

User Feedback Collection Method with Trackback for TV Broadcast Services

Noriyuki Hashimoto, Masaki Suzuki, Takuya Komata, Hiroshi Shigeno
Graduate School of Science and Technology, Keio University
{hasimoto, masaki, komata, shigeno}@mos.ics.keio.ac.jp

Kyoko Ariyasu, Hiroshi Senoo
NHK Science & Technical Research Laboratories
{ariyasu.k-la, senoo.h-iy}@nhk.or.jp

Abstract

In the terrestrial digital television broadcasting services in Japan, we can send feedback data by remote controllers, but cannot send comments for broadcast contents. In the Internet, there are some feedback systems we can send opinions for Web contents; posting comments and using trackback. In this paper, we propose a Broadcast Trackback System which is a user feedback system using Trackback in broadcast contents. When we use trackback, trackback servers treat trackback pings which are notices of trackback. However, they cannot operate attributes of broadcast contents. We extend one of the trackback server functions and parameters in a trackback ping, so that the trackback server can operate attributes of broadcast contents. We implement the trackback Ping URL which we can use trackback for time and spatial parts of broadcast contents. We describe the user feedback which is synchronized with broadcast contents, as users post articles using the trackback ping URL.

1. Introduction

In Japan, the 2.84 million households use the digital terrestrial TV broadcast services in 2005. The digital terrestrial TV broadcast service[2] has a feedback system operated by the wireless remote controllers. By using the controller, users send data to broadcast stations through ISDN. Yet, users cannot post comments on the broadcast contents. In the Internet, we increasingly pay attention to video contents services[1] to make use of the feedback of peculiar to the Internet services.

There are two feedback methods for Web contents in the Internet; posting comments and using Trackback(TB)[3]. Posting comments is a feedback

method that users directly write opinions at the comment entry column on web contents. Comments written at web contents are managed by a server to which they belong. Some delivery services of video contents in the Internet have a feedback system which allows users to post comments to video contents they watch. iVas[5] and Mars[4] have such services. The Use of TB is one of functions in Weblog. TB is a feedback method to link a Weblog article as comments to another Weblog article to which users want to give feedback. In the case that users use TB, feedback data are distributedly managed in the Internet. Legacy TB servers are not able to operate attributes of broadcast contents such as program objects because they only operate those of Weblog articles.

AdapTV service[6] is a service to meet users needs by converting broadcast contents adaptively in a TV set. Related to this service, a study in Japanese by Suzuki et al[7] proposes an adaptive presentation method to adaptively convert broadcast contents into the context of the user, and a study in Japanese by Hashimoto et al[9, 8] proposes an adaptive presentation of broadcast contents in the AdaptTV service in the Internet.

In this paper, we propose user feedback collection method using TB for TV broadcast services, extending functions of legacy TB servers so that they can operate attributes of broadcast contents and parameters in TB Ping. By using this method, users can post articles related to broadcast contents to a Weblog as a feedback. We implemented prototype system to test our proposal method, and the TB Ping URL which we can use TB for time and spatial parts of broadcast contents.

The rest of the paper is organized as follows. Section 2 describes TB in Weblog. Section 3 describes problems when users refer to broadcast contents using TB. We propose broadcast TB method in Section 4. We describe the implementation of the prototype sys-

tem in Section 5. Finally, We conclud our argument in Section 6.

2. Trackback in Weblog

TB is a feedback method to notify that a Weblog server links articles users post as comments to another Weblog articles to which users want to give feedback. This notice is called TB Ping. A server which treats TB Ping is called TB server. When we use TB for Weblog articles, we need to use TB Ping URL, which is the address which consists of an address of the TB server and a fragment identifier assigned to each Weblog article. In each Weblog article, TB Ping URL corresponds to peculiar article URL. For example, if an article URL is "http://www.foo.com/archive.html#foo", the Weblog server assigns a number of 5 to the article. In this case, the TB Ping URL, "http://www.foo.com/tb.cgi/5" would be assigned to the corresponding article.

Figure 1 shows the a mechanism of TB.

