The DNS Atlas: Assessing DNS Dependencies at Scale
Ph.D. candidate vacancy, University of Twente, The Netherlands

Project description – The Domain Name System (DNS) plays a central role in the Internet's infrastructure. Its distributed nature has enabled global scalability, but it also introduces risks that undermine resilience. Delegations in the DNS namespace form long and often opaque supply chains, increasing the attack surface and introducing potential single points of failure.

In today's landscape, many organizations rely on third-party DNS services without full visibility into what lies beneath. These managed services often depend on other providers, recursively forming complex supply chains that are difficult to analyze. As a result, operators may unknowingly introduce technical, operational, and regulatory risks – especially in critical domains such as e-government, healthcare, and finance – where compliance with frameworks like NIS2 and DORA is increasingly more essential.

This project aims to analyze and map these hidden dependencies from a technical and scientific perspective. The Ph.D. candidate will develop methods for uncovering DNS infrastructure dependencies at scale, relying on active measurements and graph-based analysis. The focus will be on designing reproducible techniques for identifying dependency structures, validating these methods through large-scale experimentation, and evaluating how well DNS configurations align with recommended best practices.

Key research activities include designing and implementing DNS measurement methodologies focused on identifying hidden dependencies, analyzing large-scale DNS and infrastructure data, and building visual tools to support the interpretation and communication of results. The work has a strong foundation in systems and network research, with an emphasis on DNS protocol behavior, resolver interactions, and dependency modeling.

This project builds on ongoing collaborations with both national and international partners, including SIDN and TNO in the Netherlands, CAIDA in the United States, and IIJ in Japan. The candidate will be part of the Design and Analysis of Communication Systems (DACS) `https://www.utwente.nl/en/eemcs/dacs/` group at the University of Twente and will work under the supervision of Dr. ir. Raffaele Sommese and Dr. ir. Mattijs Jonker from DACS and Dr. Abhishta Abhishta from the High-tech Business and Entrepreneurial (HBE) `https://www.utwente.nl/en/bms/organisation/departments-institutes/department-hbe/` group of the University of Twente.

Requirements

- A Master Degree in Computer Science, Electrical Engineering or closely related discipline;
- Good communication skills and an excellent command of English;
- A strong computer networking background, coding skills and willingness to work with real-world deployments;
- Creative thinker with analytical and problem-solving abilities;
- A high degree of responsibility and independence, while collaborating with close colleagues, researchers and other staff.
- Bonus points: Knowledge of organizational or business process, graph theory, and big-data processing.

Application – your application should include:

- a motivational letter, including explanation of your motivation for this PhD position and for this project;

- A detailed CV (resume);
- An academic transcript of B.Sc. (if applicable) and M.Sc. education;

Conditions of employment

- A full-time 4-year PhD position;
- Full status as an employee at the UT, including pension and health care benefits;
- A gross monthly salary of €2,901.- in the first year that increases to €3,707.- in the fourth year;
- A holiday allowance of 8% of the gross annual salary and a year-end bonus of 8.3%;
- Excellent facilities for professional and personal development;
- A total of 41 holiday days per year in case of full-time employment;
- Free access to sports facilities on campus;
- The University of Twente offers excellent working conditions, an exciting scientific environment, and a green and lively campus with ample sports and cultural facilities.
- A friendly and welcoming research group, with attention to employee wellbeing.
- Access to state-of-the-art laboratory facilities and equipment.

For enquiries and to apply, please contact: **Dr. Raffaele Sommese** (`r.sommese@utwente.nl`), **Dr. Mattijs Jonker** (`m.jonker@utwente.nl`), or **Dr. Abhishta Abhishta** (`s.abhishta@utwente.nl`). Application deadline: **Aug 15th, 2025**, but applications will be reviewed on a rolling basis and the position may be filled earlier if a suitable candidate is found.