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TITLE: Signalling for audiovisual or multimedia connections on ATM Networks

PURPOSE: Proposal

Abstract

Circuit switched and ATM networks present different functionality to the services supported. Some of the functions of end-to-end signalling for audiovisual services on circuit switched networks are highly network dependent. These include multiplexing of audio, video and data channels, and error protection mechanisms. Such signalling should be reassessed for ATM networks, in the light of the functionality provided by virtual connections and the ATM Adaptation Layer.

1. Introduction

Provision of end-to-end signalling facilities depends on the capabilities of the underlying network. In the case of circuit switched networks, multiplexing of the components of a multimedia connection has to be handled by an end-to-end signalling and framing system, such as Rec. H.221. Greater network flexibility may mean that this is quite different in the case of ATM. Differing error control mechanisms also apply.

This contribution emphasises the need to identify the signalling requirements of audiovisual services, identify those facilities that are provided by ATM networks and reassess the user-user and user-network signalling necessary to provide the required functionality.

2. ATM Network Capabilities

An ATM-based B-ISDN will provide virtual connections, using cell-based transmission, over a broadband network.

The broadband capability means that high bandwidth services (such as video) can be accommodated in a single channel; there is no need to multiplex separate channels to obtain sufficient capacity for their support.

The capability to flexibly establish multiple simultaneous connections between terminal equipment is provided by the virtual channel based connections. The simultaneous connections can be established and terminated, and vary in rate, independent of one another.

B-ISDN switches should have the technical capability to provide distribution to multiple receivers by multicasting, though standards for this are still under discussion within SGXVIII.

3. Revised approach to Signalling and Framing

These network features necessitate a revision of the approaches to support of audiovisual and multimedia connections that have been established for circuit switched networks.

Rec. H.221, for example, provides for subdivision of an allocated bandwidth into lower rate channels for audio, video, data and telematics. Such "subdivision" is an inherent part of an ATM network. H.221 specifies a frame and multiframe transmission structure based on an 80 octet frame length. If a similar frame structure is used on ATM, then one aligned to the available number of octets in each cell may be more appropriate.

Encryption must be studied in the context of cell-based transmission. In particular, a cell loss must not result in the permanent disruption of the decryption procedure.

Decisions must be made concerning the linking of associated information streams. Audio and video are multiplexed into the same frame structure in H.221, but could be transmitted in separate virtual channels in an ATM environment. The result would be much greater flexibility (different audio channels could be sent to different receivers, multipoint conferencing control handles audio and video separately, interworking with audio-only terminals is simplified), but overheads may be required to ensure audio/video synchronism.

H.221 also allows for data channels and their control, as well as channels for still picture transmission. The flexible transport mechanism in ATM suggests that such additional channels could be established independently, and the network provides multiplexing.

Other issues that arise when looking at the functionality provided in Rec.'s H.221, H.230 and H.242 include:

- End-to-end quality monitoring is likely to have differing requirements over an ATM network;
- Synchronisation of multiple B- or H0-channels will not be relevant;
- Data transmission attributes, activation and deactivation of data channels could be separated from the video connection and associated with a separately established data connection;
- Control and Indication (C&I) information, particularly related to multipoint connections, may be different for ATM networks;
- Call connection and disconnection will, of course, be different, although based on current ISDN principles.

4. Conclusion

The purpose of this contribution is to highlight the need for studies of network and end-to-end signalling for video services provision on ATM networks. Many of the features provided by frame structures that have been defined for audiovisual services on circuit switched networks can be provided by the ATM network itself. Importantly, separation of multimedia connections into separate virtual channels may be preferable to explicit multiplexing controlled by an end-to-end protocol.