

CITIZEN MEDIA

Event metadata automatic enrichment in a digital TV environment

Document Type.: White paper
Issue: Issue 1
Date: 30 03 2007
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Classification: Public

ENGLISH (UK)

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Contents

1 Introduction	4
1.1 Purpose	4
1.2 Audience.....	4
1.3 Alert	4
1.4 Definitions and acronyms.....	5
1.5 Documentations.....	5
2 The problem.....	6
3 The solution in brief.....	7
3.1 Existing SI system	7
3.2 SI system with a MES.....	8
3.3 Event metadata input.....	9
3.4 Internet Content Provider.....	9
3.5 Broadband Guide (ECG).....	10
3.6 Multi devices considerations.....	10

1 Introduction

1.1 Purpose

The purpose of this document is to introduce the event metadata used in a regular digital TV environment and the way(s) to enrich them in the **CITIZEN MEDIA** framework.

CITIZEN MEDIA is a collaborative research project which unites leading creative and technology experts from across Europe on research, development and validation of A/V systems to enable multiple non-professional users to co-create networked applications and experiences based on their own user-generated content. In this project new ways are investigated on how to exploit the huge amount of user-generated content in innovative ways to support people in their daily lives and how technology will enable social change to strongly involve users for co-creating networked applications. This work will introduce new concepts that may modify the role of stakeholders in the classical value chain for content delivery.

To this end, applications, services, systems, infrastructure, technology and architectures are developed based on a user-centric approach. The goal is to enable any user at any location with any device to consume, author and publish his own content towards a networked A/V system.

The **CITIZEN MEDIA** program (Project Number: IST 038312) is a European R&D program part of the **IST 6th Framework Programme**.

NDS is one of the partners inside the **CITIZEN MEDIA** consortium.

Inside **CITIZEN MEDIA**, NDS extends the set of TV interactive services embedded in the STB for handling user generated content (production and / or consumption) in a novel networked application environment taking into account nomadic and home users on different terminals.

1.2 Audience

Each people interested in the technology area may read this document.

1.3 Alert

This document is not the specifications or requirements related to NDS deliveries for **CITIZEN MEDIA**.

This document is a snapshot of what NDS figures out at the date the document is written.

1.4 Definitions and acronyms

Table 1: List of terms

Term	Description
DTT	Digital Terrestrial Television
DVB	Digital Video Broadcasting (standard)
ECG	Electronic Content Guide
EPG	Electronic Program Guide
Event or program	a TV Program
HTML	Hyper Text Markup Language
HTTP	Hyper Text Transfer Protocol
MES	Metadata Enrich System
MPEG	Motion Picture Expert Group (standard)
Sat	Satellite
SI	Service Information
STB	Set-Top Box
TV	Television
UGC	User Generated Content
URL	Uniform Resource Locator
XML	eXtensible Markup Language

1.5 Documentations

The following documents are referenced in this document.

Table 2: Related Documents

Ref 1.	DVB Specification / Service Information (SI)	ETSI TS 300 468
Ref 2.	Information technology – Generic coding of moving pictures and associated audio information: Systems – International Standard	ISO IEC 13818-1

2 The problem

In a digital TV system, a large offer of channels exists. The size of program guides is so important that it can not be read in a paper format. The existing solution found is the EPG made of data coming from DVB-SI tables (see Ref Ref 1) and / or interactive TV streams.

Some servers (commercial products) have been developed to build this guide and provide a DVB SI EPG for any digital TV platform (satellite, terrestrial, cable) that uses the DVB standard. They are in charge of collecting, sometimes editing, and transmitting the different SI information to multiplexers or any others MPEG-2 (see Ref Ref 2) broadcast equipments.

It becomes ordinary to have hybrid STB supporting multiple TV platforms (satellite, terrestrial and multicast / unicast streams). Combined with the increase of TV channels and on demand offers, the amount of metadata needed to describe this large TV offer increases continuously. In addition, it becomes more and more important for content providers and platform operators to improve the attraction of consumers. To achieve this, the usual text based program guides need to be enriched with multimedia resources like images, trailers, ratings...etc

In brief, the digital TV system needs to manage more and more event metadata and enrich these metadata with multimedia resources in order to improve the promotion of the TV contents.

From the end user point of view, when browsing an electronic program guide, it becomes "natural" to wish to consume "extra multimedia materials" in order to help him in the content selection process. Because of the STB, connected to the Internet, could take benefit of all said related "extra multimedia materials" that exist on Internet today. Trailer, still picture gallery, credit description are part of the said expected extra multimedia material.

3 The solution in brief

The proposed solution introduces a new component in existing digital TV system, a Metadata Enrich System (MES) in charge of collecting input SI data from several sources in order to make them available in a unified way to the EPG (with a consistent set of SI data). An automatic mechanism is included in the MES in order to enrich current metadata with additional information sourced by Internet Content Provider.

