

# A CATV-Based High-Speed Packet-Switching Network Design

David Charles Feldmeier

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Massachusetts Institute of Technology  
Laboratory for Computer Science  
Cambridge, Massachusetts 02139



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by  
David Charles Feldmeier

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## Abstract

A high-speed packet-switching data network to the home can be built on an existing, unmodified, residential cable television (CATV) system. This thesis considers the theoretical and practical technical aspects of providing such a service and suggests a possible system design. All network data must pass through the CATV hub, so the network design is divided into three major parts: upstream transmission, downstream transmission, and access scheme.

Upstream transmission is difficult because of the high noise level on the upstream channel caused by ingress of shortwave signals and impulse noise. The noise level is increased by the CATV system topology that funnels all system noise to the headend. Several noise-reduction techniques must be used simultaneously for robust upstream transmission. The downstream channel has low noise, but the data signal must be compatible with the CATV system, video signals and television receivers. Vestigial sideband data modulation is suggested for total system compatibility. Existing access schemes, such as those for local area networks and satellite networks, are unsuitable for a high-speed CATV-based network. Modified versions of two satellite access schemes are suggested as possible solutions. The best techniques for upstream transmission, downstream transmission and access scheme are combined into a single proposed system.

*Key Words:* cable television, metropolitan area networks, broadband networks, access control techniques

*Thesis supervisor:* Jerome H. Saltzer.

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