Real-time microwave remote laboratory architecture

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Abstract

An advanced software/hardware flexible and realtime microwave and optical REmote-LABoratory (LABoratoire d'ENseignement VIrtuel: LAB-EN-VI) architecture is presented in this paper. The software part is based on the use of a free license server Node.js written in JavaScript. It offers lightweight Hypertext Markup Language (HTML) and JavaScript clients.

The integration of socket.io module enables a real-time operation mode of this Client/Server communication. Associated with hardware architecture, collaborative remote handling of resources (practical works and instruments) is enable in the same way as a chat communication used in Internet. Each remote action performed by one user is instantaneously visible in other users'web interfaces. The hardware part includes a minicomputer "PCduino" that executes node.js server and hosts Mysql databases under LINUX (Lubuntu) operating system. PCduino directly controls specifically developed relays circuit. These circuits offer the required flexibility and reusability for current remote laboratories. Practical Evaluation Board (PEB) corresponding to specific practical works are then designed and easily connected to instruments.