COMPETITIVENESS AND INNOVATION FRAMEWORK PROGRAMME

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DTV4All

D3.3 – First Phase Emerging Access Service Demonstrator

1. Introduction

A demonstrator for video signing solutions has been implemented based on the SAVANT system (FP5 IST RTD Project: Synchronised and scalable AV content Across NeTworks: http://dea.brunel.ac.uk/project/savant). This implementation of open video signing, using a hybrid broadcast/broadband DTV solution, was demonstrated at the European Ministerial e-Inclusion Conference 2008 in Vienna. It allowed users to change the position of the signer on the TV screen and the dimensions of the signer. However, the demonstrator will be improved upon until at the International Broadcast Conference 2009 (IBC), Amsterdam, where it is anticipated that broadcaster mix and receiver mix signing will be exhibited side by side by the DTV4All project so that it can clearly been seen that the quality of receiver mix signing is at least a good as broadcast mix signing while also allowing the user to customise the service.

1.1 Overview of Hybrid Broadcast/Broadband System

The video signing solution demonstrated in the DTV4All project is a hybrid broadcast/broadband service. The programme being signed is delivered over a broadcast network such as DVB-S (Satellite) and the video of the signer is provided on-demand over a wired broadband IP connection. An overview of the hybrid broadcast/broadband system is shown in Figure 1 below.

