

EBU – TECH 3316



Monitoring of Access Services

Requirements, Developments and Recommendations

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Background

In early 2005 the European Broadcasting Union created Project Group P/MAS (Monitoring of Access Services) to study the technical monitoring of Access Services. The Chairman was Mr Andrea Gabriellini from BBC Research & Development and members came from CyBC, RAI, RTE, RBB, SVT and VRT.

Over a period from February to Decembers 2005 the Group gathered requirements, information on developments and formulated recommendations for the implementation of Access Services monitoring. Interaction with equipment manufacturers was part of the approach, and the EBU wishes to thank all participating vendors for their valuable contributions.

This document is meant as a concise guide for EBU members to help them implement or improve the monitoring of Access Services.

Monitoring of Access Services

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1. Introduction

It should be noted that this report deals only with Access Services that are carried on digital broadcasts. Four distinct Access Services are considered in this report: subtitling, spoken subtitling (see Appendix A), audio description (see Appendix A) and signing.

1.1 Why monitoring?

In its final report [1] the EBU P/AS Group (Access Services) included the following recommendation on monitoring:

The EBU should investigate Access Services monitoring

The monitoring of Access Services is often an afterthought. There seems to be room to study this topic together with manufacturers. The EBU is advised to consider starting a group on this topic.

One may ask why this topic is regarded as important to broadcasters. At least three reasons may be provided:

1. For viewers and listeners who rely on Access Services, their reliable delivery to the home receiver is particularly important. Any unexpected absence of an Access Service therefore significantly reduces the enjoyment of the viewer or listener, leading to dissatisfaction and to complaints to the broadcaster or service provider¹.
2. Frequently, the relevant Access Service is provided only for a small proportion of programmes, in which case a failure affecting just one programme has an even greater impact. If the intended proportion represents a regulatory quota then that one failure can cause considerable embarrassment to the broadcaster or service-provider.
3. When there are regulatory requirements to carry an Access Service the regulator may also require the broadcaster or service-provider to take steps to reduce the incidence of delivery failure.

Responding to customer and/or to regulatory complaints² is an expensive and non-productive overhead. Executive monitoring of Access Services, particularly where it leads to prompt action to

¹ Such an absence might be caused by a failure to meet a delivery deadline (e.g. a master tape arriving too close to transmission time to allow authoring of subtitles) or by equipment failure in the broadcast signal distribution chain.

² Members remarked that for the audience, broadcasters are the 'obvious' point of contact in case of problems with using Access Services, even if the problems are caused by e.g. incompatible set-top boxes.

rectify a fault, is therefore a better long-term investment. As a useful by-product reliable monitoring could also provide statistics on the volume of Access Services delivered.

1.2 Quality control, monitoring and logging

Three distinct phases in the monitoring of Access Services may be distinguished; quality control, real-time monitoring and logging.

By **quality control** we refer to the off-line process of ensuring that Access Services meet the broadcaster's quality standards.

By **real-time monitoring** we refer to a set of tools and processes aimed at constantly observing the presence and quality of a service and capable of promptly reporting failures to all interested parties. Corrective actions may be triggered by a monitoring system in case of failures; such actions may be automated or carried out manually.

Logging is also concerned with the presence and quality of a service but it only aims to record the state of a service for later use. Logging may be required for several reasons, such as legal requirements (meeting quotas), managing contractual boundaries ("it was fine leaving me") and fault analysis after the event.

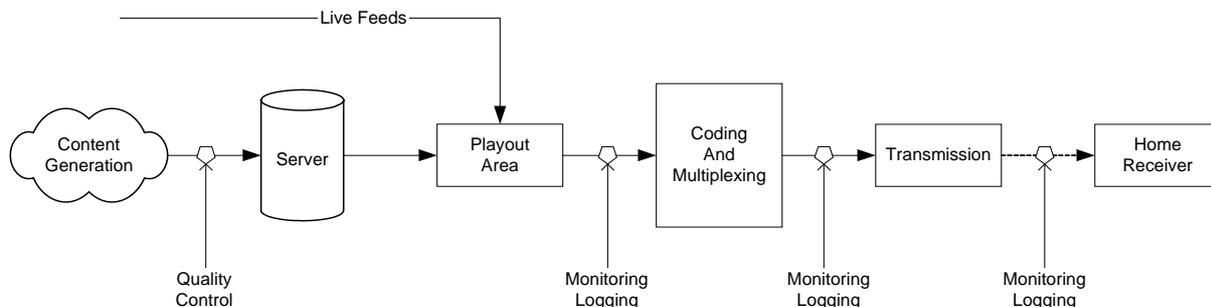


Figure 1- Simplified diagram of the digital programme chain

Figure 1 presents a simple programme chain for digital TV. An actual implementation may differ by having additional stages before transmission (e.g. a local playout server with its own presentation suite and coding and multiplexing stage) and by having an additional distribution stage.

