



EYEBOX

VIDEO-CENTRIC SOCIAL NETWORKING

Version 1.0
December 1, 2008



FOR MORE INFORMATION
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CONCERT TECHNOLOGY

OVERVIEW

Social networking and media have intersected in a large way. According to a recent Pew Study, posting video and still images online often “starts a virtual conversation” and play a “big role” on social networks ¹. Systems have been developed to exploit the relationship between social networks and media, but video has posed a unique challenge. The intersection of music and social networks have been addressed nicely by applications such as [HighNote](#) or iLike, which allow a user to discover what music his or her social network is listening to, often in near real time.

EyeBox addresses the intersection of video and social networks by answering the question: “what are my friends watching?”. It is a discovery tool for video content in a social network, which may include a large network of friends of friends.



USER INTERFACE

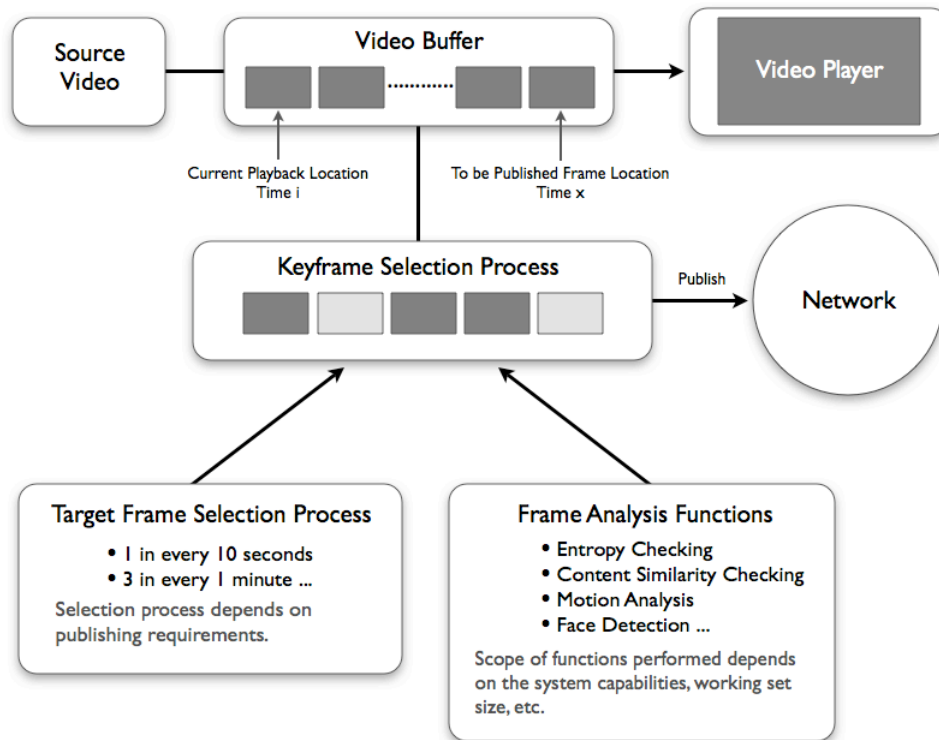
For each participant in the network, EyeBox displays a thumbnail image which represents the current playback location in the video. The thumbnail image is a Video Key Frame (VKF), which is updated on a regular basis and represents a unique participating user.

The EyeBox user can scroll through these video keyframes and view additional meta data associated with the corresponding video and user. When integrated with a content delivery system, the user will be able to purchase and start watching the selected content.

EyeBox adopts the “whole world is your buddy” approach to social networking, meaning that it allows sharing VKF’s between any set of users regardless of personal social relationships. This enables social networks to be formed around the video content itself rather than the people watching it. In the current release of EyeBox, all users are anonymous. However, in future releases, users may create accounts to establish an identity and manipulate privacy settings.

HOW IT WORKS

EyeBox uses a proprietary technology we call Just-In-Time Video Key Frame analysis, which analyzes the current video buffer and determines which of the video frames best represent that segment of video. This analysis uses techniques such as entropy checking, content similarity checking and motion analysis to pick the best keyframe to publish to the EyeBox network. This technique allows us to bypass frames which are transition scenes, dark scenes, or non representative scenes with a high degree of accuracy.²



