

# In and out of sync

Lip-sync is a difficult and elusive issue, a broadcast gremlin, if you will. But, with a little diligence and a good deal more persistence, a sync problem can be identified and eliminated. DENNIS BAXTER



On several occasions, Zenon has asked me to address the issue of audio-video sync — better known as lip-sync in broadcasting. Honestly, I've always hesitated because I'm not viewing the same signal and feeds that he is or you are. But, with his latest urging, I thought I'd give it a shot and pick up where John Watkinson left off in one of his columns.

Consider this: in nature, light travels many times faster than sound, so the associated sound lags behind the visual event just like in a storm — the sound of thunder lags behind the lightning strike. As human beings, we can accept a certain degree of audio lagging behind the video because it is what we experience in nature. However, in broadcasting, it is just the opposite. Video lags behind the audio because the video is subjected to greater processing delay than the audio.

Lagging or leading, lip-sync is one of the most annoying issues in broadcasting today. The problem has been studied by many industry groups that have analysed and made recommendations in four areas:

1. Acquisition, production and postproduction process
2. Distribution facilities and systems
3. Local and regional broadcasters
4. Home receiver.

Synchronisation problems may be introduced or exacerbated in all these areas of the signal chain. Sync begins in the origination process and is where the field audio practitioner must be diligent under difficult circumstances. The audio can begin to slip between the camera and microphone because of frame synchronisers, analogue to digital convertors, wireless microphones and even in the audio and video mixing desks. Digital equipment has latency issues and certainly the proliferation of digital processing equipment in broadcasting has compounded the problem.

Final distribution to the home viewer by terrestrial transmission, land-based cable or home satellite dish relies on a heavily compressed signal (bit-rate reduction) to facilitate delivery. Clearly, compression and decompression, format conversion, and transmission time are some of the causes of latency and audio-video sync issues.

During transmission, synchronisation is the most stable and predictable aspect of the signal chain because MPEG encoding and transport systems allow perfect synchronisation between the audio and video elements of the programme by using a 27MHz

master clock. However, during local and regional distribution, additional programming and commercials are inserted that create a stitched-together frame-by-frame situation where the audio is often ignored.

The delay put in by a single frame synchroniser isn't sizeable. Often the audio would not get a compensating delay and nobody noticed. But as systems get more complex and the signal chain includes frame synchronisers, digital video effects, virtual video overlay, standards convertors and even the video switcher, all of those negligible delays add up to the present lip-sync mess.

The International Telecommunication Union (ITU) strongly recommends monitoring for sync coherency during the various stages of the production and distribution process and to make corrections, where required, to deliver audio-video synchronisation to the viewer. But one of our most accurate monitoring tools for lip-sync has been discontinued — at least at an affordable price.

The cathode ray tube (CRT) video monitor was the standard for reference monitoring since the 1940s and is the most accurate indicator of the integrity of a television picture — including the synchronisation of the audio and video. All LCD monitors have built-in latency issues because of frame buffers and deinterlacing which must be done before displaying video. As LCD screens grow in size, synchronisation becomes more of a problem. Frame buffer and deinterlacing latency can vary from as little as a few ms all the way up to 100ms. In fact, some displays have added audio delay to match the video to avoid lip-sync issues.

What is the solution? Diligent and accurate monitoring until monitoring and time adjusting hardware and software is developed that can accomplish the shifting automatically. Additionally, faster processors are needed to reduce the latency to at least a couple of frames. More equipment and fewer people — right. But are we going backwards with fewer qualified technicians to make qualitative decisions?

I am sorry to say I waited anxiously for the French Open 2010 to see and hear if, for the third year in a row, the audio and video were out of sync. In the US, I was not only disappointed, but astonished and puzzled; only some of the elements of the feed I was watching were out of sync. For example, the sound of the ball lagged the video, but the on-camera view of the presenters was in perfect sync. The venue sound lagged behind the picture during the entire event.

Why? Maybe the synchronisation validity tests were within acceptable tolerances, but through standards conversion of the sports video and insertion of the commentators something happened. Or maybe the audio and video were in sync leaving the OB van in Paris, but became out of sync during the transmission path to master control. Or perhaps the problems occurred during routing the signal around the facility. I'm trying to understand, but at the same time, I have to believe that if someone, somewhere was really watching and listening, they would have figured out there was a problem.

There are solutions. But it requires a level of expertise, attention to detail and dedication to quality in broadcast production that, unfortunately, is becoming as elusive as the fix for lip-sync itself. ■