



## Review

## Cross-layer signalling and middleware: A survey for inelastic soft real-time applications in MANETs

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## ABSTRACT

This paper provides a review of the different cross-layer design and protocol tuning approaches that may be used to meet a growing need to support inelastic soft real-time streams in MANETs. These streams are characterised by critical timing and throughput requirements and low packet loss tolerance levels. Many cross-layer approaches exist either for provision of QoS to soft real-time streams in static wireless networks or to improve the performance of real and non-real-time transmissions in MANETs. The common ground and lessons learned from these approaches, with a view to the potential provision of much needed support to real-time applications in MANETs, is therefore discussed.

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## Contents

1. Introduction .....	1928
2. Background .....	1929
2.1. Real-time applications for MANETs .....	1929
2.2. Cross-layer optimisation defined .....	1930
3. A taxonomy of cross-layer signalling methods .....	1931
3.1. Network-wide signalling .....	1931
3.2. Local node signalling .....	1932
4. QoS control with protocol tuning .....	1934
4.1. Network-adaptive tuning .....	1935
4.2. QoS-adaptive tuning .....	1937
4.3. Hybrid network and QoS-adaptive tuning .....	1938
5. Conclusions .....	1939
Acknowledgement .....	1940
References .....	1940

## 1. Introduction

Mobile ad hoc networks (MANETs) are emerging in all sectors as the vision for future communications. This vision has at its basis the belief that a mobile device, whatever its location and speed, should have the ability to connect to the rest of the world. For example, a cellphone user may require access to a video stream while at a distance from a cellular mast. In the military sector, the mobile device may take the form of an aircraft

transmitting mission critical video data to a ground unit, on friendly vehicles in the vicinity. The usefulness of such connectivity is not limited to communications and there is growing interest in the transmission of command and control data over ad hoc links, for example in the operations of remote industrial or medical safety-critical devices.

The provision of such services to users is dependant on ability to guarantee a high level of performance or QoS. A MANET has several performance-limiting factors, stemming from the mobility of the infrastructure devices (or nodes) and the nature of the transmission medium. A MANET is a self-configuring wireless network where mobile devices connect to each other, when in range, creating a dynamic and somewhat unpredictable topology over which packets can be forwarded. Such networks may stand-alone or be connected

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