

Marlin Developer Community Overview

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Marlin Developer Community Overview

Executive Summary

Marlin is a DRM-based content sharing platform for consumer devices and multimedia services that is based on open standards. A group of companies that include Intertrust, Panasonic, Philips, Samsung, and Sony has jointly developed the Marlin specifications.

The Marlin core system provides seamless functionality when moving licensed content across different devices and services in a consumer domain. Although Marlin currently supports broadband, broadcast and mobile delivery systems, it will also support other methods that include IPTV and optical media. The Marlin Developer Community (MDC) releases these specifications on its website for developers to review and enhance the code, and for adopters to build their own advanced, trusted and flexible DRM-based content sharing implementations. Marlin will establish the Marlin Trust Management Organization (MTMO) to manage key distribution and certification. Early implementations of Marlin technology have been announced for mid-2006.

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Marlin Developer Community Overview

1. Introduction

In January 2005, five companies – Intertrust, Panasonic, Philips, Samsung, and Sony – jointly developed specifications for a DRM-based content sharing platform for consumer devices and multimedia services called Marlin. Marlin provides consumers of licensed multimedia content with the ability to share this content seamlessly across the different devices and services in their home network or *consumer domain*.

In October 2005, the Marlin founding members announced the formation of the Marlin Developer Community (MDC) to build on existing Marlin technologies and open the Marlin community. The MDC website publishes the Marlin specifications to interested developers for review and code enhancement. To commercially deploy the specifications, the MDC is in the process of establishing contractual agreements with the Marlin Trust Management Organization (MTMO). In addition to licensing the specifications to different categories of adopters, the MTMO will also distribute certificates and administer a certification program. A Marlin Licensing Agency (MLA) will license essential patents on behalf of the founding members on reasonable terms and conditions.

Marlin is a domain-based technology that expands beyond PC-centric models, offers flexible business models, and is designed to be intuitive to the consumer. By providing a consumer-friendly experience for handling protected content, Marlin achieves a high level of consumer satisfaction that directly benefits potential adopters:

- Service providers benefit through additional revenue per user or ARPU
- Content providers through increased revenues from selling licensed content
- Device and component manufacturers benefit from the sale of additional devices
- Consumers benefit from high quality content which can be enjoyed seamlessly across devices

Accordingly, the Marlin community is developing a set of specifications that allow consumers to acquire and use content customized for broadband, broadcast, physical or mobile distribution and then make it usable on any Marlin-based device.

2. Goals

The primary goal of the Marlin community is to manage licensed content so that the consumer experience is transparent and intuitive, even when that consumer transports the content between different services and devices within a domain. Marlin's secondary goal is to build out a trusted global ecosystem that is based on competitive practices (rather than silo-based, protectionist practices which are detrimental to the market).

Marlin technology is designed to:

- Move complexity out of consumer devices to keep costs down and simplify user interaction
- Support new and flexible business models in content distribution
- Make it easy to configure and implement multiple server and client platforms
- Leverage P2P technologies to let Marlin devices communicate directly, expanding beyond the features available in PC-centric implementations
- Implement a common domain model that is user-centric rather than device-centric.
- Allow consumers to seamlessly import content from multiple sources into their domain. Sources can include online content services, broadcast channels, mobile services and optical discs
- Use a standards-based, trusted services framework that allows devices to access media services in a transparent fashion
- Be available from multiple sources which use a common interoperability standard, yet compete on quality of service and innovation

3. Scope

In the near-term, Marlin's scope covers three key areas: technology development, trust management and building an ecosystem (see Figure 1 below).

3.1. Technology development

In addition to developing specifications, Marlin's technical scope includes generating tools, reference technologies and technical documentation, building SDK's, and providing a set of conformance test suites.