Depending on the digital TV system having to deploy such a solution, the MES shall be able to manage the output in the following way:

- Automatic production of an EPG for further access via a broadband connection on user request.
- Interface with existing SI Management system for injecting data in the broadcast stream (DVB-T, DVB-S, DVB-C or DVB-IP streams);
- Interface with existing SI Management system for managing a SI data cache having to be stored on the STB hard disk, this cache being delivered via the broadcast stream (DVB-T, DVB-S, DVB-C or DVB-IP streams) or on demand via a broadband connection;

3.1 Existing SI system

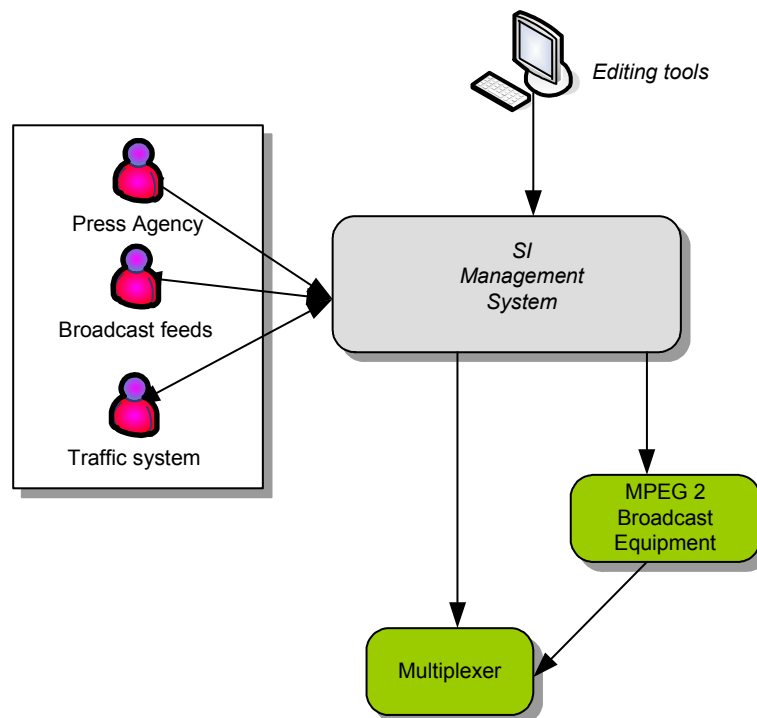
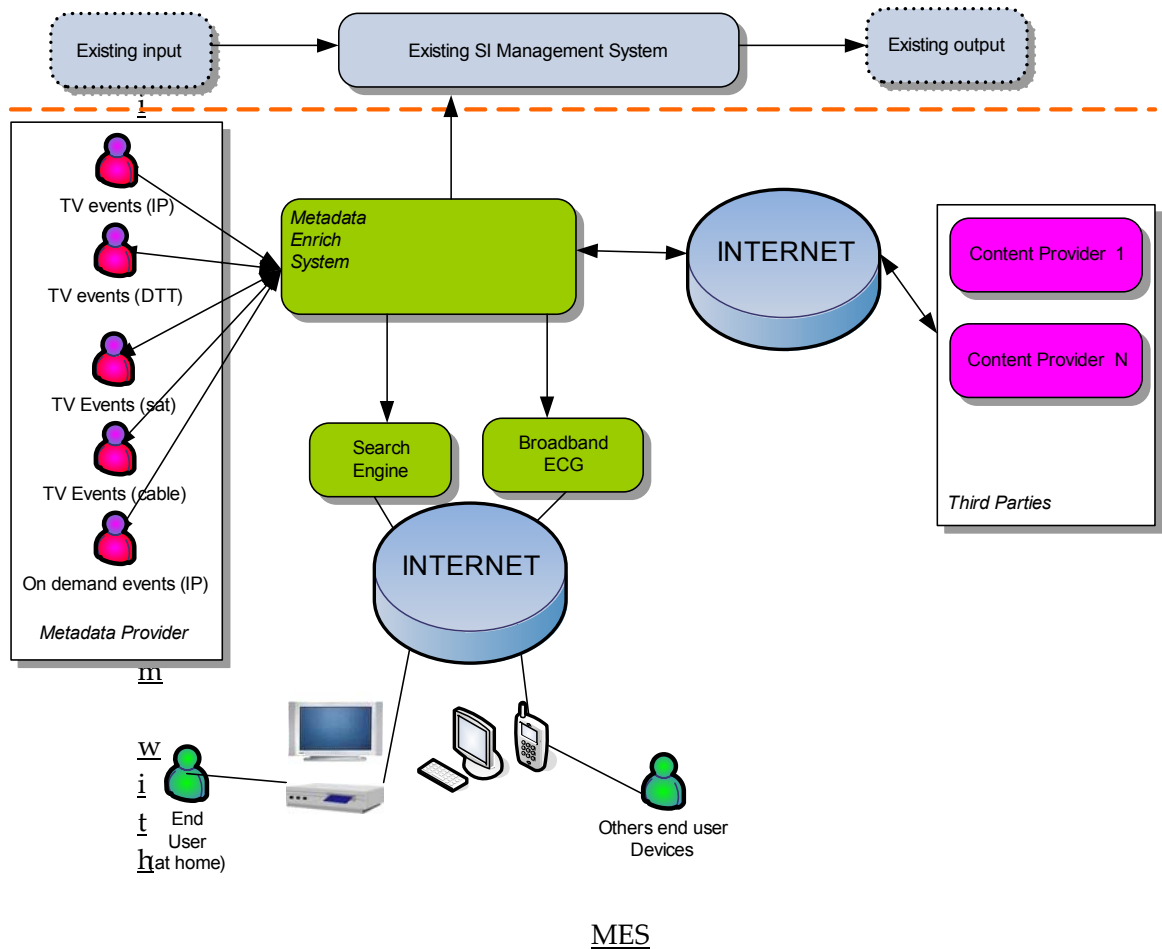