It should be noted that ensuring that the signal being transmitted is "correct" does not ensure that the service enjoyed by the viewer/listener will be fault-free as this may be affected by other factors, such as local reception and the make and software version of the receiver. This document will not consider the monitoring of the signal as received by the viewer/listener, i.e. as output by the home receiver. In an open environment where the broadcaster or multiplex operator has no control over the receivers being used by the viewers/listeners all that can be done is to verify the compliance of the transmitted service to the adopted standard.

Figure 1 highlights some monitoring points where it would be desirable to observe the state of the system. These may coincide with contractual boundaries (e.g. one company may be in charge of the playout area, whilst another may be responsible for the technical area, including coding and multiplexing. Yet another company may be responsible for the transmission). They could therefore be ideal places to probe and record the state of a service managing the service level agreements.

Figure 1 also shows that quality control only applies to pre-prepared Access Services (live content can only be monitored in real-time).

2. Requirements

This chapter aims to identify the functional requirements for quality control, monitoring and logging of the four Access Services. A monitoring system consists of tools and processes.

2.1 Common requirements

Some requirements are common to all Access Services (spoken subtitling, subtitling, audio description (AD) and signing) and will be listed first. Only closed versions of signing will be considered in the following.

2.1.1 Quality control

- [Req. A -1] Verify that the correct content is loaded on to the server, e.g. the right subtitles for the programme.
- [Req. A -2] Verify that the content complies with the adopted technical standards prior to ingestion (e.g. STL file without illegal characters).

2.1.2 Monitoring

- [Req. A -3] The monitoring system must be able to generate alarms on pre-defined service failures and these alarms must be available in the technical area that is responsible for it (e.g. a failure of the playout server should be promptly notified to the technical staff in the presentation area).
- [Req. A -4] Open, standardised alarm reporting must be used. This does not preclude the manufacturer from offering additional, proprietary solutions.
- [Req. A -5] Identify the presence of the service in the signal. Note this applies to the signal at various monitoring points, as illustrated in Figure 1.
- [Req. A -6] Verify that the correct content is played out (details for each service are given below).
- [Req. A -7] Identify presence of unintended Access Services
- [Req. A -8] Verify that * MERGEFORMAT [Req. A -5], * MERGEFORMAT [Req. A -6] and [Req. A -7] are satisfied for the entire duration of the programme.
- [Req. A -9] Error messages should include clear information on the cause of the fault and/or how to rectify it.
- [Req. A -10] Verify compliance of the stream carrying the service to the adopted standard (e.g., DVB subtitling).
- [Req. A -11] Regional variants of the same service should be monitored distinctly

2.1.3 Logging

[Req. A -12]	If parts of the digital stream are recorded (e.g. for legal requirements, complaints checking, service level agreements) then the Access Service components should also be recorded.
[Req. A -13]	Record the presence of the service (desirable on a programme basis)
[Req. A -14]	Record faults as identified in the monitoring sections of this document ([Req. A -5], [Req. A -6], [Req. A -7], [Req. C -2]).
[Req. A -15]	The format of the logged data should allow for the generation of service availability reports (on a programme and time basis)

2.2 Subtitling

2.2.1 Quality control

[Req. B -1]	Verify correct timing of the subtitles a. Synchronisation to the spoken word b. Synchronisation relative to shot changes c. Duration; on screen long enough to be readable but not longer than intended
[Req. B -2]	Verify that time-code overlaps do not exist (preparation stage).
[Req. B -3]	Verify that overlapping subtitles do not occur between services (in case of open and closed subtitling both being provided for the same programme).
[Req. B -4]	Ensure that the length of the subtitle lines is within limits.
[Req. B -5]	Ensure that only supported characters are used.
[Req. B -6]	Ensure that the font style and size are easily readable (where applicable, eg. DVB Subtitles)
[Req. B -7]	Verify that on-screen position of the subtitles is correct.
[Req. B -8]	Verify that colours are used correctly.
[Req. B -9]	Verify that the allowed number of lines is not exceeded.
[Req. B -10]	The content of the subtitles script must be validated prior to broadcast. Possible checks: indecency, watershed. Note that the same programme may be broadcast twice (or more) and the content must be validated against the requirements of all intended time slots, not just the first.

2.2.2 Logging

[Req. B -11]	Log timing of subtitles as transmitted relative to the original file.
[Req. B -12]	Log the position of the subtitles as transmitted.
[Req. B -13]	Log transmission of unsupported characters.
[Req. B -14]	Log all captions including colour information (character-based captions only).
[Req. B -15]	Log number of lines simultaneously on screen.

