Project Title: iTRAC Wireless: Intelligent Compression of Transportation Video for Wireless Networks

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An important source of information in the monitoring, development, and planning of transportation systems is video data. This type of data is acquired at the scene of interest and either processed on site or transmitted to a control center for observation, automated processing and archiving. In almost all cases the digital video data is compressed to reduce the number of bits to be transmitted and/or stored. However, most video compression algorithms are not optimized for traffic video data and do not take into account the possible data loss that may occur when sending over lossy wireless channels or the analysis that will follow at the control center. As a result, the quality of the data may be low for viewing purposes, or as the principal investigators' past research in vehicle tracking has shown the tracking accuracy and efficiency1 using such video may be severely limited.

In 2009-2010, as part of the CCITT iTRAC project the principal investigators (PIs) developed a system suitable for centralized transportation surveillance applications, where low cost remote cameras with minimal onboard processing capability are connected to a powerful central data processing location [1, 2, 3, 4]. iTRAC focused on developing video processing and compression algorithms that minimized the bandwidth requirement of links between remote and central nodes, allowing on average the use of 90% less bandwidth than existing state-of-the-art video compression systems. Such a dramatic drop in bandwidth requirements leads to the dramatic reduction of ubiquitous system deployment costs by allowing the use of low cost wireless links rather than dedicated wired links currently in use.

The reduction in bitrate available through the use of iTRAC technology is particularly attractive for cellular infrastructure and can allow the adoption of automated transportation surveillance on a previously unfeasible scale. However, transmission of video over lossy channels, such as cellular networks, presents its own a unique set of challenges to account for possible data loss, especially when the video in question is intended for tracking. The PIs propose to develop iTRAC Wireless, a system leveraging the gains from iTRAC while improving upon them by introducing algorithms to specifically deal with the unique challenges of lossy cellular networks in the context of automated tracking.