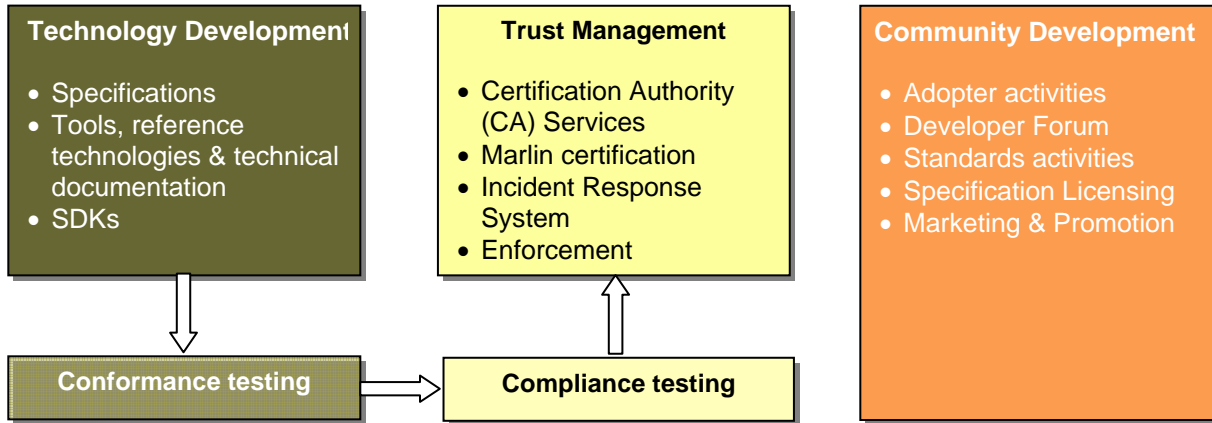


Figure 1: Marlin's scope of activities

Specifications: Marlin founders have developed a set of specifications to expedite implementations of domain-based, interoperable and DRM-based content sharing platforms for their CE-based devices and services. The current specifications bundle for release to the Marlin community website includes:

- The Marlin Core System (MCS) specification (includes protocols for common domain management)
- the Marlin Broadband Delivery System Specification
- the Broadcast Delivery System Specification
- the Marlin OMA v.2.0 Gateway System Specification

Tools and Reference Technologies: Marlin founders are working on tools and reference technologies to further illustrate the specifications. A reference technology based on the Marlin Core System and the Marlin Broadcast Delivery Specifications is currently available. Reference technologies built on the Marlin Broadband and OMA v.2.0 Gateway Specifications will be available downstream, as will authoring tools for boilerplate licensing and other tools for creating and customizing control programs, and tools for creating delegates and agents on the operational side.

Software Developer Kits (SDKs): Marlin founders are also working on client and server-side software developer kits (SDKs) to help accelerate implementations. This incorporates a set of documentation, libraries, pre-integrated components, sample applications, and tools to simplify the deployment of interoperable Marlin capabilities in a straightforward fashion.

3.2. Trust management

The Marlin community has established a trust management infrastructure to provide services for Marlin-enabled implementations.

Certification Authority (CA) Services: to secure and manage the keys for issuing certificates to subordinate Certificate Authorities (CAs), and to manage and issue the Certificate Revocation List (CRL) and the Broadcast Key Block (BKB) for Marlin-wide operations. Primary services include:

- Managing trust anchors
- Delegating subordinate certificate authorities for Key Issuance
- Developing revocation, shunning, and exclusion criteria and procedures (based on policies established with input from an Industry Advisory Council)
- Implementing certificate revocation and device exclusion

Marlin Certification: to certify device and service implementations that meet the conformance and compliance/robustness requirements and grant permissions to use logos to those that meet the certification criteria. To this end, Marlin will provide:

- Conformance Test suites: automated tools to test normative requirements in the specifications.
- Compliance Requirements: rules to ensure the proper import of protected content into Marlin and to ensure that Marlin content is rendered to approved outputs or to approved export technologies
- Robustness Requirements: rules to ensure the proper implementation of security aspects of a compliant product (i.e., secure storage, secure time, secure memory, and tamper resistance)
- Test certificates and objects for interoperability testing
- A guide to the Marlin Certification Process.