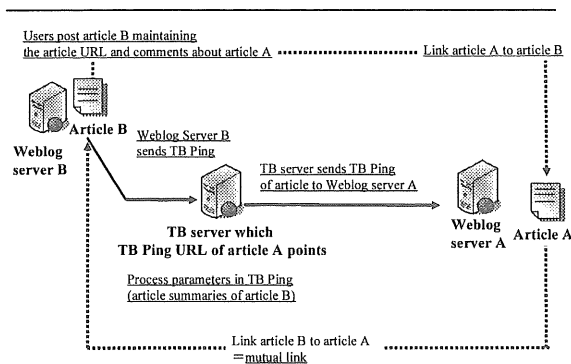


Figure 1. Mechanism of TB

A user read the article A, and makes the article B which contains comments on the article A by using TB Ping URL of the article A. The Weblog server B which has articles that the user posts makes a link from the article A to the article B, and sends TB Ping to a TB server which is addressed by the TB Ping URL. Here, TB Ping represents the information of the article B. The TB server operates parameters in TB Ping, and sends them to the Weblog server A.

Table 1 shows the parameters in TB Ping. The TB Ping has four parameters of the article B; an article title, an article summary, an article URL, and a Weblog name. The Weblog server A manages information including the article A. Here, when a user use TB for article A, the article A is the origin of TB, and a list of TB Pings that the article A contains is called TB information.

Parameter name	Content
title	an article title
excerpt	an article summary (The sentence that shortened an article)
url	an article URL
blog name	Weblog name

Table 1. Parameters in B-TB Ping[3]

3. Issues of Trackback to broadcast services

There are two issues when users refer to broadcast services using TB in Weblog. One issue is a format of TB Ping URL. The other issue is TB Ping processing mechanism. We show these problems in the following sub section.

3.1. Format of TrackBack Ping URL

When users use TB for Weblog articles, it is required that users can refer to the whole article and cannot use TB for a part of the articles. On the other hand, in broadcast services, it is required that users use TB not only for the whole broadcast contents but also for a part of the broadcast contents such as scene units, frame units, and object units, if they use TB for broadcast contents. In this way, we find that there are more targets of video contents than those of Weblog articles.

Table 2 shows comparison between target of TB about broadcast contents and that of TB about Weblog. It is necessary to improve ability of presentation to use TB for not only the whole broadcast contents but also scene unit and object unit, in order to use the legacy TB Ping URL for broadcast contents.

Attributes of TB	Contents
Weblog articles	• the whole article
Broadcast contents	• the whole program • the program part of scenes or news • The program objects represented character

Table 2. Target of TB

3.2. TrackBack Ping processing Mechanism

In table3, we show details of attributes of Weblog articles and broadcast contents. A TB servers used in Weblog has a problem that they cannot operate attributes of broadcast contents, because they operate

only attributes of Weblog articles. When users use TB for broadcast contents, TB servers need to have a TB Ping processing mechanism to operate attributes of not only Weblog articles but also broadcast contents.

Attributes of TB	Contents
Weblog articles	<ul style="list-style-type: none"> • the whole article • article summary • article title • article URL • Weblog name
Broadcast contents	<ul style="list-style-type: none"> • the whole program • The scene and a program part by one news • Line information • Scene information

Table 3. Attribute of Weblog and broadcast contents

We assume that Weblog is a sort of stored contents, while broadcast contents can be the real-time TV contents and VoD contents. In collecting user feedback, the TB server is required to treat not only VoD contents but also real-time broadcast contents.

4. Broadcast TB System

In this section, we propose user feedback collection system for broadcast services using TB system; Broadcast TB system (B-TB system).

We call TB Ping for broadcast contents B-TB Ping. In this proposal, we extend some functions of legacy TB Ping processing mechanism in Weblog for broadcast contents. In B-TB Ping processing mechanism explained in subsection 4.1, we extend a function of the legacy TB Ping processing mechanism, so that the TB server can operate attributes of broadcast contents. In addition, we extend the parameters in TB ping. We add the TB parameters which represent attributes of broadcast contents. We can use TB Ping URL for broadcast contents.

We built a prototype system which employs the processing mechanism.

