Standardization Activities in the Content Reference Forum

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Abstract

Standardization of a framework for reliable content commerce in a peer-to-peer environment has started. The framework will provide information about how to purchase content and about terms and conditions for using it, as well as rewards for referrers who introduce the content to others. There has been discussion about an experiment to be conducted at the end of 2003.

1. Background of content commerce

Content commerce based on viral marketing[*1] has now become a reality. However, most of the content exchanged through peer-to-peer (P2P) file-sharing systems is not properly regulated and is unreliable. There is no guarantee that a massive downloaded file will function successfully. Furthermore, in many cases, the intellectual property rights of the content creators are not protected, and the essential players in viral marketing such as consumers do not obtain any benefit. Furthermore, the content cannot be provided in a common file format because of the distribution channels, regional restrictions and rights, and usage environments. We must solve these problems and develop an efficient viral marketing and content distribution mechanism that enables consumers to obtain the best content for their usage environment and preferences. We must also support new business models that take into consideration the benefits of participants in the value-chain[*2]. The top-priority issues are as follows.

- Referring to content in an abstract manner instead of referring to specific files (This abstract data is called a content reference (CR)).
- Tracking value-chain paths.
- Controlling value-chain participants and allotting rewards based on their contributions.
- Obtaining consumer contexts (information about usage environments).
- Expressing CR, value-chain information, and the contexts.

2. Goal and plans

The goal of the Content Reference Forum (CRF) [1] is to examine the above issues and construct a framework and develop specifications that will establish trustworthy content commerce in the P2P environment, in other words, to actively distribute suitable content to consumers under suitable usage conditions.

There already exist several standards bodies that are working on part of the framework, such as ISO/MPEG-21 (ISO: International Organization for Standardization, MPEG-21: Moving Picture Experts Group-21) [2], W3C (World Wide Web Consortium), DOI/IDF (DOI: Digital Object Identifier, IDF: International DOI Foundation) [3], cIDf (Content ID Forum) [4], WS-I (Web Services Interoperability

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*1 Viral marketing describes any strategy that encourages individuals to pass on a marketing message to others, creating the potential for exponential growth in the message's exposure and influence.

*2 The value-chain that we refer to here is slightly different from the ordinary marketing term. It focuses specifically on players, who contribute to the distribution of the content, and we do not take into account production processes whereas an ordinary value-chain or supply-chain does.

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Organization) [5], and OASIS (Organization for the Advancement of Structured Information Standards) [6]. These are conducting standardization within their own vision. However, their standards are insufficient to fully realize the framework of the CRF, so we have been working closely with them by incorporating their existing standards as much as possible to develop missing specifications for the CR data format, contract expression, and the Reference Service (RS) within the CRF.

3. Framework for content reference

The framework that the CRF is aiming at is shown in **Fig. 1**. Assume that User A in the US is watching a movie on cable TV and likes it so much that he tells his friend, User B in Japan, about it. User A sends sufficient CR information to User B so that she can find the same movie locally. The CR includes such information as title, cast list, synopsis, and enough metadata to identify the movie. If she is interested, User B sends the CR to an RS server with additional information about herself (hardware/software components and personal information permitted to be disclosed). The RS server returns information about using the content in her specific environment. This tells User B, for example, that she can watch the movie for 300 yen by streaming it from an Internet site or purchase it as a DVD for 3000 yen at another online site. The RS server may also introduce other movies starring the same actor, a site that sells T-shirts of the actor, and other related services. The information presented to User B (which we call the "Offer") is generated based on contracts or business logic held by the RS. User B chooses the desired information and purchases it. Upon completion of the purchase process, rewards are allotted based on the

information on the value-chain participants (in this case, User A as a referrer) that are collected along the whole procedure.

Necessary elements for the framework are as follows:

① CR: XML-based metadata for identifying content and expressing user context information
② Offer: XML-based information about where one can purchase the content and about related content/services
③ e-Contract: business logic expressed by the Contract Expression Language (CEL), which includes information such as sales rules and usage conditions
④ RS: a service that generates and returns information (Offers) that may satisfy the user's request based on the provided information in the CR and e-Contract
⑤ Value-chain management: Participants involved in the content commerce are traced and managed as a value-chain. Participants are given rewards when the purchase is complete.

4. Organization and activities

Discussion on the establishment of CRF began in May 2002, and CRF was formed in March 2003. This forum is made up of six companies (all are Principal Members): NTT, ARM, ContentGuard, Microsoft, Universal Music Group, VeriSign, and Macrovision. The organization consists of the Board of Governors and four Working Groups (**Table 1**). We have been working vigorously on developing specifications and profiles for the experiment to be carried out around the end of 2003.
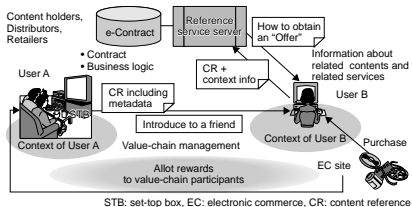

Fig. 1.   Basic model of content reference framework.

Table 1.   Working groups in CRF.

Working group	Chairman	Work items
RA (requirements & architecture)	UMG	Architectural framework, functional requirements, and usage case scenarios
CR (content reference)	UMG	Format of CR and Offer
CEL (contract expression language)	ContentGuard	CEL
RS (reference services)	NTT	RS, communication protocol among RSs

5.   NTT's actzivities

NTT has been actively participating in the CRF because CRF's goal is promising for the future framework of the content commerce, and it aligns well with the strategy of metadata distribution in NTT's R&D scheme. Currently, two positions in the CRF are held by NTT: one board member and the RS working group chair. Technically, NTT has incorporated into the framework of the CRF the concept of "Related Service Offering" [7], which provides related content and services as well as the basic RS functionalities of obtaining the designated content and its usage conditions.

We are currently developing specifications and a prototype system for the experiment planned for the end of 2003. This experiment will examine the feasibility of the selected technologies and business models, and the specifications will be reflected in other standards.

References

[1] http://www.crforum.org/
[2] http://www.chiariglione.org/mpeg/
[3] http://www.doi.org/
[4] http://www.cidf.org/
[5] http://www.ws-i.org/
[6] http://www.oasis-open.org/
[7] H. Sakamoto, H. Fujii, S. Irie, and H. Yamashita, "Service Gateway to Enable the Introduction of Content Related Services," ICME2001, Tokyo, Japan, P150, pp. 637-640, Aug. 2001.

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