Incident Response System: to contain the impact of an attack on or compromise of a single or multiple devices, or rogue services, Marlin will implement an incident response system that includes plans for state management, and a plan of which of the following security mechanisms to use in the case of each threat, based on best practices.

- Revocation of devices and services via a Certificate Revocation List
- Exclusion of devices via a Broadcast Encryption Scheme
- Shunning of devices and/or services via operational policy
- Expiration of credentials (ensures that entities whose certificates have expired are refused service; used in conjunction with key rollover and key renewal procedures)
- Renewal where required.

Enforcement: to prevent Marlin specifications from being misused, and to protect Marlin implementations from attacks, Marlin will establish both contractual and legal remedies. Contractual remedies include such mechanisms that include breach of contract, revocation of certificates, etc., while legal remedies include IP infringement, anti-circumvention etc.

3.3. Community Development

Since Marlin is a community-based technology, it relies on support from the entire value network to build a complete ecosystem. Accordingly, there will be a range of outreach activities targeted at strategic adopters and non-commercial participants, that include standards-based activities, licensing, and marketing and promotional activities.

Adopter outreach activities: initially, these are targeted at content providers, service operators, device makers (including mobile handsets, CE device and components makers, etc.) and other solution providers to help seed the market with Marlin implementations.

Developer outreach activities: the MDC will establish a developer community portal to make the specifications available to a wider audience. Joining the MDC allows parties to review and contribute to the specifications and reference technology (software and implementations), receive updates, and participate in meetings. The MDC will also offer training programs to bring new developers up to speed. It will also sponsor PlugFests to assist developers in meeting the Marlin conformance specification and to ensure interoperability. These test sessions, which are a form of internally controlled field testing guidelines, test implementations for interoperability and conformance against the Marlin reference implementations.

Standards activities: Marlin supports a series of open standards and also coordinates with other standards bodies including Coral (The Coral Consortium <http://www.coral-interop.org> which establishes specifications for interoperability between rights management systems), the Open Mobile Alliance (OMA) and the Digital Living Network Association (DLNA). Since the Marlin founding members are also among the Coral founders, Marlin tracks Coral very closely and will support it fully.

Licensing: Marlin's licensing program will minimize market hurdles and provide input into compliance frameworks

Marketing and Promotion: this will include logo branding, media outreach, conferences and event planning at trade shows.

4. Value Proposition

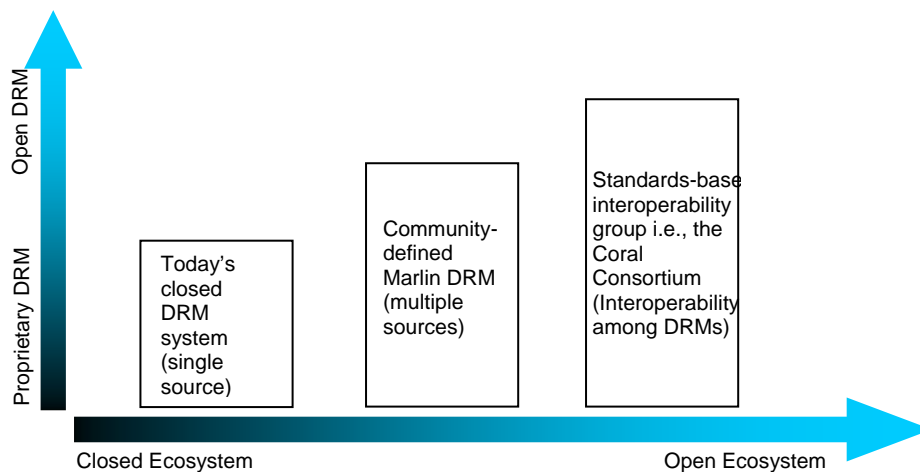


Figure 2 – Marlin Landscape

Marlin benefits consumers and adopters equally. By moving complexity out of consumer devices and making rights management invisible, Marlin makes the consumer experience intuitive and supports a broad range of devices. Also, it is the first rights management system based on a consumer domain (or personal/home network) model; while other copy protection systems integrate domains into their systems after the fact. By supporting a domain-based model, Marlin allows consumers to share their

content between registered devices directly, without relying on a central “media hub”. This interoperability between Marlin-enabled devices and services is enabled by the core system specification within the Marlin-compliant implementation using Coral for the interoperability with other systems.