4.1. B-TB Ping processing mechanism

Figure2 shows a B-TB Ping processing mechanism.

At first, users watch broadcast contents, and they write articles which are comments such as opinions about the programs in broadcast services, or they post articles using the B-TB Ping URL of the programs. Weblog servers, which have articles users post, make links from articles to broadcast contents and sends B-TB Ping to a B-TB server shown in B-TB Ping URL. The TB server sends the B-TB Ping to the broadcast

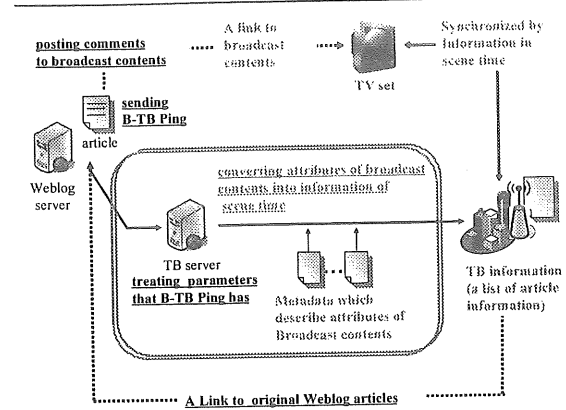


Figure 2. B-TB Ping processing mechanism

station after it processes parameters in B-TB Ping. The difference between the legacy TB Ping of Weblog and B-TB Ping is that the target of using TB is replaced broadcast contents instead of Weblog articles, because the TB server is required to operate time which is associated with a scene of broadcast contents. We extend a function in which TB server operates TB Ping to convert information about broadcast contents into information about scene time if the TB server treats B-TB Pings. The TB server acquires the metadata of broadcast contents from the broadcast station. With this metadata, the TB server converts attributes of broadcast contents into information about scene time in the B-TB Pings. The user interface module in TV sets shows TB information for users, synchronized with the play time of broadcast contents.

In addition, this system supports not only VoD but also real-time broadcast services. For example, for the broadcast contents of real-time contents such as sports programs, users can use TB for the real-time broadcast contents by assigning B-TB Ping URL every period of time, because the broadcast station provides TB Ping URL when programs play.

4.2. Formats of parameters and B-TB Ping URLs to constitute B-TB Ping

Table4 shows the parameters in B-TB Ping. B-TB Ping has 15 sorts of information shown in Figure 4. We use legacy TB Ping to make parameters in B-TB Ping URL; title, excerpt, url, and blog_name. Start-time and scenetime express a time part of broadcast contents, while scene_no expresses scenes that are assigned in advance. On the other hand, we use positionX and positionY to express a spatial part of broadcast contents. CommentDuration expresses the time that represents comments, because length of scene duration is different from that of representing comments. These information are converted into XML, and are in-

Attributes of broadcast contents	Content
scene_no	the scene number
starttime	the start time of the scene
scenetime	the scene time
ping_url	URL address
movieid	ID of the broadcast contents
title	the title of the Weblog article
blog_name	the title of Weblog
excerpt	<ul style="list-style-type: none"> • the summary of the Weblog contents • the comment text
url	URL of the Weblog
time	time users post article
positionX	A comment indication point
positionY	A comment indication point
commentDuration	A comment indication period
scale	A comment indication magnification
datal	An identifier to show a contribution method

Table 4. Parameter of B-TB Ping

tegrated into other feedback data. Generating objects other users share, the user feedback data is reflected in the B-TB user interface in a TV set.

B-TB Ping URL is realized by extending the parameters of TB Ping URL based on attributes of broadcast contents. This URL can target at not only a broadcast content but also a part of it such as object units or scene units.

Users can use B-TB Ping URL for the whole broadcast contents to represent the name of them. `http://(the server name)/tb/(the broadcast contents)`. For example, Weblog server send B-TB Ping for the broadcast content whose name is "championship", the B-TB Ping is "`http://localhost/tb/championship`".

Users also can use the B-TB Ping URL for a part of broadcast contents such as scenes or appearance persons in programs. We define B-TB Ping URL which represents the time parts and the spatial part. There are three kinds of presentations of B-TB Ping URL corresponding to the scene duration.