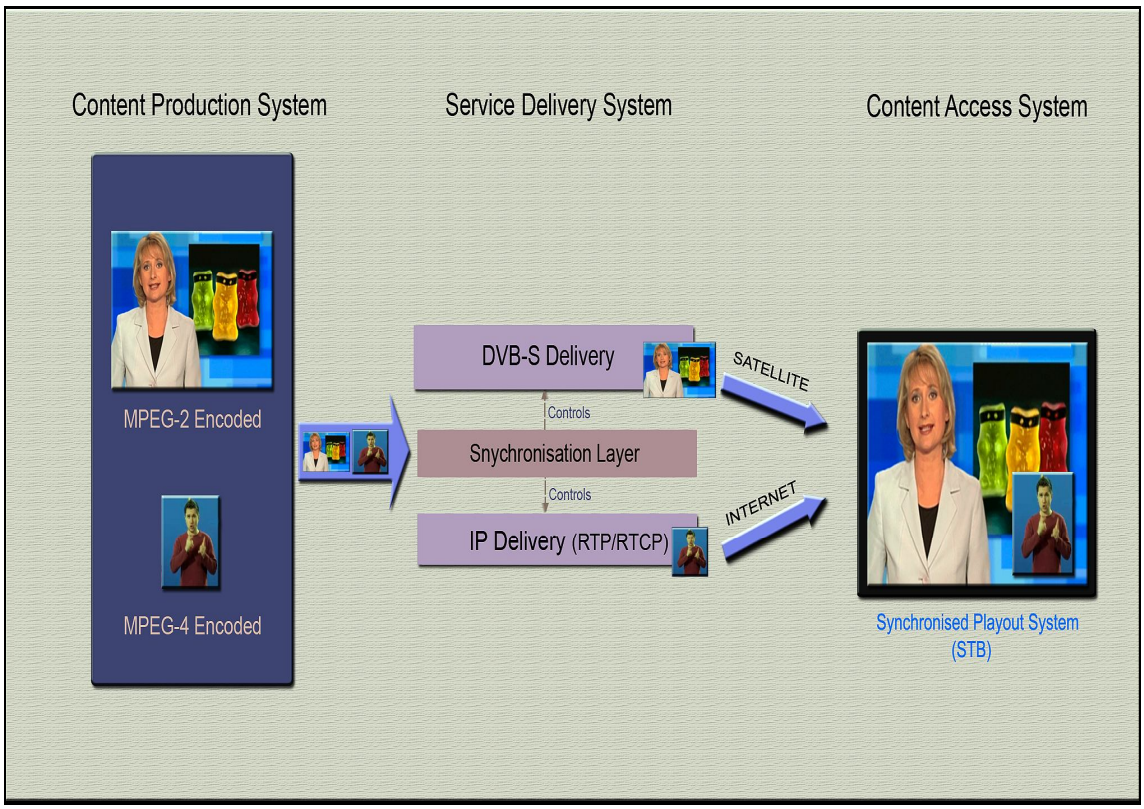

Figure 1: Overview of the Hybrid Broadcast/Broadband System

1.2 Motivation for Adopting Hybrid Broadcast/Broadband System

The hybrid Broadcast/Broadband delivery solution enables broadcasters to better utilize their bandwidth in a convergent digital television environment. Traditional digital television content delivery relies on a one-to-many broadcasting infrastructure. Consequently, content can not be targeted at a specific audience. Furthermore, in a bandwidth resource-limited broadcast network, it can be seen as inefficient to deliver content that will be utilized by only a small target population. Adopting a broadband/broadcast system addresses these issues. Access services such as open signing, where the video of the signer is smaller in spatial dimensions and complexity than the video of the programme being signed, can be encoded at a much lower bit-rate than the programme for which the access service is being provided. In the case of open signing, typically 128 to 512 kbit/s making it an ideal candidate for separate delivery over a wired broadband network. In contrast, if the main programme is a standard definition MPEG 2 video (625i25: 625 vertical lines, 25 frame/s with interlacing), where MPEG stands for Moving Picture Experts Group, it requires 2-3 Mbit/s. In a Broadcast/Broadband DTV system, broadcasters can chose the delivery mechanism used for a video service and, consequently have the ability to provide all users with a wider range of digital television services.

1.3 System Architecture for the Hybrid Broadcast/Broadband Delivery System:

The system architecture of synchronised Broadcast/Broadband delivery is outlined in Figure 2. The required components for the demonstrator were developed in the SAVANT project.

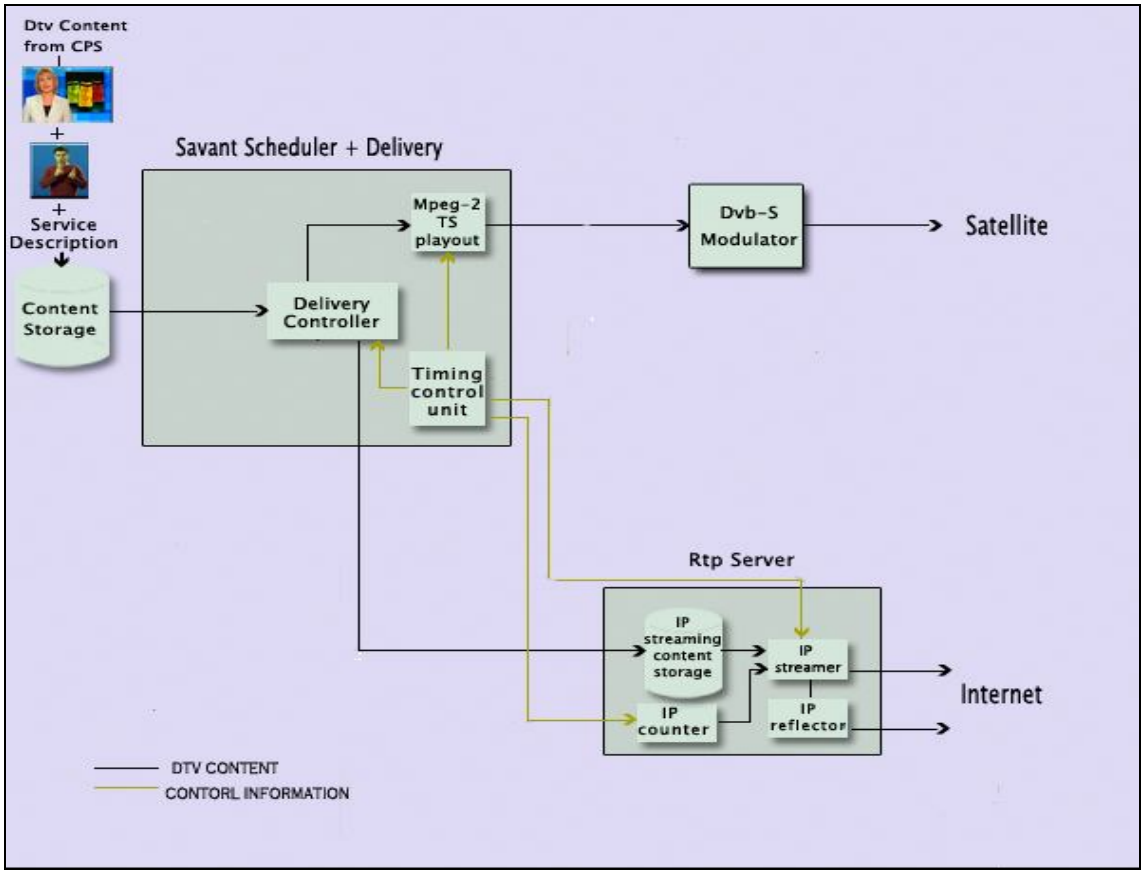

Figure 2: Hybrid Broadcast/Broadband Delivery System

The Content Storage stores all the media for each digital television service. This comprises a Digital Video Broadcasting (DVB) compliant transport stream for the main digital television programme, the sign language video encoded in MPEG4 part 2 or 10 using the MPEG4 container format and a service description (called service metadata) based on an extension to the TV-Anytime metadata standard. The service description links all the media elements/service components of the DVB service and holds the timing information required for synchronizing them.

