



Video on the Web: New Challenges

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Video over IP takes two forms with regards to the network over which the content is distributed: 1) distribution over Telco controlled network (a.k.a. IPTV), and 2) distribution over the Internet (a.k.a. PCTV). Both have their own set of challenges and as more and more people are supplementing traditional TV viewing with Internet video (and in some cases, supplanting it), we foresee a hybrid model that blurs the boundary between traditional broadcast and Internet based video. In the end, it is all about giving users seamless access to content, be it on a large screen TV or on a mobile phone. Today there are a lot of differences between broadcast and Internet video space and their convergence raises a new set of issues in multiple areas.

- **Video Format**

Depending on the type of end device (PC, TV, cell phone), content needs to be modified for presentation. In most of the cases, this is a function of the end device but is inefficient in terms of network resource consumption. Moreover, majority of the content that is available today on the Internet is low resolution and low bit-rate and such content cannot be viewed on large screen TVs. This means that content needs to be available in different formats and different resolutions for different devices. Techniques like Scalable Video Coding (SVC) need to be adopted to address content format scalability.

- **Video Search**

On the Internet, tags provide search metadata which is simple to implement, but is limited. One person may tag the same content entirely differently than another person; what you perceive important in a video may not be relevant to me, etc. In the broadcast TV scenario, EPG/ESG provides a mechanism for search which is mostly based on title of the content. The metadata is very limited and is worse than the tag approach. However, since the content comes from known sources (compared to the Internet), it is more amenable to be found. It is certainly a challenge today to index content in an automated way and exported for others to browse and search.

- **Video Metrics**

Downloading and real time streaming are two models for delivering content to the end users. Both have their own set of requirements in terms of network transmission parameters. Real time streaming requires low delay, latency and jitter while downloading



depends on delay. Whether the content is delivered in a peer-to-peer or client-server mode, the underlying protocols must be “quality” aware for providing satisfactory user experience. This means that we should be able to measure quality as perceived by the users and feed it back to the system to take any corrective action.

- **Video AAA**

Authentication, Authorization and Accounting will form the backbone for video distribution on large scale. By defining open interfaces, content owners and distributors will be able to inter-operate and exchange usage as well as billing information and ensure that the content rights can still be protected.

- **Video Distribution**

While we see some attempts to use Peer-to-Peer technologies for providing video content in real-time, today Peer-to-Peer still mainly deals with file download (which includes video files, though illegal in most cases). Also, the client-server model does not scale well for video distribution. At the same time, the recent success of user generated content sites such as YouTube or DailyMotion also demonstrate that users are interested in getting video content through the web. P2P combined with quality assurance mechanisms would be important in delivering high value content via the Internet.

Standardization is the key to interoperability and by defining open interfaces we open the doors to seamless convergence of broadcast and Internet video.