial
- Enterprise
- Government
- Military

For some of the above application domains, there may be more than one ecosystem that is relevant. For example, there are likely to be different ecosystems for the entertainment domain, each of which may be independently certified as compliant.

#### **2.5.3.2 Specify Compliance and Robustness Rules**

Compliance and robustness rules will be defined for the DReaM implementation. These will ensure that DReaM certified products are designed and manufactured to deter attempts to circumvent or “spoof” the system. Such circumvention attempts may include:

- Non-compliant modification of code
- Insertion of switches or bypass mechanisms
- Insertion of non-compliant mechanisms to enable unauthorized copying, distribution or usage of protected content.

The DReaM implementation will be tested to ensure that critical data (decryption keys, etc.) are never exposed. Also, these tests will ensure that decrypted data is never exposed.

Once these tests are completed, the DReaM implementation code will be digitally signed such that any further attempts at modification after compliance certification can be detected.

#### **2.5.3.3 Manage Branding and Logo Administration**

Branding and logo administration for certified, compliant implementations is a very important function to ensure the credibility of the DReaM system. It is anticipated that any certification mark or logo adopted for this purpose would be authorized for use only if the certification and conformance process is satisfactorily completed.

#### **2.5.3.4 Administration of Root(s) of Trust**

The administration of the Root of Trust will need to be determined by agreement of the DReaM-CA and the administrators of each individual ecosystem. While a single root of trust per ecosystem is possible, it is expected (and presumed desirable) that multiple roots of trust per ecosystem will be employed to allow for multi-service, heterogeneous

service infrastructures that employ federated trust models rather than a single point of trust.

### 3 Sun Microsystems Patent Analysis Summary

It is Sun's opinion, based on its review to date of non-Sun (third party) patents, that the DReaM-CAS technical specification (version 1.0) can be practiced as unencumbered and royalty-free. With respect to the ongoing DReaM DRM/MMI study, no formal opinion has been developed yet by Sun, but we anticipate that there may be certain DReaM architectural or sequencing configurations that are deemed 'safe' (i.e., fall outside the scope of third party patent claims) for DReaM implementations, and others having certain features that may be possibly impacted by identified IP encumbrances. Importantly, it is not currently expected that such constraints will affect DReaM-CAS or DReaM-MMi specifications. It is important to acknowledge, however, that an implementation of IP encumbrance-free DReaM architecture specifications can become subject to IPR concerns as a function of the surrounding implementation. For example, the 'content server' function is out of scope of the DReaM architecture. But a given DRM system based on the DReaM architecture (i.e. MMI and D15N) may need to consider IPR implications depending on its content server operation.

---

***The above reflects Sun's opinion as of the date this paper is issued and Sun encourages you to carefully evaluate the assumptions and methodology described in this paper and to assess Sun's conclusions in the process of developing your own independent opinion. Nothing in this paper is intended to promote infringement, misappropriation or other improper use of any intellectual property rights without the consent of the owner. By releasing this paper, Sun does not intend for others to rely on Sun's opinion independent of their own analysis, nor does the paper constitute legal advice or a representation, warranty or indemnification of any kind.***