1. Introduction

The current contribution aims initially at presenting the objectives of an EU IST-funded R&D Project called MELISA:

- MELISA: Multi-platform E-publishing for Leisure and Interactive Sports Advertising

To the MPEG ad-hoc group on On-line Gaming. The project lies directly within the interests of the group since it envisions, among other goals, the enabling of online and real-time gaming and betting services on a variety of end-user terminals.

Subsequently, generic requirements are identified, as being captured by the MELISA consortium, related to implementation issues of online and play-by-play or real-time gaming and betting services on a variety of end-user terminals over diverse transmission channels.

2. MELISA overview

Sports present a domain where a great number of business entities gain significant revenue and which draws the interest of a huge amount of end-users, eager to watch, hear, live the experience and thrill of sports events. Sports events are global in their majority and present a means of gaming – a great number of current dedicated PC games deal with sports themes. Thus, sports could present a means of online and sometimes real-time gaming for end-users: an example is that of online play-by-play or real-time betting on sports related bet options like the outcome of a football game – the limitation in this case is the number of gamers involved: such gaming presents individual playing and not group playing with the means to directly influence what the others gamers also receive and interact with.

Taking under consideration the current trends within sports media coverage and related services, among the MELISA business objectives, which also present the current market needs nowadays concerning technological advancements in the field, are the following:

- To provide ubiquitous multi-modal access to sports data and sports events – all will be able to watch sports events and use the associated services anytime anywhere. Content providers will be able to gather an increased user base for their offering.
- To provide additional revenue streams for the sports publishing value chain, by directly facilitating commercial activities over the medium, e.g. enabling in-play real-time betting, a service still in its infancy.
- To increase the effectiveness of advertising by narrowing the gap between advertisement and consumption. The interaction with advertisements as well as the possibility to instantly follow or bookmark links to e-commerce sites of advertised companies is expected to give a boost to sports related e-commerce and increase the revenue of advertised companies.
- To create new services (or service packages) to add value to the service provision of network operators or broadcasters.

1 MELISA Consortium: INTRACOM, OGILVY INTERACTIVE, SYMAH VISION, CANAL+ TECHNOLOGIES, UNIV. OF ESSEX, INTRALOT, COSMOTE, UPPSALA UNIV., LADBROKES, ERT, ONDIM, ENST
From a technological point of view, the primary objective of MELISA is to establish the infrastructure to support the virtual value chain for sports events broadcasting and related services, emphasizing on the betting and gaming ones, over a variety of broadband networks. Specifically, MELISA aims at providing a multitude of services related to cross-media sports broadcasting featuring visual enhancements, interactive advertising and sports-related in-play real-time betting services over digital Television and next generation mobile network infrastructures (DVB-S, GPRS/UMTS). For such a purpose, the MELISA system should ensure secure transactions within the contexts of gaming/betting and e-commerce as well as service subscription, where applicable, in real-time. The use of MELISA will increase the competitive value of the broadcasting companies (in cooperation with the post-production companies) and the network operators, which aim at providing a multitude of services to their subscribers. Furthermore, MELISA will contribute to the development of next-generation TV-viewing and viewing on other types of terminals, will at the same time provide context related services (Advertising sector companies, Betting sector companies) and increase the entertainment, thrilling and gaming experience of viewers either at home or elsewhere. Specifically:

- The goal of broadcasting companies (in co-operation with post production companies or their own post-production teams as well as with sports organizations) using MELISA will be to increase the amount of viewers (and so their revenue) during the broadcasting of sports events by transmitting visual enhancements (in MPEG-4, incorporating images, graphics, text, audio, video or 3D content) along with sports broadcasts to give a much more enhanced and game-like viewing experience to the spectator. MELISA's advanced technology will also increase the ability of broadcasting companies to claim for more rights for the broadcasting of multiple sports events by presenting this innovative technology as an important competitive advantage, additionally to conventional characteristics.

- The goal of network operators, that are interested to offer a variety of services to their subscribers, is to enhance their service provision and be a more active “participant” in the entire sports broadcasting chain.

- Advertising business sector companies are interested to have yet another powerful media means for advertising. The novel way of interactive in-content advertising that will be supported by MELISA offers them a new added value and is expected to provide them with instant purchases from eager buyers and thus increased gains and much less efforts concerning the purchase process.

- Betting companies (along with statistics companies and sports organizations) are eager to offer the thrill of instant betting and gaming via interactive TV and 3G mobile phone means to their clients (bettors, gamers), which will obviously increase their betting placement frequency due to the real-time applicability capabilities right there, while the sports event is still happening, when the thrill of the game is still felt – it will be like simulating the bettor’s virtual presence to a football game or a horse racing event. The feeling will be almost similar.

