Design of a flexible architecture for characterization of active and passive microwave devices (patch antenna, filters, couplers and amplifier stage) in a remote laboratory

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Abstract :

The objective of this work is to present a new hardware and software flexible architecture of a remote laboratory. This architecture is applied to characterization of active and passive microwave devices. This remote laboratory is based on the use of a previously developed hardware interface FHI (Flexible Hardware Interface). FHI card is employed to the remote control of RF switches that serve to switch between ports or access of measurement and test instruments connected in various devices or Microwave stages. This method allows the remote characterization of several microwave devices using the same measuring instrument (Vector Network Analyzer for example). The same architecture is used for characterization of passive and active devices in microwave band. The passive devices may include patch antennas, filters, couplers ..., and active ones like amplifier stages for example. These require other instruments for remote characterization in low and high RF power (RF generator, scope, spectrum analyzer, DC (Direct Current) power supplies...). Switching between instruments is made by the remote control of RF Switches connected to them. The instruments are exploited remotely using those specific interfaces. The remote control of RF Switches is made through HTML web interfaces specially developed for each application.

This flexible architecture allows easy implementation of different and multiple distant electronic practical experiments in microwave domain for undergraduate engineering classes. The AJAX approach is used for the transfer of commands and data between the user and the hardware part of the remote laboratory. Results are stored in PhpMySql databases.