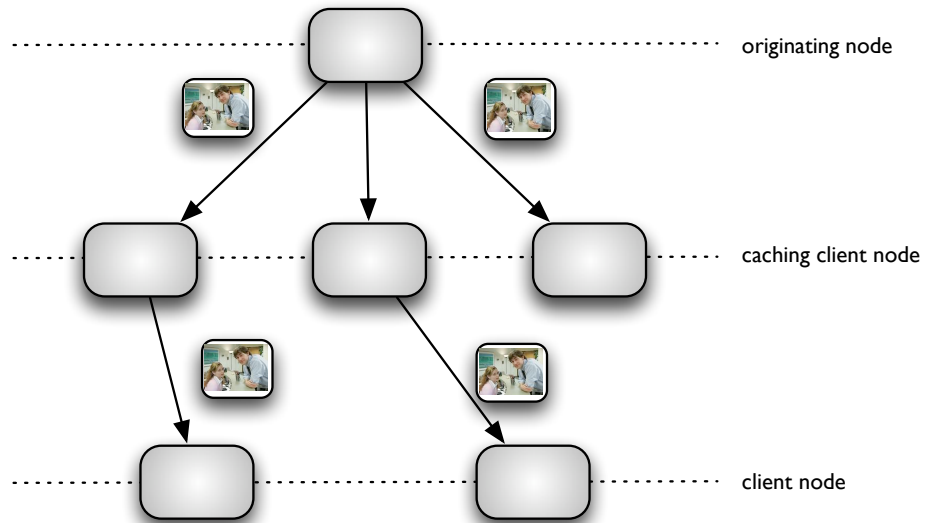
NETWORK MODEL

EyeBox adopts a hybrid Peer-to-Peer/Central Server model for network connectivity. Specifically, registration and discovery are via a centralized Discovery Server, but the keyframe distribution itself is performed via a Peer-to-Peer (P2P) publish/subscribe network. This has the advantage of keeping business-relevant information, such as user viewing profiles and preferences, at the central server, but relegating non-critical data, such as the keyframes themselves to the P2P network. This leads to a substantial savings of bandwidth, since each keyframe is, on average, 4KB in size, but each piece of viewed content metadata is only a few bytes in length. There is a centralized discovery service which is used for by EyeBox clients to discover other peers in the network.

FILTERING RESULTS

Client queries may include user-provided search terms, such as media-related categories and keywords like “Action”, “Comedy” or “Michael Scott”, to identify a specific subset of videos being watched.

Once a set of EyeBox peers (specifically, VKF Producers) is discovered, the EyeBox billboard (or VKF Consumer) sends subscription messages to subscribe to the VKF being published. Each EyeBox peer publishes VKFs directly to only a limited number of client peers, so as not to exceed available upstream bandwidth or overload any single peer. Any additional subscriptions are forwarded by publishing peers to their subscribing client peers, which repeat the operation recursively as necessary. When a relatively unloaded EyeBox client peer is finally found, it accepts the subscription message and begins publishing any keyframes produced or received to the new EyeBox client peer.



This recursive forwarding of subscriptions results in a tree-like distribution network. Note that the P2P distribution network follows a best-effort-only paradigm. P2P KeyFrame Distribution uses UDP-based messages with a proprietary protocol for publish/subscribe and data transfer.

NAT traversal is accomplished using Teredo tunneling.³

SOCIAL NETWORKING

Although not fully implemented in the current release of EyeBox, one of its most attractive features is social networking around video content being watched. Some potential features include:

- Selecting a movie to watch, download or buy by clicking on a keyframe on the EyeBox billboard
- Annotating a video or a scene by annotating a keyframe on the EyeBox billboard
- Accessing metadata or annotations about the video by clicking on a keyframe
- Interacting socially with a user watching a video on EyeBox
- Setting up a joint viewing session between a group of EyeBox users

ABOUT US

Digital media distribution is fundamentally changing the relationship between consumers and content. At Concert Technology, we're engaged in R&D directed towards the creation of patented intellectual property which we use to drive licensing programs that derive revenues from the ongoing changes in technology, consumer habits, and business models.

- Rich Media Internet Services
- Mobile Media Device Technologies
- Recommendation Systems
- Social Networking
- Location Based Services

We strive to prototype and develop products that deliver on the promise of the digital media experience: high quality entertainment that is easy to find, discover, organize, share, and enjoy.

For additional information or to explore partnership opportunities with Concert Technology, please contact bizdev@concerttechnology.com.

The screenshot displays the Concert Technology website layout. At the top left is the logo, which includes a film strip icon with a pulse line and the text "concert technology". To the right of the logo is a navigation menu with links for "home", "about us", "portfolio", "careers", and "contact". Below the logo is a graphic featuring a mobile phone, a CD, and a film strip. The main content area is divided into three sections:

- 01 intro**: A paragraph stating the company's focus on digital audio and video solutions for personal electronics, and a mention of the iPod, TiVO, and PlayStation Portable.
- 02 focus**: A section titled "Music and Video" and "Intellectual Property" with descriptive text.
- 03 social audio**: A section titled "The Musical / Social Network" with descriptive text.

At the bottom of the page, there are three small images: a grid of album covers, a CD cover, and a mobile device screen.

1 http://www.pewinternet.org/pdfs/PIP_Teens_Social_Media_Final.pdf

2 See *"A two-level queueing system for interactive browsing and searching of video content"*, Tiecheng Liu, Ravi Katpelly

3 http://en.wikipedia.org/wiki/Teredo_tunneling