Marlin meets the common requirements of the consumer media industry by allowing flexible business models (e.g., based on metering, domain-based policies, etc.), decoupling services and roles, allowing adopters to control product and service architectures and define business models while maintaining interoperability, building upon open standards and balancing security and utility. With the weight of the four leading CE companies and the expertise of Intertrust in trusted computing behind it, Marlin is well positioned for success.

The rights management within Marlin is based on Octopus, a lightweight system which is extremely expressive and allows for flexible business rules. It therefore provides a modular design with components that act like building blocks, is extensible for future-proofing systems, easily configurable, optimized for small systems, semantic-free and format-agnostic.

5. Organizational Structure

The Marlin Developer Community (MDC) allows interested parties to participate in the review, testing, and further development of the specifications. MDC participants have access to Marlin specifications, reference technologies, tools, technical documentation, and SDKs. In addition, the MDC offers training programs and Plugfests to train engineers and test the new technologies and handles promotion and brand marketing requirements. The MDC was established by the founding members as a Limited Liability Corporation (LLC) to accelerate the further development and commercial deployment of Marlin.

The MDC has a contractual agreement with the Marlin Trust Management Organization (MTMO) which handles key management and certification.

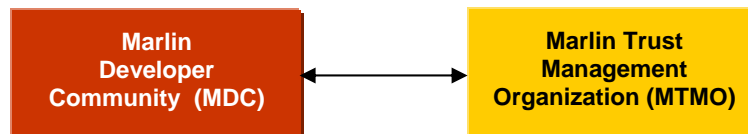


Figure 3: Organizational Structure

The MTMO serves as a one-stop shop for all trust management services, including certification and key management. The MTMO is an independent, neutral organization set up as an LLC by the founding members. In addition to the five founding members, representation in the MTMO includes strategic adopters who can participate in the Industry Advisory Committee. The MTMO also licenses specifications for evaluation, review and commercial deployment, licenses trademarks and the Marlin-compliant logo, and enforces the appropriate use and security requirements of Marlin technologies. MTMO is not operated for profit and only seeks to recover costs associated with the services it provides.

6. Participation

The Marlin community encourages participation from developers and adopters beyond the five founding members in order to accelerate further development of the specifications and implementations in the market. The MDC offers 2 categories of participation – as evaluator and participant – and the MTMO offers 4 categories of involvement –service provider adopters, client adopters, technology provider adopters and content participants.

Evaluator: this is a category within the MDC. ‘Evaluators’ have access to the finalized specifications, reference code, and technical FAQs. Being an evaluator entitles one to evaluate and suggest enhancements to the specifications, but not to build commercial deployments based on these specifications.

Participant: this is a membership category within the MDC. ‘Participants’ have access to the finalized and underdevelopment specifications, reference code,, tools, contributed code, conformance test suites, test keys, etc. Being a participant entitles one to contribute to specifications development, but not to build commercial deployments based on these specifications.

Service Provider Adopter: this is a category of adopter for the MTMO relevant to entities that provide Marlin services, such as license provisioning or renewability services. Service providers also need to be certified.

Client Adopter: this is a category of adopter for the MTMO relevant to entities that are device or component manufacturers who implement commercial devices based on Marlin technology. Client Adopters will obtain licenses and certifications that allow them to deploy their technology in end-products and operational services. Trust certification requires that their implementations meet with conformance and compliance specifications.

Technology Provider Adopter: this is a category of adopter for the MTMO relevant to entities that build technology solutions for service provider and client adopters.