- The end-users (either viewers, bettors/gamers or buyers or any combination of those), anywhere they may be, will be able to view their favourite or of major importance sports events in a completely enhanced way thanks to the visual enhancements and supplementary information that will be provided by MELISA. The interactivity and the visualisation of complementary information is expected to increase their interest and attract more viewers – trigger in them the game-like feeling. Furthermore, the MELISA provision of real-time betting placement and interactive advertising services will enhance the viewer experience and along with the personalization aspects associated with all types of provided services offer to him/her only the services/content of his/her choice – this feature, in the case of advertisement consumption is of high importance since he/she is not unwillingly and helplessly fed with (and spending time uselessly for that matter) advertisements on products or services he/she would not be interested in.

3. MELISA gaming related generic requirements definition

In order to bring to implementation the business and technological objectives of MELISA outlined in the previous section, a number of identified requirements have to be taken under consideration. In this section, we will summarize the generic requirements that the MELISA consortium has identified with respect to the enabling of online betting/gaming services and the broadcasting and consumption of associated interactive enhanced content in MPEG-4, since these aspects lie under the direct interest of the Online Gaming ad-hoc group. Identified generic requirements, also serving the MELISA goals, are:

- **Synchronization, unique identification, referencing, locating:** when gaming services are related with other types of content transmitted alongside the game content, (e.g. in-play real-time betting or provision of visually enhanced content along with sports broadcasts), then a strict requirement is that of the synchronization of all types of content and associated metadata descriptions, as well as their unique identification and proper referencing mechanisms. Cross-referencing and cross-linking should also be accounted for.
Timeliness, dynamic versus static, content updating: timeliness of content and metadata descriptions is crucial especially in cases of dynamic updating of both, which is valid for real-time odds modification for betting but also for following and properly managing the progress of a shared online game.

Presentation style: another requirement is that of presentation of game related content, when a variety of other types of content are also received and require handling and display at the same time.

Interactivity: interactivity is considered crucial from the end-user point of view. MPEG-4 is a means to enable such. Some limitations may exist on the terminal capabilities to handle and efficiently manage interactivity on hand held devices like third generation mobile phones, with a display of low resolution and less processing power or interaction options than a set-top box. This, along with other implementation limitations, enforces the requirement of terminal targeting and terminal capability definitions, better explained in a subsequent item.

Quality of service, fast transmission, system reaction: online instant in-play betting and gaming require real-time system re-action and feedback to attain the desired quality of service. Transmission delays should be avoided and a high speed return channel to the service provider should be existent. Processing of related user requests should be fast. Time constraints on the receiver terminal side are also very strict. Once the data is received on the terminal, any interaction of the end-user with the viewing software on the terminal will have to cause an immediate reaction of the system's display. Furthermore the user should be able to place a bet for an event the final outcome of which is going to be determined in a couple of minutes. Therefore the placement of the bet should be done in real time. The system should also respond quickly to end-user requests (e.g. purchase order) so that the latter does not lose his/her interest or gets disappointed at the poor “quality of service”.

Terminal capabilities: visual enhancements in MPEG-4 involving for example virtual races display to give the viewer a better aspect of the current game and thus extensive information to depend on in order to place bets impose the requirement on end-user terminals to support advanced graphics features. Again, this reflects into the more generic requirement of defining terminal capability profiles and rejecting received content that the terminal may not be capable of handling, giving at the same time proper warning to the end-user.

Terminal targeting: certain types of games/game content may require extended capabilities that certain terminal types cannot handle. This requirement is coupled with another requirement, that of defining terminal capabilities by means of preset terminal profiles, to allow for automatic identification of what the terminal may handle and display in full potential. Terminal profiles may include a generic set of definitions for identifying the terminal hybrid capabilities.

Content adaptation, scalability: another requirement is that of content adaptation and scalable bitstreams generation to allow for automatic adaptation and proper presentation of content to end-user terminals based on the latter’s capabilities (defined within their profiles) and to account for transmission channel restrictions.

Real-time data updating: a strict time limitation is set upon the in-game wagering. Within real time constraints and as the game develops, the odds may change according to the way users behave and according to the way the game is developing (real time event data). This defines again the generic requirement of the overall system attaining instant response and limiting the processing time, wherever necessary, to the minimum.

Rights management, controlled access, secure transmission: in cases that service subscription is required and since game-related content (in our case, visual enhancements, statistics, odds) may be the property of a content owner, proper copyright protection, subscription, access control and secure transmission mechanisms should definitely be accounted for. The need to support different protection levels based on the subscription profiles may be necessary.