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A study on interconnection of heterogeneous video-networks

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As performance of computers and networks advances, and intelligence of consumer electronics devices evolves, many kinds of video-networks have been emerged and are now utilized in our daily lives. Sending and receiving the higher quality video streams than ever before have also been realized. The video-networks are now utilized for many applications such as VoDs(video on demand) and teleconferences, and its applicability is expanding to some new areas such as distant educations and medical uses.

These video-networks tend to specialize in specific application area for which that systems are designed, so that the resources may be efficiently utilized for that purpose. Because of its specialty, it is hard to make heterogeneous networks interoperable. As a result, many video-networks are not interoperable with other video-networks.

By making heterogeneous video-networks interoperable, the services to more clients and more flexible operations of video-networks will be realized.

In this research, VIA(Video-network Integration Architecture) is proposed. By VIA, heterogeneous video-networks are homogenized by an abstraction model and this enables interoperability with other video-networks.

VIA is constructed with three layers, frontend networks, gateways, and a core network.

The connection between the end terminal nodes and the frontend relay node is established by the frontend network which is a kind of the video-network itself.

The connection between the core relay nodes is established by core network. The resource manager manages the resources of all connected video-networks. And the connections are established and released by the request from users.

The interconnection between the core network and the frontend network is performed by the gateway. The gateway consists of the frontend relay nodes, the core relay nodes, resource information agent, control protocol translator, and session adapter. By using

these components, various differences of frontend network and core network are adapted. The devices of the frontend networks are standardized after an abstraction model, and the commands for controlling the video-networks are also translated.

In **VIA**, devices of a video-network are handled as sets of end terminal nodes. The end terminal nodes are considered as pseudo nodes that can handle only one sending or receiving video stream at one time. Only peer-to-peer connections between the nodes that handle same video format are handled. The connections between the nodes that handle different video format are processed by the frontend networks that convert video formats. The multicast connections are also processed by the frontend networks that distributes video streams.

By using the end terminal nodes as the unit of resource management, the core network does not have to know the details of frontend networks. As a result, devices of all video-networks are managed by unified concept, and the operation interface can hide differences of the networks from users. Because of the independence between the frontend networks and the core network, no modification is necessary for the core network whenever some changes are introduced to the frontend networks.

In this research, **VIA** based on **JAIST VideoLAN** is implemented.

JAIST VideoLAN consists of two video-networks just like a structure of **VIA**. These two networks are bridged by terminal system which is a kind of gateway.

The resources of **JAIST VideoLAN** system are managed supposing the frontend networks are IEEE1394 networks and the core network is ATM. And the commands for controlling the video-networks are not transmitted across the border of the networks.

The proxy agent that complement the missing functions and the terminal system are performed as gateway.

The resource manager in the core network is implemented so as the resources can be managed after the concept of **VIA**.

By implementing these components, various heterogeneous video-networks are connected each other.

Mechanisms for accounting, controlling of bandwidth, authentication, and multicast connection are remained as future works.