First, we show the URL to designate the start time and the scene time of a scene duration; `http://(the server name)/tb/(the name of broadcast contents)?starttime=(the start time of the scene)&sceneduration=(the scene duration)`. Second, we show the URL using the scene number for the scene assigned, preliminarily; `http://(the server name)/tb/(the name of the broadcast contents)?sceneNo=(the scene number)`. Third, we show the URL to represent a spatial part of broadcast con-

tents in a scene; `http://(the server name)/tb/(the name of the broadcast content)?starttime=(the start time of the scene)&positionX=(the value of the X coordinate)&positionY=(the value of the Y coordinate)`. Here, the origin is a corner of lower left part of the broadcast contents.

Here, we show examples about these three cases. In the first case, we use TB for the scene of 10 seconds from 1 minute 20 seconds with the broadcast content whose name is "championship", we use the B-TB Ping URL of this case is "`http://localhost/tb/championship?starttime=1m20s&scenetime=10s`". In the second case, we use TB for a scene of the broadcast content whose scene number is 2 and name is "championship", and the B-TB Ping URL of this case is "`http://localhost/tb/championship?sceneNo=2`".

In the third case, we use TB for a part of broadcast contents whose start time is 11 seconds and value of the X coordinate is 1500 and that of the Y coordinate is 500 and name is "championship", and the B-TB Ping URL of this case is "`http://localhost/tb/championship?starttime=11s&positionX=1500&positionY=500`".

4.3. Distributed Management of Feedback in the Internet

An advantage of using TB in collecting user feedback for broadcast contents is that user feedback data is managed distributedly in the Internet. TB is characterized with management of feedback data distributedly in the Internet, because the server for comments manages comments and each Weblog server manages Weblog articles. Each comment object represents the user feedback in broadcast contents. The broadcast station has the comment object, and users watch broadcast contents in case that the TB server acquire the comment object from the broadcast station.

5. Implementation of Prototype System

In this paper, We implemented the prototype of the B-TB system and metadata. There are two metadata which are the one about broadcast contents and the comment information about broadcast contents. We assume that the prototype system operates in VoD services.

5.1. System Configuration

Table 5 shows the system configuration of the prototype system. We implemented a prototype system which consists of the broadcast station, the comment server, and the TB server. the prototype system run on a server.

Hardware	Software
<ul style="list-style-type: none"> • CPU Pentium 4 3.2GHz × 2 • 512MB RAM • CentOS 5 	<ul style="list-style-type: none"> • Flash Media Server 2 • PHP 5.1.6 • Apache 2.2.2 • MySQL 5.0.22

Table 5. System configuration

In Figure 3, all parts of B-TB user interface are implemented by Flash. B-TB user interface module is implemented by PHP. this user interface runs on Internet Explore 6.0. In this implementation, we prepare a movable type Weblog.

5.2. B-TB User Interface

Figure 3 shows a screen image which provides B-TB user interface.

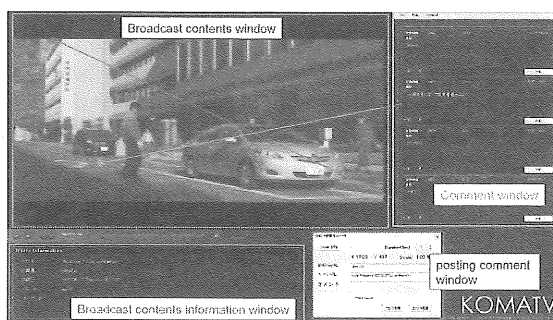


Figure 3. B-TB user interface

The user interface has functions to show broadcast contents, and to send the TB server to B-TB Ping when users post Weblog articles, and to write a Weblog article related to broadcast contents. It consists of four elements in Figure 3. The broadcast contents window show broadcast contents. Broadcast contents information window shows broadcast contents information such as information about program objects represented character. The comment window shows comments which users post. The posting comment window shows a comment entry box. Users watch broadcast contents, and post comments or Weblog articles on the posting comment window. They can read comments synchronized with the play time of the broadcast contents. In this case, comments are displayed in a comment window. In the case that users post comments or Weblog articles for their interested scenes, other users who watch the same contents read the comments, which is synchronized with play time.