Figure: existing SI system

3.2 SI system with a MES



The MES receives Event Data from several sources. Each metadata published by this interface can be enriched by using one or more dedicated Internet Content Provider to get related resources having to be inserted in the Event metadata managed by the MES acting as an aggregator.

Then, the MES is able to forward the said metadata to an existing SI Management System or it can populate the broadband EPG called Electronic Content Guide in this context.

As an option, the MES can also be used to populate the metadata database of a Searching Engine (ex. XML database with an HTTP server interfaced on it), this search engine making possible to offer an Open Search solution for Advanced Guide capability on the STB (if and only if a broadband connection is made available on the STB), but this search engine can also be used by others head-end components in order to offer a particular set of interactive services (broadcast or access via the broadband).

3.3 Event metadata input

Event metadata related to channels (satellite, digital terrestrial television, cable or IP multicast) can be provided by Press Agency or extracted from the stream received by the digital TV system before to make them available to the end user.

The MES has the ability to support event metadata related to on demand command when a broadband channel is available (on client side) for providing on demand services to the end user of the digital TV system. As an example, Video On Demand is a kind of multimedia on demand service, but radio, audio tracks, games etc ... are also part of this kind of services.

3.4 Internet Content Provider

The MES can be configured to enrich the event metadata received as an input, by implementing an automatic request / response process in order to get additional information for each particular item of the event list received.

Illustration:

- For each movie broadcast on a channel, the MES is configured to search for the movie picture provided by a particular Internet Content Provider. Then, the MES is able to download each poster in order to reference it in the event metadata before to publish it to the SI Management system. The poster file is provided to the SI Management system in order to broadcast it by a carousel containing all posters referenced by the previous process. An archive file could also be produced and cached on each STB if STB are equipped with sufficient storage area. In the details of the event on the EPG, the poster reference is used to display the image (either by retrieving it from the stream or from the local storage area).
- Based on the previous use case but the hypothesis is that the STB has also a broadband access. In this case, the MES only retrieves the poster URL, inserts this reference in the event metadata. On the STB, by browsing the EPG grid, the user can enjoy by having more details about the movie due to the fact that in addition to the regular textual SI information, the movie poster is displayed. The STB simply retrieves the poster image from the original web site from which the URL was grabbed.
- We extend the second use case: for Video On Demand content, the MES does not only retrieves the poster URL, but also a set of resources (referenced by URL) that can be consumed by the STB via the broadband link (gallery of pictures, trailer, making of, extracts, information about the actors, directors ...).

In fact, it is important to note that this automatic addition of metadata can be customized on the basis of the input source with several scenarios defined depending on the content type / category (getting more information about a sport event is different from getting more information about a movie).

Such an automatic process to enrich metadata can be done in an easy way by taking benefits of existing search facilities provided by Web sites and by defining in the MES the actions having to be performed in order to get additional information from such a content provider:

- By defining from the input metadata the list of criteria having to be used for performing the automatic search (title, category, year etc ... Combination of AND / OR is possible).
- By specifying the Content Provider used (URL). More than one Content Provider may be used for getting all the set of information for a particular item (ex. Trailer provided by Content Provider A while the Movie soundtrack is provided by Content Provider B).
- By implementing the query / response script to apply for getting said information. Most of the time, it shall be based on HTTP query / response mechanism with HTML page analysis for retrieving information. This step shall not be more detailed since it is easy to implement by someone skilled in the art.

Then, now, just imagine an Internet Content Provider hosting UGC published by any users. By using the mechanisms mentioned above, each of these users may be a contributor to the set of materials made available to the TV end user through his content guide. By selecting an event in the said TV guide, the TV end user can be made available with the option for getting related content, sourced by any users who contribute to the Internet Content Provider's list of content made available on the Internet.

3.5 Broadband Guide (ECG)

In this context, a broadband guide is made available on line (IP) for being accessed by user.

Such a guide could be (but not restricted to):

- An HTML application;
- A Flash™ (Macromedia) application;
- A Java application;

By using templates defined by the TV Operator, the MES shall generate in a dynamic way the broadband guide application by using event metadata, optionally enriched with Content Provider additional data, for building the final application executed by the user on the STB.

Such a guide could be hosted by an HTTP server in order to make it available on demand to the end user.

3.6 Multi devices considerations

Others devices, enabled to consume TV events, can also benefit of metadata enrichment. The previous sections have been illustrated with a Set Top Box but a mobile phone could be used. The search engine and the ECG are dynamic: they can support multi devices.