2.3 Spoken Subtitling

2.3.1 Quality control

[Req. C -1] Identify the presence of words not included in the dictionary prior to ingestion.

2.3.2 Monitoring

[Req. C -2] Verify the correct timing of the spoken subtitles relative to the subtitles.

2.4 Audio description

2.4.1 Quality control

[Req. D - 1] Verify correct timing of audio description (for receiver-mix AD only):

- Synchronisation of audio description and main programme sound.
- Verify that the main programme sound is faded down if a fade is necessary.
- Verify that the speed of the fade control signal is within recommended limits.
- Verify that the level of the fade control signal is as recommended.
- Verify that the speed of the pan control signal is within recommended limits.

[Req. D - 2] The content of the audio description script must be validated prior to broadcast. Possible checks: indecency, time watershed suitability. Note that the same programme may be broadcast twice (or more) and the content must be validated against the requirements of all intended time slots, not just the first one.

2.4.2 Logging

[Req. D - 3] Log timing of audio description (for receiver-mix AD only):

- Synchronisation of audio description and main programme sound.
- Verify that the main programme sound is faded down if a fade is necessary.
- Verify that the speed of the fade control signal is within recommended limits.
- Verify that the level of the fade control signal is as recommended.
- Verify that the speed of the pan control signal is within recommended limits.

2.5 Signing

Although closed signing has not yet been deployed it is included in this document because common video signal monitoring covers the monitoring of open signing. Thus the following requirements apply to closed signing only.

2.5.1 Quality control

[Req. E - 1] Verify that the signing stream is correctly timed relative to the video stream.

[Req. E - 2] The content of the signing programme must be validated prior to broadcast. Possible checks: indecency, time watershed suitability. Note that the same programme may be broadcast twice (or more) and the content must be validated against the requirements of all intended time slots, not just the first one.

2.5.2 Logging

[Req. E - 3] Log the start of the signing stream relative to the main programme

3. Current practice

In order to further the understanding of the monitoring systems and processes currently in use amongst national broadcasters, 21 EBU members were asked for their current practices. The questionnaire was not limited to digital services. The technology and processes used could probably apply to both digital and analogue services. The results are summarised below.

3.1 Deployment of Access Services

Please note that currently there is no Europe-wide register of the type and amounts of Access Services provided by public broadcasters.

The EBU Strategic Information Service (SIS) is considering including Access Services information in their yearly statistics documentation. The results below are based on the P/MAS Group's limited research. The amounts in brackets indicate the proportion of respondents to which the condition applies.

- Subtitling has an almost universal use. (18/21)
- Signing is also very popular. (14/21)
- Audio description and spoken subtitling are rare. (only used in a few countries)

For a better understanding of the quantitative differences between the services provided, see [1], page 52 and further.

3.2 Monitoring of Access Services

Regarding the process of monitoring, the following picture emerged:

- Monitoring of Access Services is predominantly a manual task.
- Subtitling monitoring typically consists of occasional (e.g. at least at the beginning of a programme) checking of the presence of subtitles, typically:
 - before transmission during preparation/ingest
 - during transmission based on the off-air signal
- Audio description and spoken subtitling are typically checked off-air using a standard receiver.
- Signing is currently broadcast in open format (i.e. always on-screen) and thus monitored by the standard video monitoring tools and processes (no special checks).

It should be noted that the actions arising from alarms due to failures in the delivery of subtitling could vary depending on the type of subtitling service. The presence of translation subtitles is fundamental to the enjoyment of a programme and therefore a failure to deliver the service results in executive action (e.g. the restart of the programme). Subtitles for the deaf and hard of hearing, however, do not attract the same measures and their failure usually does not result in taking steps that could affect the programme video and sound.

3.3 Awareness of monitoring products/services

The 21 broadcasters were also asked about their knowledge of monitoring products or services aimed at Access Services. In summary:

- The awareness of products that could (help) monitor Access Services is low. Only two broadcasters mentioned a system, one of these had been developed in-house.

- In general broadcasters reported not being aware of other monitoring efforts in their country, except for occasional feedback from the sensory impaired audience.

4. Products & developments

The general perception regarding monitoring of Access Services is that broadcasters have not committed enough resources to this area to allow for the development of suitable products. Access Services are not seen as money-generating services and therefore the budget that broadcasters allocate to their provision is proportionately small. The limited budget prevents manufacturers from developing financially viable products.

Another issue flagged by manufacturers is the fragmentation of the market for Access Services; each broadcaster has different requirements on how to monitor their Access Services and this increases the development cost of any monitoring tool.