Content Participant: this is an MTMO category relevant to entities that endorse Marlin technology and wish to release content in Marlin format.

The Marlin adopter participants listed above will sign agreements with the trust organization that gives them certain rights and obligations. The Industry Advisory Committee, which has an important say in Marlin trust management operations will have representation from these three groups.

For more details on joining Marlin, go to: www.marlin-community.com/join

7. Technology overview

7.1. Design Goals

Marlin sets out to meet some key functional goals; these include: moving complexity out of consumer devices; simplifying user interactions; allowing import from multiple independent services (that have demonstrated quality of service and innovation); enabling flexible content distribution models; and accommodating natural P2P interactions that expand beyond PC-centric models.

7.2. Domain Model

Unlike other copy protection or DRM technologies, Marlin is designed from the beginning around a consumer domain model. The goal of the domain model is to acquire content rights from multiple services, exercise rights on a diverse set of devices, enable a consistent content experience, and assure content owners that undesirable content redistribution is inhibited. Technically, this entails establishing consumer domains and linking devices to domains, backing up and retrieving rights associated with content for use in these domains, and defining methods that bring content into the domain.

Once a Marlin domain is created, managing that domain involves the following:

- Importing content from various delivery systems
- Managing and sharing content among different devices in the domain
- Managing policies that govern content when a user or device joins/leaves a domain and that transparently manage devices.
- Provision of user friendly content directories and device discovery services.

7.3. Core and delivery system specifications

The Marlin Core System (MCS) Specification: this is common to all Marlin-based implementations as it specifies how to implement a Marlin Common Domain (MCD) that allows content to move easily and directly among different Marlin-compliant devices and services, regardless of how the content was imported. The MCS specifications are based on Intertrust's Octopus and NEMO reference technologies and secure Web Services standards, all of which have been adapted for P2P device interactions.

The MCS defines the following key functions:

- *Configuration*: establishing Marlin domains and Marlin device configuration
- *Content import, movement, and export*: license generation, packaging content for use in domains, moving content (with appropriate permissions) between devices, and exporting content
- *Content access*: using content in accordance with the license
- *Security Configuration Management*: acquiring, updating and distributing security-related metadata and certifying services

In addition to the core specification, Marlin currently defines how to "import" content from three different delivery systems: broadband, broadcast and mobile. This includes specifying how to transform the original rights into Marlin-encoded rights, how to bind content to Marlin domains, how to define the service roles, client/service interfaces and protocols, and how to implement all the objects necessary to achieve the above functionality.

The Marlin Broadband Delivery Specification: specifies how to import online content acquired using an IP network over any kind of broadband transport medium (e.g., DSL, cable Internet, fiber, or wireless) into a Marlin domain. The license associated with content purchased online and licensed to an individual user is translated into a license that is bound to a Marlin User Node. The Marlin license allows a device to play content if the User Node is registered to that device.

The Marlin Broadcast Delivery Specification: specifies how to import broadcast content (acquired via cable, terrestrial or satellite channels) into the consumer domain. Devices such as STBs and PVRs that are bound to the domain will support CableLabs' Copy Control Information (CCI) and requirements like the ones that were defined for FCC's broadcast flag.

The Marlin OMA v.2.0 Gateway Specification: specifies how to extend the capabilities outlined in the OMA DRM 2.0 specification for services and handsets. Specifically, it describes how to translate ODRL expressions into a Marlin license. The Marlin specifications allow these licenses to be compound objects that retain the ODRL expressions to maintain direct OMA compatibility.. As in OMA, Marlin allows service providers ('Rights Issuers' in OMA terminology) to set up their own domain policies.

7.4. Underlying Technologies

Marlin is founded on Octopus and NEMO technologies, Intertrust's reference technologies presented to this initiative, and open standards for distributed (web services) architectures.

Octopus: is a toolkit for implementing next generation rights management functionality into device and service implementations. Octopus is a graph-based relationship engine that uses links and nodes to associate rights with abstract entities. It allows for a semantic-free expression of rights that is executed on a virtual machine. Octopus can be designed to run on various platforms, from smartcards to servers, being media format and cryptographically agnostic.