The SAVANT scheduler is the central component of the delivery system. It schedules when all service components are to be delivered, according to the service description. It controls the

Real-Time Transport Protocol (RTP) streaming server and the internal DVB transport stream playout. It ensures the delivery of the digital television content starts at the correct time and that the content is presented with the correct timing. The component that is used for Internet Protocol (IP) delivery is a Darwin Server, which is an open-source streaming server that supports the MPEG4 standard. It has been extended to communicate with the SAVANT scheduler, primarily to receive the correct timing information for synchronized delivery.

1.3.1 Synchronised Playback at the Client End (STB)

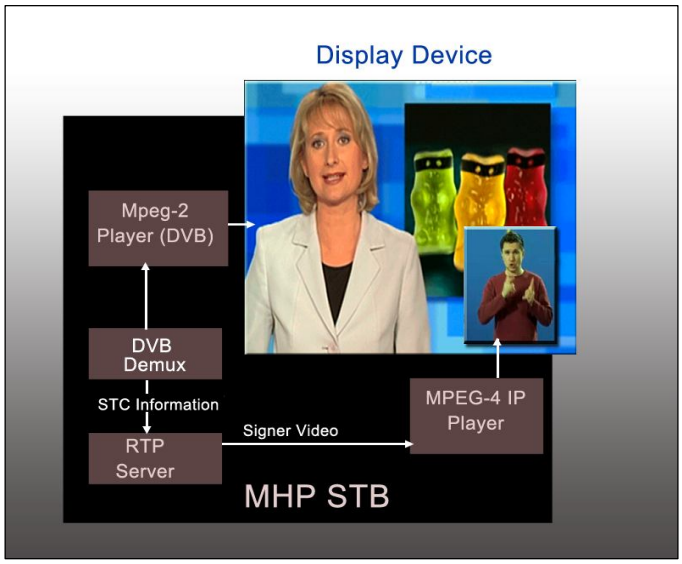

Figure 3: Client for the Hybrid Broadcast/Broadband System

The client is based on a DVB-MHP receiver implementation for Windows PCs; MHP stands for Multimedia Home Platform. It uses the MHP Application Program Interfaces (APIs) to offer a broadcast application for starting and controlling the sign language video. The receiver implementation has been extended with a media player for on demand IP content. The media player can be synchronized with the System Time Clock (STC) of the DVB transport stream. In the hybrid scenario, it is likely that the two streams will have a different transmission delay. Therefore, the receiver has to buffer one of the streams. The demonstrator simplifies this and sends the IP packets before the DVB stream so that the client is only required to delay the playout of the IP video. For the IP delivery, RTP is used to carry time stamps. The client uses the RTP timestamps as a presentation timestamp for the signer video and synchronizes it to the STC of the current tuned DVB service.

1.4 Equipment required to perform the demonstration

A demonstrator kit for the demonstration of receiver mix signing using the SAVANT system consists of the following equipment.

One PC running the server (including a DEKTEC PCI 107-SP modulator)
One PC running the client software (including a DVB consumer board, in this case Hauppauge Nova-S, which has to be compatible with the Microsoft BDA framework)
Cables: Power supply, network link, etc.

1.5 The functionality of the demonstrator

The demonstrator can be used to explore the following aspects:

User Interface	Auto-starting, manual start of the signer, etc.
Synchronization	What delays can be acceptable for the signer video
Video scalability	Size of the signer, position of signer video
Usability	Ease of use, responsiveness, etc.

Annex A: Picture of the Demonstrator Booth at the Vienna e-Inclusion event

Figure 4: The DTV4All booth at the e-inclusion event in Vienna

Annex B: Picture of the Demonstrator used at the Vienna e-Inclusion event

Figure 5: DTV4All demonstrator of receiver mix signing

Figure 5 shows the equipment used for the DTV4All demonstration of receiver mix signing using hybrid broadcast/broadband delivery at the Vienna e-Inclusion event. It comprises of a PC running the playout, a streaming server, and a second PC attached to the display shown in the picture running the receiver software. The 19" box at the bottom of the picture is a DVB-S modulator acting as a broadcast station, the output of which is fed into the receiver PC acting as a set top box. Not shown is the Ethernet connection between the two PCs.