The traditional subtitling equipment manufacturers are providing some monitoring functionality for Access Services in their main products such as prep-stations and inserters. As the market for these products can also be regarded as a niche market, it has proven difficult to market these monitoring products stand-alone. An exception may be products aimed at providing compliance recording, where, increasingly, complete bitstream recording is provided as a stand-alone product or as an add-on to subtitling logging tools.

In terms of system integration the most-popular interface is GPI (General Purpose Interface). SNMP (Simple Network Management Protocol) seems to be far less popular among European broadcasters.

5. Recommendations

The audience for Access Services is inevitably growing as a result of population ageing. The regulatory regime is becoming stricter in many European countries. Programme chains are becoming more fragmented and this requires broadcasters to manage the contractual boundaries. Broadcasters should consider monitoring Access Services for the following reasons:

1. To ensure audience satisfaction
2. To meet regulatory quotas
3. To manage contracts and service level agreements (SLA)

Design monitoring in from the start.

When planning the deployment of an Access Service consider the monitoring requirements (e.g. making a reference signal available at multiple points across the programme chain).

Distinguish the three following monitoring processes;

1. Off-line quality control - prior to content ingestion
2. Real-time monitoring
3. Logging

Perform quality checks off-line

Perform these prior to ingestion on to the final server, as this is the most cost-efficient approach (not affected by real-time constraints, more extensive checks can be performed).

Adopt open standards wherever possible

E.g. for alarm reporting.

Consider recording the entire off-air digital stream,

including video, audio and the components carrying Access Services. This allows analysing the signal as received by the viewer/listener's equipment and can provide compliance recording.

The EBU should investigate the signalling of the presence of Access Services.

Currently the presence of Access Services is not consistently signalled in the EPG/service information making the monitoring of Access Services more difficult.

Bibliography

[1] EBU I44-2004 Access Services, EBU, Geneva, October 2004, available from www.ebu.ch/en/technical/

Appendix A: Definitions of Access Services

A.1 Spoken subtitling

In some countries where a substantial (e.g. 30%) part of the programming is in a foreign language, synthetic speech is generated automatically from translation subtitles. This makes the material accessible to persons who have difficulty reading the subtitles (e.g. visually impaired and dyslexia sufferers). This service is commonly called 'Spoken subtitling' or 'Audio subtitling'.

The potential audience in Sweden for example, is estimated at 10% of the population (1 million persons), while in The Netherlands about 5-10% of the population could benefit from this service (0.8 - 1.6 million persons). Similar potential audiences probably exist in other countries.

Spoken subtitling consists of providing synthetic speech to the audience, based on textual subtitles. In principle the speech synthesizer could either be at the broadcaster's side or with the consumer, although in practice the broadcaster's side is preferred. Here, subtitles are automatically converted to computer-spoken text and then sent as audio (possibly encoded for technical reasons as 'MP3', for example) to the consumer. The consumer uses a decoder to recreate the synthesized speech and listens to it via a headphone, speaker, etc.

A.2 Audio description

Persons with visual impairments (including the unsighted) can still enjoy television, particularly when the visual elements are described for them, and communicated through an additional audio channel using 'Audio description'.

Audio description has other applications, too, for sighted people, such as providing teachers with additional information during educational programmes, or for those who simply want to 'watch' television without looking at the screen - imagine ironing a shirt during a favourite programme.

Audio description is a way of describing as clearly, vividly and succinctly as possible what is happening on-screen in the silent intervals between the dialogue or the programme commentary.

Most television programmes rely on visual content and pictorial composition to tell their story. Audio description is an ancillary component associated with a TV service which delivers a verbal description of the scene or of the action as an aid to understanding and enjoyment particularly (but not exclusively) for viewers who have visual impairments.

Audio description has two functions: it primarily provides the necessary information to understand a programme, but also, where time allows, to allow the visually impaired to better appreciate the subtleties of the programme, hopefully making it as interesting as for the sighted.

Note the difference with spoken subtitling, which basically provides audible translation subtitles only and no scene descriptions, etc.

A.3 Closed signing

"Closed signing" is an elective signing service in which the viewer can decide whether to activate the service or not. Currently two main different technologies are being investigated to deploy this service: avatar and additional video component.

An **avatar** consists of a graphical representation of the signer that the viewer can enable. All the relevant gestures and expressions of the signer are captured in a studio and broadcast as a set of instructions to a software tool resident on the home receiver. The software tool generates a synthetic representation of the signer based on the set of instructions received.

The **additional video component** approach is very similar to the current open signing service. The only difference is that the mix of the two video signals, main programme and signer, is carried out in the home receiver rather than before broadcast. As for the avatar approach, the viewer can enable the display of the video signal carrying the signer overlaid on top of the main programme video. The position and size of the signer can either be fixed or customisable by the viewer.

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