

# Universal Platform for Global Multimedia Device Cooperation

## Addressed objective

Objective ICT-2009.1.2: Internet of Services, Software and Virtualisation

a) Service Architectures and Platforms for the Future Internet

## About project

The main idea this project is based on is to create a set of technologies that would allow multimedia devices as well as multimedia web services of different purposes, with very different capabilities and from different manufacturers to transparently interoperate in a global scale (i. e. worldwide) over the Internet (Fig. 1).

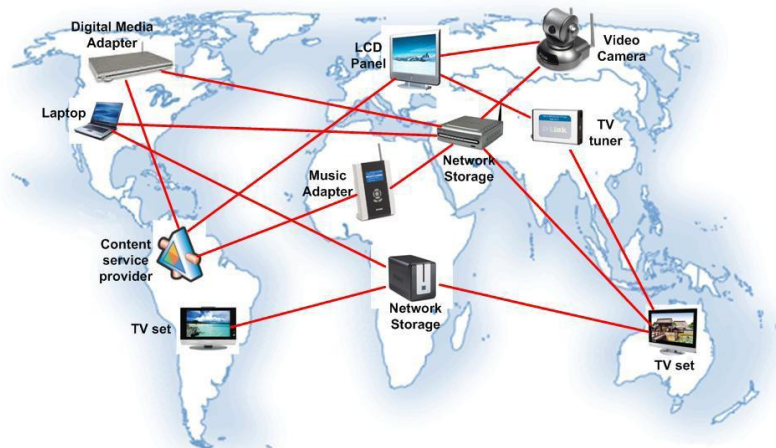


Figure 1. Multimedia devices and services of different types could cooperate worldwide

According to a vision of researchers from MERA Labs Company electronic multimedia devices (as well as web services) all over the world could join the so called Global Multimedia Device Communities. These global communities could be built on the principles very much similar to that of social networks. Just like people establish social links with each other by many different criteria such as common interests, joint business, relationships and so on – multimedia devices (and multimedia web services) would establish so called “friendship links” on the basis of complex metrics such as similarity or complementarity of purposes and functions, similarity of capabilities, proximity of geographical locations or according to their ownership or cost of provided services (especially for online multimedia services) and so on. These “friendship links” are peer-to-peer logical links that devices would establish with each other over the Internet. And all the Global Multimedia Device Community would consist of huge amount (for example, hundreds of millions) of multimedia devices (as well as services) associated by friendship links, just like people within the global society. More over it is expected that in these device communities there will be many patterns of behavior and evolution which could be found in social networks today.

The internal structure of such global device communities could be modeled by Metrized Small World Random Graph. The simulation result of device community structure for 10,000 items is presented on Fig 2. Researchers from MERA Labs are now working under the original models and algorithms for assembling of such social-like network structures. They have archived the so called Small World properties for such structures. This means that every couple of nodes within such network is potentially reachable by number of hops (measured by friendship links from one neighbour peer to another and so on until the destination is reached) logarithmically dependent on the total number of nodes in this network. In practice this means that Global Multimedia Device Communities would be infinitely extendable and there would be efficient algorithms for device and media content discovery even within communities of billions of members. The complexity of search algorithms on such structures depends logarithmically on the total number of nodes.

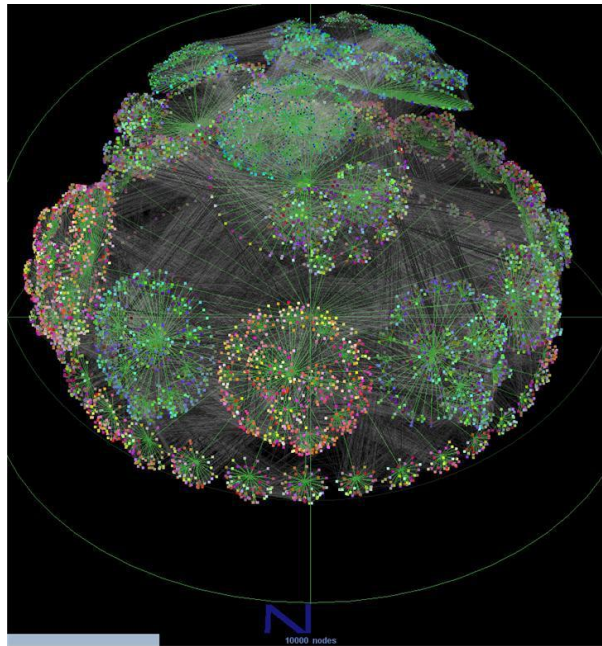


Figure 2. The simulation of internal structure of social-like device communities (10,000 items)

In parallel to the fore mentioned small world community structures within this project there is also an active work under the set of control protocols (protocol stack) which would allow multimedia devices and web services of different types and different capabilities to dynamically adapt to each other and to provide multimedia services to their users by dynamic cooperation. This aspect also includes means of extensive representation of multimedia device capabilities, behaviour and current context and includes means of representation of multimedia content metadata that is used for content discovery and exchange between devices as well as web services within device communities.

The control protocol stack allows all multimedia devices within device communities to negotiate about parameters and circumstances of possible cooperation, such as: a set of control commands which need to be supported by the partner devices for successful interoperation within certain cooperation session, a list of context parameters (e.g. internal device state, communication link state, user preferences and so on) of partner devices which are supposed to be accessible remotely for the purpose of monitoring, transport protocols for multimedia content exchange, applied codecs, currently available QoS parameters, security parameters (if necessary), the supposed duration and cost of the multimedia service session etc. There are also protocols for control of cooperation sessions (for example, to establish, to modify and to terminate of multimedia sessions), for mutual control and coordination of multimedia devices during cooperation (including means of behaviour adaptation according to current context) and for mutual monitoring of current internal state and context between partner devices.

## About MERA Labs

Mera Labs is a privately owned Russian company which acts as an incubator for high-tech venture projects. The innovation projects that Mera Labs nurtures are currently at development phases varying from seed to early-stage and address data search and storage, networking and telecommunications technologies.

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