Intervehicle communications data collection

The Internet Media Group at the Politecnico di Torino, Italy, led by Prof. Angelo Raffaele Meo and Prof. Juan Carlos De Martin, focuses on multimedia processing and transmission research. As interdisciplinary as required by modern technology and services, the group studies advanced techniques for applications such as streaming, videoconferencing, voice over IP and online gaming - for wired, Wi-Fi, cellular, mesh, ad hoc and intervehicular networks. The Internet Media Group directly contributes to both the free software and the free culture movements. For more details, please refer to http://media.polito.it .

Currently, intervehicle communications are gaining more and more interest by the automotive industry, which is increasingly looking at wireless solutions for applications ranging from safety to entertainment. Warning signals are the most immediate applications, but more complex forms of communications, and multimedia in particular, could be used by innovative applications such as multi-vehicle-based visual processing of road information, multi-vehicle radar systems for obstacle avoidance and automatic driving, and more generally swarm communications among cars traveling along the same road.

In this context, the Internet Media Group presents the results of intervehicle communications experiments performed in collaboration with University of Nagoya, Japan in 2003. In particular, the archive includes communication traces collected by using two 802.11b wireless devices, configured in ad hoc mode, located in two different cars. Several communication experiments have been performed, both in different driving scenarios and using several bit rates.

The data communication traces can be used under the condition that you insert at least one of the following reference in your works which uses the data:

- P. Bucciol, E. Masala, N. Kawaguchi, K. Takeda, J.C. De Martin, “Performance Evaluation of H.264 Video Streaming over Inter-Vehicular 802.11 Ad Hoc Networks”, Proc. of 16th Annual IEEE International Symposium on Personal Indoor and Mobile Radio Communications (PIMRC) Berlin, Germany, Sep 2005, vol. 3, pp. 1936-1940.

  Abstract: This paper evaluates the performance of video streaming in inter-vehicular environments using the 802.11 ad hoc network protocol. We performed transmission experiments while driving two cars equipped with 802.11b standard devices in urban and highway scenarios. Different sequences, bitrates and packetization policies have been tested. The experiments show that each scenario presents peculiar characteristics in terms of average link availability and SNR, which can be exploited to develop more efficient applications. In this paper we also determine the best packetization policies for the two scenarios, showing that large packets lead to better performance in the highway scenario and vice versa. Perceptual quality results indicate that the best packetization policy achieves consistent gains in terms of PSNR values (up to 5 dB), and reduced quality variations, with respect to a fixed-policy transmission technique.

  http://www.ieeexplore.ieee.org/iel5/10989/34628/01651778.pdf

- P. Bucciol, E. Masala, J.C. De Martin, “Adaptive H.264 Video Transmission over 802.11 Inter-Vehicular Ad Hoc Networks”, Proc. of 2nd Biennial Workshop on DSP for in-Vehicle and Mobile Systems, Sesimbra, Portugal, Sep 2005.

  Abstract: This paper focuses on video communications in intervehicular environments using the 802.11 ad hoc network protocol. In the first part of the work we present the results of transmission

experiments between two cars equipped with 802.11 devices in two typical driving scenarios, urban and highway. Various video bitrates and packetization policies have been tested. The results show that the two scenarios differ in terms of link availability and SNR. Moreover, the video quality measured at the receiver by means of the PSNR value shows that the best packetization policy depends on the scenario. Building on these results, we design an algorithm which adapts the video packet size to the current driving conditions to improve the efficiency of the video transmission. Consistent perceptual quality gains in terms of PSNR value (up to about 3 dB) are achieved with respect to a fixed-policy transmission technique.

http://media.polito.it/system/files/bucciol_dspvehicle2005.pdf

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