

网络、通信、安全

## Kalman滤波的自适应链路层FEC控制策略

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**摘要** 无线网络动态的信道特性、高误码率和带宽有限等特点, 使得在无线环境下为实时流媒体传输提供QoS保证面临更大的挑战。提出一种用于无线实时流媒体传输的自适应链路层FEC控制策略, 以显著提高接收方的播放质量。该策略采用跨层设计的方法, 基于Kalman滤波器预测当前的网络状态, 考虑物理带宽限制和GOP可解码帧数的特性自适应地调整FEC参数 $N$ ; 另一方面, 在应用层采用自适应FEC策略, 在视频源数据和冗余数据之间动态分配网络带宽。数学分析和仿真验证均表明, 该策略能使接收方获得最大的可播放帧率, 有效地提高了流媒体传输的可靠性和实时性。

**关键词** [无线实时流媒体](#) [跨层设计](#) [Kalman滤波](#) [自适应链路层FEC](#)

分类号

## Kalman filter-based adaptive link-level FEC mechanism for wireless media streaming

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### Abstract

The real-time delivery of multimedia data over wireless links with QoS-Guarantee is a big challenge due to the unreliable and dynamic characteristics of wireless networks, limited bandwidth and high QoS requirements for multimedia applications. In this paper, an adaptive link-level Forward Error Correction (FEC) algorithm for wireless media streaming is proposed, in the hope that the media can be played on receivers with high quality. The algorithm, based on cross-layer optimization design, predicts the packet loss rate using the Kalman filter, and adjusts the FEC parameter  $N$  as well as predicts the number of frames of a GOP. On the other hand an adaptive FEC is used at the application layer to adjust the sending rate of MPEG video frame adaptively and to allocate the network bandwidth resource between the MPEG video source data and the redundant data dynamically. Both the mathematical analysis and NS simulation demonstrate that the proposed mechanism can significantly improve quality of media streaming, in terms of playable frame rate, reliability and real-time performance on the receiving side.

**Key words** [wireless real-time media streaming](#) [cross-layer design](#) [Kalman filter](#) [adaptive link-level FEC](#)

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