Teledoc2 Project

interactive multimedia online learning service for PhD students

Project Teledoc2 provides the Philosophical Doctor (PhD) students of a group of Italian Universities with a full-featured distance learning service, using a proprietary packet communication network and simple Personal Computer (PC) running a custom multimedia application. The participating Universities are members of the **Italian National Inter-University Consortium for Telecommunications (CNIT)**.

The project is expected to run through 2003-2005, is financed by the Italian Ministry for Instruction, University and Research (**MIUR**) and is coordinated by Prof. Oreste Andrisano, from the University of Bologna.

The plan is to build the CNIT Network (the only multicast enabled network in Italy!) and to hold **multimedia courses**, dealing with specialized and avant-garde topics in the field of Information and Telecommunication technologies. The teachers belong to the Italian Universities members of CNIT, with a worldwide reputation for their research activities. Lessons consist of audio, video and data streaming in real time; students can also make use of an asynchronous service of recorded lessons in order to better prepare themselves outside real-time courses.

Teledoc2 is not only an academic project devoted to the spread of the knowledge, but is a technological challenge, too. The network and the custom multimedia application used in the project are an example of this.

The **innovative network**, featuring the pervasive use of multicasting to distribute multimedia information among its terminal sites, has been designed, implemented and is operated by CNIT. The **multimedia E-learning application**, using state-of-the-art compression techniques, squeezes the voice and the video of the teacher in a multimedia stream of about 300 kb/s. This stream is decompressed on the student PC to render images and audio on its screen and on its audio device, respectively. The quality of the teacher voice is comparable to the audio quality in a classroom.

These technological features, namely multicast transmission and data compression, allow the students to interactively attend the lectures from her/his desk using a PC connected to the CNIT national network via low-cost xDSL leased lines or directly via the CNIT satellite network. It is worth to observe that this E-learning system can be effectively used on a wide area network with a number of sites far greater than the current ones, using both terrestrial and satellite links.

The **learning strategy** of the Teledoc2 does indeed desire to recreate the environment of a real class, with a face-to-face relationship and a high level of interactivity between teacher and students. Participants can submit questions, send feedback and receive answers and clarifications in real time. The direct contact between the participants increases the motivation of both teacher and students: the teacher "feels" the students' presence through their audio, video and chat feedback and do not have the boring feel of a "lesson to anyone"; students feel that they are more supervised by the teacher and, in spite of the distance, are encouraged to pay attention.

The data communication network built up by CNIT for this project is currently used not only for E-learning purposes, but for other research and academic activities, too. An example is the interconnection of most CNIT research laboratories and the implementation of a **Network of Laboratories** to be used for teaching and research purposes.

The **packet data transmission network** used in Teledoc2 has been designed and implemented and is operated by CNIT. Large investments have been made to build a network capable of covering the whole National territory and of supporting an innovative way of transmission: multicasting.

During the 2004 year, the terrestrial CNIT network connected 42 sites with a large-bandwidth availability, as shown in Figure 1 (red dots indicate cities where more than a single site exists). A total of 33 Universities are to date connected to the network: they represent the vast majority of the Italian Universities offering Doctoral Degree Programs in the ICT field, with more than 1000 PhD students enrolled.
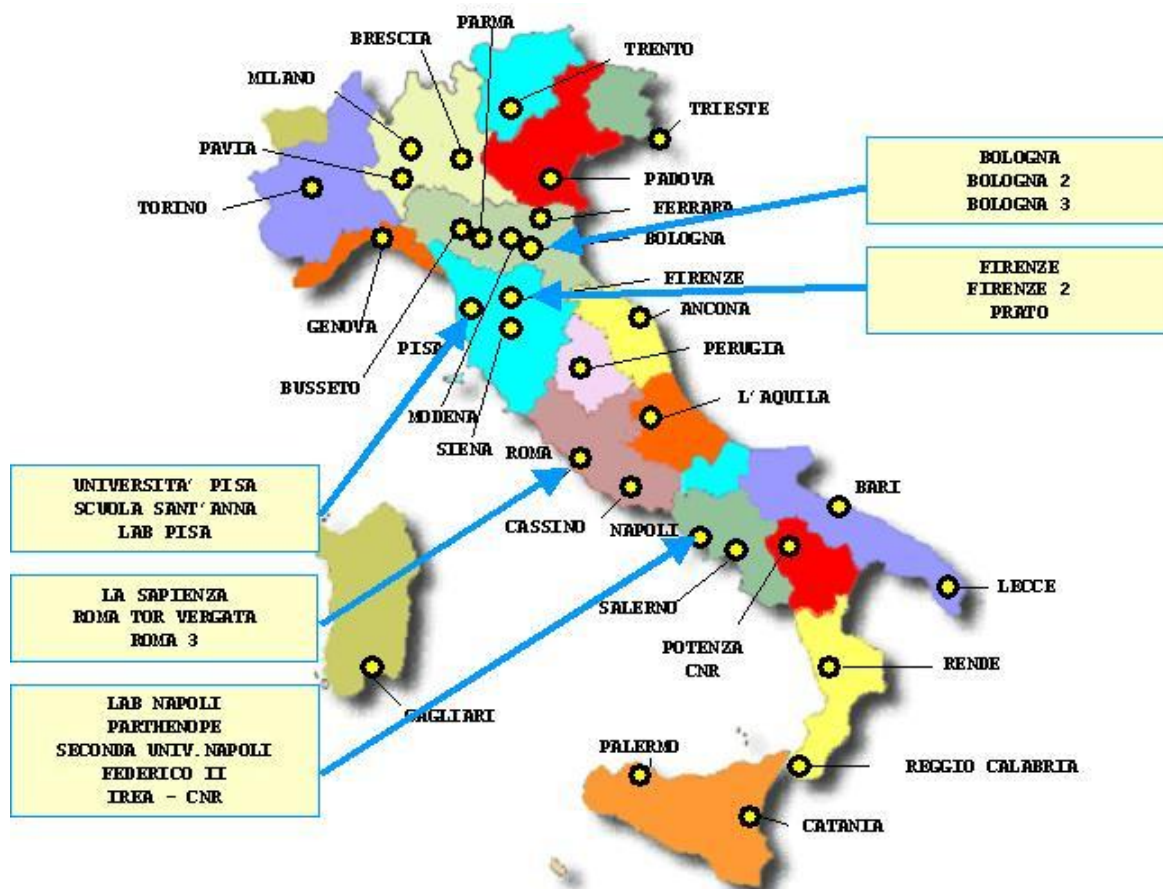

Figure 1 - The network coverage