

February 2025

Title: **Connectivity Modelling Intern**

Bureau/Dept/Unit: BDT/DNS/ FNS

Supervision: Walid Mathlouthi

Duration: 6 to 11 months maximum

Location: ITU Headquarters, Geneva, Switzerland

ITU is the United Nations specialized agency for Information and Communication Technologies – ICTs.

We allocate global radio spectrum and satellite orbits, develop the technical standards that ensure networks and technologies seamlessly interconnect, and strive to improve access to ICTs to underserved communities worldwide.

ITU is committed to connecting all the world's people, wherever they live and whatever their means. Through our work, we protect and support everyone's fundamental right to communicate.

Today, ICTs underpin everything we do. They help manage and control emergency services, water supplies, power networks and food distribution chains. They support health care, education, government services, financial markets, transportation systems, e-commerce platforms and environmental management. And they allow people to communicate with colleagues, friends and family anytime, and almost anywhere.

With the help of our global membership, ITU brings the benefits of modern communication technologies to people everywhere in an efficient, safe, easy and affordable manner.

ITU membership reads like a Who's Who of the ICT sector. We're unique among UN agencies in having both public and private sector membership. In addition to our 194 Member States, ITU membership includes ICT regulators, many leading academic institutions and some 700 tech companies.

In an increasingly interconnected world, ITU is the single global organization embracing all players in this dynamic and fast-growing sector.

1. **Organizational Unit:**

Development Telecommunications Bureau (BDT) DNS/FNS

|  |
| --- |
| 1. **Organizational context:**   The intern will work in the Future Networks and Spectrum Management Division (FNS) at the Digital Networks and Society DNS) Department and will support the work of the Network and Infrastructure Thematic Priority.  The objective of the program is to assist ITU Member States and ITU-D Sector Members and Associates in maximizing the use of new technologies for the development of their information and communication infrastructures and services and building global telecommunication/ICT infrastructure. It will be reached through: Increased usage of connectivity by citizens for socio-economic activities; efficient spectrum management by professionals using advanced technics and adoption of modern ICT infrastructure, based on international ICT standards by governmental bodies. The intern will be closely supervised by the Head of the Division. |

## **Terms of Reference / Internship Objective:**

The intern will play a key role in advancing data-driven solutions for telecommunication infrastructure planning and optimization. By developing analytical models and leveraging cutting-edge data science techniques, they will help assess connectivity needs, optimize network expansion, and enhance decision-making processes. This role offers a unique opportunity to work at the intersection of telecommunications, geospatial analysis, and software development, contributing to the design of scalable and cost-effective connectivity solutions for underserved areas.

In this role, the intern will:

* Collaborate with Data Engineers, GIS specialists, and telecommunications experts to standardise a pipeline for analysing telecommunication infrastructure, microeconomic data, and connectivity trends.
* Identify and evaluate telecommunication data sources to assess connectivity and infrastructure development in specific regions.
* Analyse population density datasets to estimate internet demand and inform network expansion strategies.
* Review and enhance connectivity models using geospatial data, ensuring interoperability and implementing models in executable code.
* Identify optimisation problems in network planning and development, researching algorithmic solutions to improve efficiency and coverage.
* Perform data extraction, preprocessing, and exploratory analysis, handling missing values and outliers to ensure high-quality datasets.
* Apply statistical methods and machine learning techniques to analyze trends, develop predictive models, and improve decision-making.
* Design and develop data visualizations to effectively communicate complex insights to stakeholders, including interactive dashboards and reports.
* Support the development of software platforms, database management, and UI/webpage design to enhance network analysis and planning tools.
* Prepare reports and presentations to translate data insights into actionable recommendations for strategic planning.

This intern position offers a hands-on opportunity to work at the intersection of telecommunications, data science, and software development, contributing to real-world connectivity solutions.

1. **Competencies**

* Basic proficiency in Python for data analysis and introductory machine learning tasks.
* Familiarity with data processing libraries such as pandas and NumPy for handling datasets.
* Understanding of SQL and NoSQL databases (e.g., PostgreSQL, MongoDB) for querying and managing data.
* Knowledge of statistical methods and their application in data analysis.
* Exposure to machine learning frameworks such as scikit-learn, TensorFlow, or PyTorch.
* Ability to create data visualizations using tools like Matplotlib, Seaborn, or Plotly.
* Interest in big data tools and platforms such as Hadoop, Spark, or Kafka (prior experience is a plus).
* Basic knowledge of geospatial libraries (e.g., GeoPandas, Shapely, QGIS) for analyzing geographic data.
* Familiarity with cloud platforms (AWS, Azure, or Google Cloud) for data storage and processing.
* Understanding of version control systems like Git and platforms such as GitHub or GitLab.
* Willingness to learn and contribute to developing, training, and evaluating machine learning models and product or user documentation creation and reviews.
* Strong communication skills to present data insights effectively to both technical and non-technical stakeholders.

**Technical Competencies**

* Understanding of research principles and ability to apply them in data analysis.
* Basic experience in data collection and processing, including handling and cleaning datasets.
* Critical thinking skills to analyze problems and propose data-driven solutions.
* Foundational software development experience in Python, with exposure to data analysis libraries.
* Familiarity with information theory and optimization problems is a plus.

1. **Qualifications required**
2. **Education**:

The internship is open to Bachelor's, Master's, and Ph.D. students, or recent graduates (no more than six months post-graduation), with academic backgrounds in information and communication technologies, computer science, applied mathematics, physics, or closely related fields. Candidates with experience in coding and software development will be given preference. Those with other relevant university degrees may also be considered, provided their studies align with the research, technical, and development areas of the internship.

1. **Work experience**:

No work experience is required.

1. **Languages:**  
   Good knowledge of English for conducting research as well as for drafting and editing documents. Knowledge of one of the other five official languages of the Union (Arabic, Chinese, French, Russian, Spanish) would be an advantage.
2. **Training and Learning Elements:**

Through this internship, the intern will gain valuable knowledge and hands-on experience in:

* Applying ICT infrastructure business planning methodologies to support connectivity initiatives.
* Implementing and executing connectivity models for various technologies and deployment scenarios.
* Conducting research on last-mile connectivity projects and their global implementation.
* Utilising open-source data and GIS tools for planning and optimising telecommunication networks.
* Collaborating in an international environment, developing communication and teamwork skills across diverse teams.

1. **Additional information:** N/A