Octopus provides the basic rights management objects and methods in Marlin that run within a consumer media application to enable governance. This includes providing a key distribution system that integrates naturally with management controls and a means for associating rights with abstract entities and for leveraging relationships. Adopters control Octopus implementations

NEMO: this stands for Networked Environment for Media Orchestration. It is a services-based architecture for providing rights management. It achieves this by supporting a trusted interaction among entities that play well-defined and certified roles. These services may be operated together with other, application-specific media services that are not required to be NEMO-compliant.

In Marlin, NEMO defines service interfaces, service access policies, and support for trust relationships among distributed entities. The rights management services it supports are:

- Personalization
- Registration
- Content publishing
- Trusted metadata provisioning
- Licensing
- Renew-ability
- Credential maintenance

Since Coral's interoperability specifications are also based on NEMO, it provides the bridge for interoperability with Coral-compliant implementations.

Open web services standards: Marlin relies on open standards for integrating web-based applications over the Internet. They are used primarily for businesses to communicate with each other and with clients. Web services can securely share business logic, data and processes across a network through standardized interfaces. Such services are not tied to any single operating system or programming language, and do not require browsers or HTML support to run. Marlin makes use of the following web services standards:

- *SOAP* (Simple Object Access Protocol): used to transfer data as it encodes the information in Web service request and response messages before sending them over a network.
- *WSDL* (Web services description language): used for describing services that are available

- *WS-Security*: an OASIS (Organization for the Advancement of Structured Information Standards) standard for security and distributed management
- *SAML* (Security Assertion Markup Language): ensures that electronic communications and online resources are only accessed by authorized parties, by defining mechanisms to exchange authentication, authorization and non-repudiation information. SAML allows single sign-on capabilities for Web services.

7.5. Compatibility with Coral and other Standards

Marlin is committed to being the first Coral-ready system. Further, Marlin relies on Coral to provide interoperability with non-Marlin rights management implementations.

Marlin is also committed to implementing OMA v.2.0 in its mobile gateway specification. Marlin is also closely tracking progress made in the DLNA (Digital Living Network Alliance) and DVB groups, as it shares a common goal of evolving the home domain.

8. Roadmap and milestones

Since the formation of the JDA in January 2005, Marlin has made significant progress towards meeting its milestones. Marlin's upcoming milestones include the following:

Q1 2006:

- Release the Marlin specifications to the MDC website. This includes the Core System (MCS) Specification v.1.1, Broadband Delivery Specification v.1.0, Broadcast Delivery Specification v.1.0 OMA v.2.0 Gateway Specification v.1.0 MCS Specification v.2.0 with the Marlin Common Domain (MCD)
- Work on requirements for new delivery systems

Q2 2006:

- Finalize Core conformance and compliance test suites
- Offer Marlin Introductory Seminars in Asia, Europe and the US
- Develop SDKs, reference technologies, and tools based on the Marlin specifications

Q3 2006:

- Release early implementations in the market
- Build Marlin SDKs for different platforms
- Early Marlin implementations in the market

9. Conclusion

Marlin is a DRM-based content sharing platform that is designed for transparent use by consumers, and easy deployment by content, service and device providers in the CE value chain. Marlin currently provides specifications for a core platform and import specifications for broadband, broadcast and mobile content. These specifications are available for review and further development to the community at large through the MDC website. The MTMO will handle key management and credential delivery, and conformance and compliance testing to certify a product as being Marlin compliant. Essential patents held by Marlin's founders will be licensable through the MLA on reasonable terms and conditions. Marlin invites participation from adopters in the device, content and service provision industries to help build out the complete ecosystem. Functionally, Marlin offers greater functionality and flexibility than existing technologies. The earliest Marlin-based implementations are slated for public release in mid-2006.

To join the Marlin Developer Community, please go to <http://www.marlin-community.com/>