

Slimming cure for digital videos

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The future, high-speed DSL lines will no longer be the sole preserve of computer users. The TV set will also become a multimedia device, capable of downloading videos for instant viewing via telephone cables. Up until now the required data volumes have been too large for transmission with good picture quality. Researchers from Siemens and MainConcept have now developed a system applying the latest video standards to compress the huge streams of video data.

Mobile telephony is already so popular that a sizeable proportion of telephone traffic in Germany is no longer conducted from an indoor telephone, but from a cell phone away from the home or office. This is a good reason for the telecommunications companies to look for new ways of using the fixed network. One technology that looks likely to become established over the next few years is so-called home entertainment systems. The idea is to connect the television set to the telephone line by means of a supplementary device, the set-top box, thereby transforming it into a multifunctional device. Users will be able to call up Internet pages by remote control without any programming or computer knowledge whatsoever, conduct video telephone conferences or call up videos. The last of these functions, video-on-demand, looks particularly promising. It would make visits to the video rental store a thing of the past. Instead, you'll be able to watch your favorite film on the Internet over the telephone line simply by pressing a button on the remote control. The charge for watching the video would then be billed conveniently with your next telephone bill.

Up until now, however, the transmitting of videos has been a problem.

Not even the high transmission performance of DSL connections is good enough to transmit the large volumes of video data to the television set fast enough to generate an acceptable picture. A compression standard (known as H.264 or MPEG-4 AVC) that halves the data volume of the digital video compared with that of digital television (DVB) does in fact exist, but to date no one had succeeded in transforming the new standard into a fully functioning DSL-compatible product. Developers at Siemens Corporate Technology (CT) in Munich have now come a crucial step nearer to achieving this goal. Together with MainConcept, a company based in Aachen, Germany, the experts developed a system that converts video images into space-saving data packets with the new compression standard, sends these packets over a DSL line efficiently and converts them back into a smooth-flowing video image on the television.

The usual transmission technique used for videos is the established MPEG-2 method, which is used, for example, in the new digital television system between the transmitter and indoor antenna. The data zooms through the air at an average rate of 4 megabits (Mbit) per second (that's four million bits). By way of comparison, one letter in an e-mail contains just eight bits. For digital television channels that sort of data rate would be child's play. The DSL connection on the other hand can generally handle only about 2 Mbits per second. The object of the Siemens researchers was therefore to stay below this limit since they also use the MPEG-2-standard, although only as a vehicle. An MPEG-2 signal thus consists of a transport stream and an information stream. The information stream carries the audio and video data, while the transport stream contains the information for synchronizing the audio and video data. The researchers have succeeded in replacing MPEG-2 with H.264 within the information stream while leaving the MPEG-2 transport stream unchanged. "We began by looking for existing software for H.264 compression and analyzing it," said Marcel Wagner, project leader at CT. The team then had to load an MPEG-2 transport stream with H.264 video data, which posed a major challenge. The problem is

that the data volume of a video signal changes constantly. With moving scenes, for example, a large number of picture elements change at once, and the data volume increases. The data volume for still pictures, on the other hand, is relatively small. “Our object was to generate a uniform data stream despite these fluctuations, or in other words to pack the data into equal sized packets, as it were, and send them off at equal intervals,” said Wagner. “At present there’s no other solution available on the market that can do that.” Apart from the H.264 expertise, it was mainly the relevant experience with MPEG-2 transport streams that gave the Siemens developers the crucial lead over other companies. This expertise allows the video bits to be slightly time-shifted without this change being perceptible to the human eye. In this way, it’s possible despite fluctuating image data volumes to generate consistent data flows that can be transmitted over the existing DSL infrastructure without great problems. Together with a new set-top box developed by Siemens that can decode the H.264 standard, the digital information can be reassembled into a smoothly moving picture on the TV set.

Source: Siemens

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