Researchers developing faster video streaming

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Combined with LTE functionalities HEVC enables faster video streaming. Credit: Fraunhofer HHI

In the smartphones and tablet era, more and more users are watching videos on the move—with a resulting strain on mobile networks. The combination of the HEVC video compression standard with LTE brings networks welcome relief.

Whether on a long train journey, sitting in a cafe or lounging at home on the sofa, smartphones and tablet computers allow us to watch videos anywhere and at any time. As convenient as this development is for users, it also throws up some problems. Because the downloaded video files are usually very large, they are increasingly putting too much strain on mobile phone networks. There is a reduction in image quality and videos take a long time to load. Sometimes users are even forced to take breaks while watching videos, because data cannot be downloaded fast enough.

New types of data transfer are needed if networks are going to be able to cope with this onslaught. And this is exactly what researchers at the Fraunhofer Institute for Telecommunications, Heinrich Hertz Institute, HHI in Berlin are working on. "We are combining the new LTE mobile communication standard with the HEVC video compression standard, taking the best parts from both technologies," says Dr. Thomas Schierl, group manager at the HHI. But what exactly lies behind these shiny new acronyms?

LTE mobile communication standard

Cell phone calls, websites, and videos are currently transmitted using the UMTS standard. However, LTE, which stands for long-term evolution, is now replacing UMTS. If for instance an iPhone is displaying a "3G" connection, this means it is using UMTS. In future, connections are set to become faster: then 4G or LTE – depending on the provider – will be displayed. Initially, LTE achieves speeds of 100 megabits a second. Future rollouts will see speeds rise all the way up to 300 megabits a second. By comparison, the maximum UMTS speed is 28 megabits a second. As a result, tablet computers using LTE can load content about three to four times faster. This is particularly interesting for rural areas, where the cells of networks are so large that data rates are often scarcely sufficient to download videos or other large files to mobile devices.

Not only do LTE networks transfer videos and other volumes of data faster, they also have shorter time lags. This is particularly important for video conferencing, where participants do not want to sit waiting for the response of their dialogue partner to be transmitted. "LTE allows resources to be distributed to users of mobile services in a very flexible manner," says Thomas Wirth, group manager at the HHI. "In addition, new protocols carry information about the application being used, which makes it possible to further optimize transmission."

To deliver videos to mobile devices at even greater speed, researchers are integrating LTE technology, which is fast in its own right, with the High Efficiency Video Coding (HEVC) video compression standard. Researchers at the HHI have developed important technologies for HEVC together with well-known electronics manufacturers.

The advantage of HEVC is that the standard requires only half the bandwidth for high-quality video transmission, which means it can serve twice the number of devices as the previous H.264/MPEG-4 AVC standard. But how does it manage this? "A lot of concepts have been taken over from H.264 and systematically improved," says Schierl, group manager for multimedia communication at the HHI. "One example is block size: whereas H.264 breaks up the image to be transmitted into blocks with a maximum size of 16 x 16 pixels, HEVC has much greater flexibility as regards choosing the maximum block size – from 16 x 16 all the way up to 64 x 64 pixels. Larger blocks enable significantly greater coding efficiency, especially for videos in high definition (HD)." For instance, if an object within a video moves, this movement can be described. Video compression standards calculate motion information for each block. This information is typically transmitted once per block. On account of the significantly greater block size capacity and flexibility with HEVC compared to H.264, there is a corresponding decrease in the amount of motion data required.

"The combination of the two standards will transform user behavior," says Schierl with conviction. "Today's mobile Internet is faster than the typical DSL connection people have in their homes, which means a lot of users will choose to go online via LTE even when at home." The researchers will be presenting their innovation, which should be operational in a few months' time, at the Mobile World Congress in Barcelona from February 25 to 28 (Hall 7, Booth D60).

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