How good are your video encoders?

A demonstration of video quality.

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Introduction

Not all video encoders and decoders are made equal, and with the advent of the new H.264 video compression algorithm the difference between various manufacturers' Video Encoders/Servers is becoming more apparent. We take a look at COE's new X-Stream video servers, and see how they compare to the biggest competitor in the market.

Video encoders are becoming more and more popular thanks to the rise in IP based security systems. By offering a way of converting analogue CCTV devices into fully fledged IP products, it has become a far more cost effective route into IP security for many end-users. But what is going on in that little box your camera is plugged into, and how well is it doing its job?

A video codec is essentially a device for converting analogue to digital, or more specifically an IP friendly video stream. This process involves compressing the encoded video stream, as an uncompressed video stream is incredibly bandwidth intensive. This means a 'lossy' data compression algorithm is utilised to cut down the amount of network bandwidth and storage space that is required. This brings us to the first comparable specification between different manufacturers' encoders for determining quality; the compression algorithm.

In recent years it was deemed that MPEG-4 compression was the best solution for streaming video - such as videos over the internet and CCTV over a closed network. At the time, this was true, a high quality video stream with an acceptable impact on network resources - it was the ideal solution. In the past two years though a new standard has emerged as a far superior solution, and it has all come to our attention thanks to High Definition TV and Blu-Ray video discs. The new format, most commonly known as 'H.264', but to give it's full name - 'H.264/MPEG-4 Part 10 AVC' - offers much improved image quality, high resolutions and significantly reduced bandwidth requirements. So the future clearly lies with H.264, and any encoder manufacturer not offering this has failed our first test!

This improved performance comes at a cost though, and that is increased processing requirements on-board the encoder. The number crunching required to produce these streams increases exponentially with the rise in resolution and image quality, highlighting potential performance issues with the manufacturer's choice of DSP ('digital signal processor') and their ability to extract the best performance from the DSP. We are going to show you the results of an encoder test shortly, that clearly demonstrates the difference between two popular encoders. Be prepared to be surprised.

The Test

Video encoders are impossibly complex devices, and choosing the best performing devices is far more difficult than expected - be aware of manufacturers stating various numbers and stats on their datasheets - the only way to really understand and appreciate a high quality, high performance codec is to see one working. So let us take on that task for you - what follows is a practical demonstration of video quality and bandwidth utilisation between two comparable encoders.

The test is a comparison performed between a COE X-Stream 400 4 channel encoder vs. Bosch VIP X1600 4 channel encoder.

- An analogue video source is split and fed into the two video encoders, ensuring their inputs are synchronised.
- The encoders are configured to have comparable setups, ensuring the test fairly compares one to the other - H.264 compression is utilised, with a full resolution of D1 (720x576 pixels) at 25 frames per second. Video quality settings are adjusted to their maximum on both encoders.
- The resulting video streams are routed over the same network, through the same switch to ensure there are no variables in the environment.
- These video streams are compared side by side on a client PC.

Look out for the following indicators:

- Image Quality - do the video streams look as good as each other?
- Resolution - is the output resolution correct?
- Video Latency - both encoders have a fair and equal number of steps to go through to get the images to our screen, but do they do arrive at the same time?

Visit the COE X-Stream 400 product page here

Visit the Bosch VIP X product page here

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The Results

The COE X-Stream is the image on the left, Bosch VIP on the right. Firstly, notice the green bar on the right of the Bosch VIP image? That is caused by the output video stream not meeting the requirements for full D1 resolution, even though it has been configured to output D1. Upon closer inspection it is clear the output is in fact 4CIF resolution - 16 pixels too small on the horizontal plane.

Now have a good look at the image quality. The Bosch VIP output is far less crisp, and far less vibrant than the COE X-Stream. Look closely at the standing water on the ground, the door handles and the wheels on the car, to really see the difference in video quality. After further testing, and by dropping the resolution of the COE X-Stream to try and match video quality, we discovered the Bosch VIP appeared to be encoding images at 2CIF resolution then up-scaling to 4CIF, meaning a 51.1% reduction in unique pixels compared to the COE X-Stream.

Lastly, notice the road cone behind the car on the COE X-Stream image on the left? Why is it not there on the Bosch VIP image on the right? Simple, the COE X-Stream has a far superior DSP implementation and H.264 algorithm which results in much lower latency - the Bosch VIP is actually running a few frames behind the COE X-Steam.

Conclusion

So what can we conclude from this test? Encoder quality is all about the quality of the DSPs used, the quality of the compression algorithm and the implementation of the two together. COE have clearly developed a far superior implementation to the other leading manufacturers which results in a better image quality, full resolution output, reduced bandwidth requirements and reduced latency video stream - all markers of a great video encoder.

Lastly, you should never compare encoders by the performance figures quoted on the datasheet. Always test and review encoders before buying them to make sure they really can do what they promise.

If you would like to do your own tests with the COE X-Stream why not take a FREE 30-day loan of an X-Stream video server to trial? Call the Comms Centre sales team on 01634 291191 to arrange your loan unit. You can also download the latest data sheets at http://www.commscentre.com

You can also download a FREE copy of the COE I-Command software package to try, compatible with most of the leading manufacturers' IP cameras and video encoder products, at http://www.coe.co.uk

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