# Efficient Redundant Picture Coding for Enhancement Layers of the Scalable Extension of H.264/AVC

**M.B. Dissanayake**

*Department of Electrical and Electronic Engineering, Faculty of Engineering, University Of Peradeniya*

With the growth in the range of multimedia services being used for everyday activities such as teleconferencing, mobile television and peer-to-peer video sharing, the reception of video with high quality is of prime importance to users, as well as to service providers. However, providing video communication over wireless or wired networks creates many challenges due to fluctuations in the channel characteristics. In internet packet network scenarios the whole packet can be lost during the transmission due to congestion, faulty network connections and signal degradation. These errors create artefacts in the reconstructed video frames that propagate in both spatial and temporal domains due to the hierarchical prediction scheme employed in video compression stages. Hence, error resilience for video transmission has become a crucial area for research in the field of multimedia communication in the last decade. The methods used for this purpose vary from retransmission on request, embedding extra information in to the coded stream, to concealing the errors with already available data. However, the utilisation of error resilient tools in transmission networks is restricted by the channel bandwidth. Therefore, it is essential to maintain a flexible balance between the error resilient tools and the quality of the reconstructed video sequence. The overall objective of the research presented is to find a flexible error resilient mechanism which incorporates the redundant information transmission to recover from packet errors.

The proposed error resilience algorithm incorporates motion information generated by motion compensated prediction (MCP) to improve the robustness of the transmitted data. The MCP exploits the correlation between successive frames and identifies the movement of the objects within the current frame compared to the previous frame. This movement is described using motion information and can be used to predict an approximation for the current frame using the previous frame. Hence, the motion information of the video data plays a vital role in frame reconstruction. Therefore, the technique proposed in this research highlights the effect of providing extra protection for the motion information. The proposed system is implemented based on the existing redundant coding algorithm of the scalable extension of H.264/AVC and it encodes redundant data only for the motion information. The encoded scalable data stream consists of two layers: base layer with QCIF resolution and enhancement layer with CIF resolution. The paper analyses the effect of the proposed error resilience technique, redundant motion information coding, on enhancement layer picture quality. The performance of the algorithm is evaluated using objective quality measurements under both error free and error prone Internet Protocol (IP) packet network environments. The proposed algorithm increases bandwidth utilisation with slight degradation in the primary picture quality for error-free conditions, compared to the existing redundant coding method of H.264/AVC standard. Furthermore, the simulation results under packet loss environments show that the proposed algorithm outperforms the existing redundant picture coding technique of H.264/AVC standard.