

A Survey on QoS architectures in Ad Hoc Networks

Tor K. Moseng Øivind Kure
torkjetei@q2s.ntnu.no okure@unik.no

Centre for Quantifiable Quality of Service in Communication Systems (Q2S),
NTNU, Trondheim

Extended Abstract

An ad hoc network is a mobile, multihop network consisting of nodes without any infrastructure. This means that if two nodes are outside of their communication range, they have to rely on other nodes to forward their traffic. The nodes must therefore have, in addition to communicating applications, router functionality implemented. The routing must handle a fast changing topology because of mobility and the time-varying wireless medium. Also, the nodes have often low capacity on processing, memory and power¹, which necessitates simple protocols with low overhead. The data traffic over the ad hoc network may demand a certain quality on the transmission. Typical quality of service (QoS) parameters are bandwidth, delay, jitter and loss. Less used parameters include security and reliability. It is hard to provide QoS in infrastructure networks, but even harder in ad hoc networks. The ad hoc network have decentralized control, mobility and time-varying channels, which makes it harder to control the resources in the network and keep the QoS over the connection period. One additional property that the ad hoc networks must have is the ability of connecting to an infrastructure network in order to provide communication with fixed nodes and Internet access. The interconnection point must be clearly defined and interoperate with both networks.

The QoS architectures proposed in the literature can be divided into those that use resource reservations and those that base their architecture upon the class concept. Resource reservations will guarantee that a connection receives the reserved amount of e.g. bandwidth during the connection time in every intermediate node. It gives a good guarantee, but increase the signaling overhead and lowers the scalability in the network. The IntServ architecture proposed for fixed IP-networks is an example of a resource reservation QoS architecture. The class concept assigns all packets to a class that receives a certain treatment in the network. The classes differ in respect to the QoS parameters. At each intermediate node, each packet is treated individually according to the class' per-hop behavior. No reservations are provided. The class-based architectures scale well and make more dynamic resource assignments possible. The DiffServ architecture proposed for fixed IP-networks is an example of a class-based QoS architecture. This survey presents QoS architectures based on resource reservations and class-based QoS architectures. Also, proposals defining the interconnection between the ad hoc network and the infrastructure network are presented.

¹If used in environments as cars and other vehicles, these limitations become weaker.