Laboratorio di telecomunicazioni

Finalità

Introducing Students to the world of measurements in Telecommunications, with a strong emphasis on industrial scope. Great attention is set in order to get acquainted Students with the most-used instruments and on the data acquisition procedures utilized in Research, Development and Validations Laboratories of main Telecommunications Firms.
Part of the Course is developed with the effective collaboration of the main instrumentation- and network-equipment suppliers, as Anritsu, Tektronix and Cisco Systems. They give talks on particular subjects and lend part of the equipements for the laboratory activities.

Programma

* Statistical Methods applied to measurement theory
    - Measurement Errors
        + Measurements representation
        + Errors in direct and in indirect measurements
        + Errors propagation
        + Errors propagation in presence of uncorrelated errors
    - Statistical Distributions
        + Uniform Distribution
        + Gaussian Distribution
    - Valuers Use
        + Average as True-Value valuer
        + Variance as Error Valuer
        + Weighted Average
        + Data rejection; Chauvenet's Criterion
    - Least-Squares Method
        + Indipendent variable with negligible uncertainty
        + Indipendent variable with not-negligible uncertainty
    - Covariance and Correlation
* Electrical Instrumentation
    - Real Time Oscilloscope (in coolaboration with Tektronix)
    - Sampling Oscilloscope (in collaboration with Tektronix)
    - Electrical Spectrum Analyzer
    - Network Anlaizer (in collaboration with Anritsu)
* Optical Instrumentation
    - Optical Spectrum Analyzer
    - Tunable Laser Source
    - Multichannel Optical Transmitter
    - Amplified Multichannel Optical Receiver
* Data Collection and Analisys
    - GPIB Bus
    - LabView Interface
* Laboratory Experiences: Theorical Analisys
    - Amplitude Modulation
    - Baseband Digital Modulations (in collaboration with Tektronix)
    - Use of Network Analyzer in characterizing RF devices (in collaboration with Anritsu)
    - Erbium-Doped Fiber Amplifier Characterization (in collaboration with Anritsu)
        - 10 Gb/s BER and Q measurements in amplified multichannel optical systems (in collaboration with Cisco Systems)
* Talks Tentative Scheduling:
    - 14/04/2005: Ing. Canafoglia - Cisco Systems
      EMI and ESD measurements for telecommunication equipment in central office environment.
    - 18/04/2005: Ing. Soffientini - Tektronix
      Modern Oscilloscopes Capabilities
    - 02/05/2005: Ing. Balzerini - Anritsu
      Vectorial Network Analyzers and their use in Telecommunication
    - 16/05/2005: Ing. Moscheni - Tektronix
      Jitter in 10 Gb/s systems: sources and test strategy
    - 23/05/2005: Ing. Mazzini - Cisco Systems
      The Industrial Process for Telecom Products; Agenda
    - 24/05/2005: Ing. Mazzini - Cisco Systems
      Test Strategies for Products in Industrial Environments; Agenda

Modalità d'esame
Examination is based on individual reports on laboratory experiments and on a talk. Reports due date is in two weeks before the examination date.

Testi consigliati
Teacher's Materials: http://www.tlc.unipr.it/dimaio/