

WIRELESS COMMUNICATIONS VIA SATELLITE AND ITS SERVICES AND APPLICATIONS

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Welcome to the 2013 IEEE International Courses for Wireless Technology Professionals – “Satellite Communications” jointly organized by Wireless Communication Laboratory of Faculty of Science and Technology of University of Macau and IEEE (Macau) AP/MTT Joint Chapter. The lecture presents a fundamental description of satellite communication systems. Detailed overview of the system structure and architecture is given: satellite orbits, space and ground segments, link budget analysis, methods of signal transmission and multiple access techniques (FDMA, TDMA, CDMA). Services delivered by satellite systems are discussed: fixed and mobile systems, radio and TV transmissions, data transmission systems, Internet via satellite, wideband multimedia systems, radionavigation systems. The course is organized in the following:

Part I Introduction

3.5 hours / Jan 30, 2013

- History of satellite communications
- System architecture
- Services
- Frequency bands
- Satellite orbits (GEO, LEO, HEO)

Part II Space Segment – Satellite

- Space environment
- Satellite subsystems
- Satellite repeater

Part III Ground Segment

3.5 hours / Jan 31, 2013

- Ground station – architecture and types
- User terminals
- Antennas

Part IV Satellite Radio Link

- Structure of digital radio transmission system
- Digital modulations
- Multiple access methods

Part V Link Budget

- Received power
- Noise
- Interferences
- Influence of atmosphere

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Part VI Fixed Satellite Services

3.5 hours / Feb 1, 2013

- Digital television - DVB-S and DVB-S2
- VSAT networks
- Internet via satellite

Part VII Mobile Satellite Services

- Inmarsat
- Iridium, Globalstar
- Thuraya, ACeS

Part VIII Future Trends in Satellite Communications and Navigation Systems

- Radiodiffusion
- Services for fixed users
- Services for mobile users

Date: January 30, 31, 2013

Time: 2:00 p.m. to 5:30 p.m.

Venue: JMI6, Silver Jubilee Building, University of Macau (UM), Av. Padre Tomás Pereira Taipa, Macau, China

Date: February 1, 2013

Time: 2:00 p.m. to 5:30 p.m.

Venue: J407, Silver Jubilee Building, University of Macau (UM), Av. Padre Tomás Pereira Taipa, Macau, China

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About the lecturer:



Józef Modelski received his M.Sc. degree in electronics in 1973 at the Faculty of Electronics of Warsaw University of Technology (WUT). The Faculty Council has also granted him the degrees: Ph.D. (1978), based on the dissertation: Method of Designing a Microwave Analogue Phase Shifter in a Set Frequency Band (with distinction), and the D.Sc. (1987) for the monograph: Microwave Analogue Modulators and Phase Shifters. In 1994 he received the state title of Professor and in 2011 title of doctor honoris causa from the Military Technical Academy.

Since 1973 Józef Modelski has been employed at the Institute of Radioelectronics of Warsaw University of Technology, holding in sequence all academic positions from teaching/research assistant to tenured professor (1991). In 1976-77 he spent over a year in the US as a Fulbright grantee working with the microwave laboratories at the Texas University (Austin), Cornell University (Ithaca) and COMSAT (Clarksburg). In 1985 he visited Germany as a DAAD grantee and in 1986 he joined for 2 years the Braunschweig Technical University (Germany) as a senior scientist and visiting professor. He has been on numerous research internships to European telecommunications firms and universities in inter alia: UK, Italy, Belgium, Portugal and Germany.

J. Modelski's research interests focus on microwave techniques, radiocommunications and television. In 70's and 80's he dealt with the design and construction of microwave modulators and phase shifters used in telecommunication systems with semiconductor diodes, MESFET transistors and ferrite elements. During his stay at the Braunschweig Technical University he was involved in researching the design of microwave subsystems in the technology of integrated waveguides INWATE and the main project was focused on working out the prototype of a satellite converter for the German telecommunications industry. In the years 1983-94 he conducted research on the design of accurate methods for analyzing dielectric and ferrite resonators as well as applying these resonators in filters, generators and material properties measurements in microwave band. In recent years his research interests have mainly focused on ferroelectric and smart antennas.

He is the author and co-author of over 300 publications, 9 patents and 4 monographs, inter alia: Microwave Modulators and Phase Shifters with Semiconductor Diodes, Dielectric Resonators and their Applications. His major original achievements implemented in practice include: the microwave integrated phase modulator used in the transmitter of the INTELSAT satellite (USA, 1978) and the TV converter integrated circuit in the INWATE technology for French-German satellite - Kopernikus (implemented for mass production, Germany, 1988).

Within the last decade he has initiated and co-organized a fair number of international programs. His research team was involved in 5 European projects: 2 EU specific targeted research projects: Reconfigurable Systems for Mobile Local Communication and Positioning RESOLUTION as well as Core Subsystem for Delivery of Multi-Band Data in CATV CODMUCA, integrated EU project: Co-operative Systems for Road Safety "Smart Vehicles on Smart Roads" SAFESPOT, 2 EU networks of excellence: Antenna Centre of Excellence ACE2 and Top Amplifier Research Groups in a European Team TARGET. Currently, he has been coordinating EU Specific Targeted Research Project PROTEUS - Integrated Mobile System for Supporting Anti-terrorist and Crisis Management Operations. For his research achievements he has received 6 Awards of the Ministry of Science and Higher Education. His team was also the winner of the European Microwave Association Award for the best paper of the European Microwave Conference 2008 in Amsterdam.

J. Modelski has lectured the following courses: Electromagnetic Field Theory, Microwave Techniques, Contemporary Applications of Microwaves, Satellite Television, Cable Television, Antenna Analysis and Design, Satellite Communications (since 1997). He is the co-author of the three textbooks. He has been supervisor of over 100 B.Sc. and M.Sc. theses, as well as 20 Ph.D. dissertations. For the didactic achievements he has received numerous distinctions, including the Medal of National Education and 4 Awards of the Ministry of Science and Higher Education.

Since 2001 Professor Modelski has been a Fellow Member of the Institute of Electrical and Electronics Engineers (IEEE), since 2009 Member of the IEEE Board of Directors and since 2011 President of the National Committee of the International Union of Radio Science (URSI). Since 2007 he has been a Member of the Polish Academy of Sciences (PAN) and Chairman of the Electronics and Telecommunications Committee of PAN. In 2008 he was President of IEEE Microwave Theory and Techniques Society and in 2009-2010 Director of IEEE Region 8

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(Europe, Africa and Middle East). In the years 1994-2006 he was Chairman of the International Conference on Microwaves, Radar and Wireless Communications MIKON, and since 2004 he has been Chairman of the Microwave and Radar Week in Poland. He is Associated Member of the Ukrainian National Academy of Sciences and Warsaw Scientific Society, a Member of Scientific Councils at the National Institute of Telecommunications and Bumar Elektronika. He has been a Member of TPC and Steering Committees of numerous conferences in the field of electronics and telecommunications (inter alia: International Microwave Symposium (USA), European Microwave Conference) and member of Editorial Committees of several scientific international and Polish periodicals (e.g. IEEE Transactions on MTT, Proceedings of the EuMA, International Journal of Electronics and Telecommunications PAN).

Professor Modelski acts as a consultant to many governmental agencies, industry and telecommunication operators.

J. Modelski has been awarded inter alia: the Cavalier's Cross of the Order of the Restoration of Poland, IEEE Third Millennium Medal.

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