In addition, if comments are associated with a spatial part of a broadcast content in scenes in which users

are interested, they click a point in the part of broadcast contents, and post comments or Weblog articles.

Lines represent that comments showed in comment window are associated these comments with the spatial parts of a broadcast content in a scene users are interested in.

5.3. Metadata

In general, metadata is described by XML, and broadcast contents are divided by every scene. In addition, the broadcast contents are assigned metadata beforehand by every scene. In this system, metadata is described by XML, and we make a format about scenes of broadcast contents. Table 6 shows the information of broadcast contents.

Information of broadcast contents	Content
scene_no	the scene number
starttime	the start time of the scene
scenetime	the scene time
article_num	the feedback number users post

Table 6. Metadata of the broadcast contents

The metadata for a scene has the scene number, the start time of the scene, scene time, and information of the feedback number. The TB server maintains metadata to reflect B-TB Ping about the feedback from users managed, independently of broadcast contents.

5.4. Operation Example of B-TB System

Figure 4 shows how the B-TB system is operated when users watch broadcast contents.

A user designates broadcast contents they want to watch, and requests them to the broadcast station. The broadcast station requests a comment DB to user feedback data and receives the user feedback data from the comment DB based on the broadcast contents ID. The broadcast station generates comment objects. Comment objects are information shared by the users, when the users watch the same broadcast contents at the same time. The broadcast station does not require comments to the comment DB, in case that comment objects are already generated. The Broadcast station sends broadcast contents and comment objects to users. Users can watch the comment objects on interested scenes, watching the broadcast content.

When users watch interesting scenes, they give feedback to the scenes. In the B-TB user interface, we

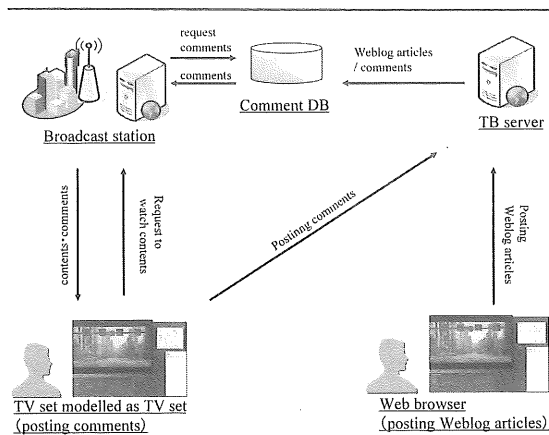


Figure 4. Operation example of B-TB system

prepare two kind of feedback methods; posting comments or Weblog articles. Posting comments is the method that users post comments to the posting comments windows on the B-TB user interface. Posting Weblog articles is the method that a user makes a Weblog article and the TB server relates the article to a scene of a broadcast content.

When a user posts a Weblog article, a Weblog server which has the Weblog article sends the article as B-TB Ping to a TB server. The B-TB user interface module sends comments as B-TB Ping to the TB server as the user post comments. The TB server stores the B-TB Ping the comment DB. The broadcast station updates comment objects by referring to the comment DB.

The feedback data of the users is reflected in the B-TB user interface of other users immediately, because other users share the the feedback data in advance.

6. Conclusion

In the interactive functions of digital terrestrial TV broadcasting, users can send feedback data by the wireless remote controllers, but cannot post comments for broadcast contents.

In this paper, we propose user feedback collection method in the case that users use trackback in broadcast service. This system can manage user feedback data distributedly in the Internet, while the broadcast station sends broadcast contents to users in the broadcast service. There are two issues in the case that users refer to broadcast contents using TB. One issue is the format of TB Ping URL. The other issue is processing TB Ping method.

To solve these two issues, we extend two functions in the legacy TB Ping processing mechanism in the Internet. First, we extend function of the legacy TB server to be able to treat attributes of broadcast con-

tents. Second, we propose B-TB Ping and B-TB Ping URL. We also implement the prototype system, and we operate this prototype system in the environment that we assumed.

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