

The **ITU Journal: ICT Discoveries** publishes original research on telecommunication/ICT technical developments and their policy and regulatory, economic, social and legal dimensions. It builds bridges between disciplines, connects theory with application, and stimulates international dialogue. This interdisciplinary approach reflects ITU's comprehensive field of interest and explores the convergence of telecommunication/ICT with other disciplines. It also features review articles, best practice implementation tutorials and case studies. The ITU Journal welcomes submissions at any time, on any topic within its scope.

Special Issue

## **Propagation modelling for advanced future radio systems - Challenges for a congested radio spectrum**

### **Call for papers**

A wide range of radio wave propagation phenomena, including effects due to climatic factors, have a significant impact on radiocommunication systems performance, availability and reliability, the efficient use of the congested radio spectrum, and on system and network planning. These phenomena affect all terrestrial and satellite services, including new broadband radiocommunication systems.

Providing radio services in an ever increasingly congested and expensive radio spectrum requires that such services be planned to operate with optimum efficiency, ensuring that the service is provided in an adequate manner using the minimum amount of radio spectrum, and avoiding harmful interference to and from other systems.

This special issue of the ITU Journal will provide the latest developments concerning radio wave propagation modelling and phenomena that are relevant to the planning and deployment of advanced future radiocommunication systems and the efficient use of the radio spectrum.

#### **Keywords**

Radio wave propagation modelling, attenuation, radiometeorology, interference, field strength measurement, terrain height database, surface feature database, statistical modelling, radio spectrum, radio network planning, radio network optimization, interference, propagation path, radio noise, ionospheric propagation, ray tracing

#### **Deadlines**

Paper submission: **3 June 2019**

Paper acceptance notification: 16 September 2019

Camera-ready paper submission: 7 October 2019

#### **Paper submission**

This special issue calls for original scientific papers. Submitted papers should not be under consideration for publication elsewhere. Submissions must be made electronically using EDAS: Editor's Assistant. Templates and guidelines can be found at: <https://www.itu.int/en/journal/Pages/submission-guidelines.aspx>.

#### **Publication**

As soon as they get accepted, papers will be continuously published on the ITU digital library. They will then be bundled into the yearly volume.

#### **Editor-in-Chief**

Jian Song, Tsinghua University

#### **Guest Editors**

- Christopher R. Anderson, United States Naval Academy
- Leke Lin, China Research Institute of Radio Wave Propagation
- Carlo Riva, Politecnico di Milano
- Sana Salous, Durham University
- Zhen-Wei Zhao, China Research Institute of Radio Wave Propagation

#### **Associate Editors-in-Chief**

The list of the Associate Editors-in-Chief is available at: <https://www.itu.int/en/journal/Pages/editorial-board.aspx>.

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Stephen Ibaraki, Social Entrepreneur and Futurist - Chair REDDS Capital

## Suggested topics (but not limited to):

### **Fundamentals of radio wave propagation**

- Radio wave propagation by diffraction, atmospheric refraction, scintillation, atmospheric duct, tropo-scatter, etc.
- Attenuation and dispersion due to atmospheric gasses, clouds, fog, sand, dust and precipitation, including specific attenuation model for rain using local rain drop size distribution.
- Attenuation due to vegetation, ground clutter and building-entry loss.
- Ground conductivity and permittivity, ionospheric characteristics, minimum and maximum transmission frequencies.
- Radiometeorology and digital maps, including radio refractivity, water vapor, rain drop size distribution, rain rate, the vertical structure of precipitation and rain height modelling.
- The use of topographic and surface coverage databases in radio wave propagation modelling.
- Variability of attenuation statistics and statistical aspects of modelling.
- Cross-polarization and anisotropy.
- Radio noise, radio emissivity of the atmosphere and ground.
- Wet antenna effects.

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### **Radio wave propagation modelling methods**

- Radio wave propagation modelling including path specific, path general, statistical and wideband-channel models.
- Models for all types of propagation paths.
- Numerical and artificial intelligence algorithms of electromagnetic wave propagation.
- Ground wave, sky-wave, trans-ionosphere propagation and ray-path modelling.
- Models for the prediction of interfering and wanted signals, taking into account the exceedance of percentage of time and percentage of locations, and the statistical modelling of various components of loss.
- Measurement methods and data for the development and/or validation of propagation models.
- Channel propagation and modelling in new scenarios, such as massive MIMO, vehicle to vehicle, high-speed train, IoT, etc.

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### **The impact of radio wave propagation modelling methods on link/network planning, optimization and reliability**

- The impact of radio wave propagation considerations on system planning issues such as link budget, coverage planning, frequency reuse, etc.
- The impact of radio wave propagation considerations on system design issues such as channel coding, modulation and MIMO.
- The effect of radio wave propagation on system availability, reliability and diversity.
- The impact of radio wave propagation considerations on spectrum planning such as intersystem impact, interference and compatibility analysis, etc.

### **Additional information:**

Please visit the ITU Journal website at: <https://www.itu.int/en/journal/2019/001/Pages/default.aspx>  
Inquiries should be addressed to Alessia Magliarditi at: [journal@itu.int](mailto:journal@itu.int)