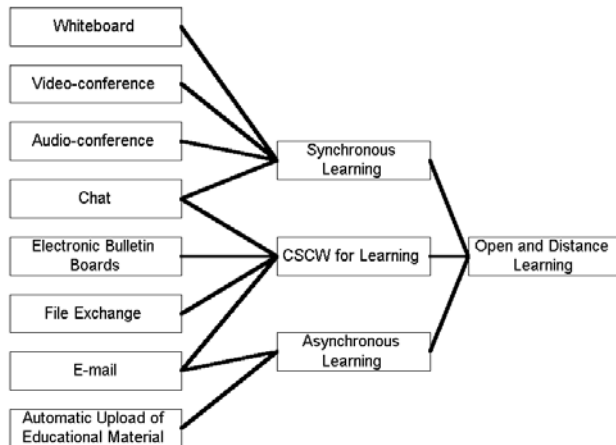


Research Activities

RU6 works on the developments of advanced Telematic applications, focusing in Open and Distance Learning (both Synchronous and Asynchronous), Teleconference, and Voice over IP (VoIP). RU6 contacts research in advance Telematics services with the use of Real Time Protocols (RTP, RTCP, RSVP), multicast technologies (simulcast, multicast congestion control, multicast of layered video) and new session initialisation protocols (SIP) over next generation networks. In addition RU6 has significant activities in the area of Virtual Conference Services. The above technologies will support the next generation Telematics applications.

Telematic Services - Real time services

Open and Distance Learning (ODL) could be regarded as the process of learning with the use of Telematics that is the combination of telecommunication, information and multimedia technology and its services]. In such a scenario: All the interactions among trainees, trainers and instructional material, which are essential for the instructional process, can be implemented. The information and the knowledge, which are essential for the instructional process are accessible and readable. The place, time and the pace of learning are flexible. The relation between the services for the integration of an ODL system is shown in following figure:



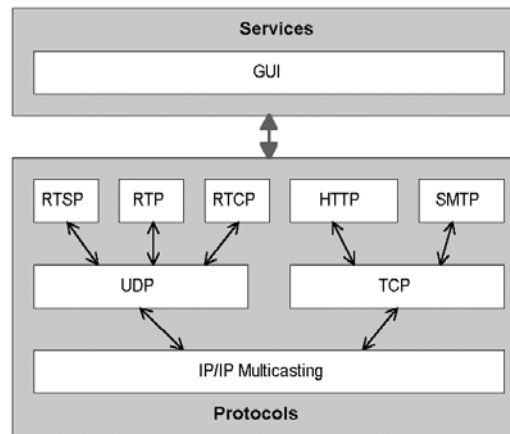
RU6 has contacted research, has designed and implemented various ODL solution both for synchronous, asynchronous

and Computer Support Collaborative Work (CSCW) Learning.

In addition RU6 has contacted research in the area of Real Time protocols needed for the transmission of the multimedia data during various real time services like the ODL services. These protocols include:

- RTP/RTCP (Real-time Transport Protocol / Real-time Transport Control Protocol): For the transmission of Real Time data like the multimedia data
- RTSP (Real Time Streaming Protocol): For the control of the transmission of Real Time data like the multimedia data
- SIP (Session Initiation Protocol): For initiating, modifying, and terminating an interactive user session that involves multimedia data

The following figure shows the interaction among the above protocols



Moreover RU6 has design and implemented various Telematic / Real time services either as research prototypes or as commercial products. Here are some representative services:

- Design and implementation of synchronous teleteaching application for IP (H.323) and ISDN (H.320) for OTE S.A. (Greek PTT)
- Design and implementation of an integrated ODL platform which supports synchronous, asynchronous and CSCW learning for the University of Patras, Greece

Adaptive Transmission of multimedia data

The heterogeneous network environment that Internet provides to real time applications as well as the lack of end-to-end QoS (Quality of Service) guarantees, many times forces applications to embody adaptation schemes in order to work efficiently. Today's Internet is divided into thousands of different administration domains. The QoS strategies that are implemented on each one are certainly different (and not compatible) and in many cases no QoS strategy is implemented at all. So the multimedia data flows that have to traverse many of these different domains in order to reach the end user don't have a sufficient QoS support.

Multicast transmission of real time multimedia data is an important component of many current and future emerging Internet applications, like videoconference, distance learning and video distribution. The methods proposed for the multicast transmission of time sensitive data in the Internet can be generally divided in three main categories, depending on the number of multicast streams used:

- The Server uses a single multicast stream for all Clients.
- Simulcast: The Server transmits versions of the same multimedia encoded in varying degrees of quality. This results to the creation of a small number of multicast streams with different rates, responsible for a range of Clients with similar capabilities.
- The Server uses layered encoded technique, which is multimedia that can be reconstructed from a number of discrete data streams and transmits each layer into different multicast stream. The multimedia is divided in to one basic stream and more additional streams. The basic stream provides the basic quality and the quality improves with each layer added.

The focus of our team is the implementation of TCP friendly adaptation mechanism for unicast and multicast (one stream, simulcast, layered encoding) transmission of multimedia data. Our team has proposed various adaptation mechanisms and has evaluated them through prototypes (implemented with Java JMF) and trough simulation (NS-2).

Virtual Conference Services

As the need for synchronous communication and collaboration among geographically scattered users is increasing, Research Unit 6 conducts both research and development on methods, tools and applications that integrate various types of functionality for supporting and facilitating the collaborative processes. The following figure show a virtual conferencing scenario:



Some of the services integrated for the realistic and effective virtual conferencing are: a) collaborative area, for sharing applications such as whiteboard, slide show and prepare slides, b) text chat, for sending and receiving short messages, c) voice chat and d) gestures so as to make the conversation with other users more efficient and realistic.

Every tool designed for supporting e-collaboration should exploit aspects of space and spatial mechanisms, such as providing identity, orientation, a locus for activity, and a mode of control, which can be considered as powerful tools for the design. These aspects are: a) relational orientation and reciprocity, b) proximity and activity, c) partitioning, d) presence, awareness and support of users' representation.



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RESEARCH UNIT 6

NETWORKS TELEMATICS AND NEW SERVICES

Research Field:

Telematics

