Virtual mixed reality is a key application that is expected to shape the next generation of consumer electronic devices, social networking and multimedia experiences. This thesis deals with the development of such an application framework to provide such novel experiences. More specifically, it deals with network and streaming support for these type of applications in a realistic context. To achieve this virtual reality future, this thesis looks at the overall end to end system and from this higher level point of view, it defines requirements for compression of content generated for these types of applications based on point cloud and mesh representations. This thesis then develops techniques for the compression of meshes and points clouds for virtual mixed reality streaming. The results are compared to state of art techniques such as defined in MPEG and in the open source point cloud library and embedded in prototype streaming setups. The results show that competitive and improved results are achieved. This thesis completes the work by the design of a full streaming platform that includes support for media synchronization with spatial audio to support the complete the 3D VR media experience. This platform has been fully integrated in a novel mixed reality video conferencing system developed in the Reverie FP7 project that enables synthetic and natural content to seamlessly blend. In addition, the results in this thesis have helped to define the needs for mesh and point cloud compression for virtual reality in future international media standards that envision mass consumer adoption by 2020.

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