



Norwegian University of
Science and Technology

Jobbnorge ID: 297855
Deadline: 5/15/2026
Website: <http://www.ntnu.no>
Scope: Fulltime
Duration: Project

The Department of Information Security and Communication Technology has a vacancy for a position as

PhD Candidate in Scalable and Resilient Quantum Internet Architecture and Operations

This is NTNU

NTNU is a broad-based university with a technical-scientific profile and a focus in professional education. The university is located in three cities with headquarters in Trondheim.

At NTNU, 9,000 employees and 43,000 students work to create knowledge for a better world.

You will find more information about working at NTNU and the application process [here](#).

Video: <https://youtu.be/Xt-yHCN5QS0>

About the position

The [Department of Information Security and Communication Technology](#) invites applications for a PhD Research Fellow position in **Quantum Internet Architecture and Protocol Stack**. The successful candidate will be offered a 4-year appointment that includes teaching responsibilities.

The PhD position will investigate the design of a scalable, interoperable, and resilient quantum internet architecture and protocol stack for real-world operation in hybrid quantum-classical networks across intra- and inter-domain settings. The candidate will study architectural models, including the placement and roles of quantum repeaters, memories, and control-plane functions, and how these integrate with classical networking and orchestration. The work will also explore operational control in quantum networks, including quantum-aware resource allocation, routing, scheduling, and fault tolerance, assessed using relevant quantum performance indicators such as entanglement latency/throughput, multi-hop fidelity, and entanglement swapping success.

A central focus is resilience and security, developing strategies and metrics to maintain dependable operation under failures, noise, and adversarial conditions, including measures such as QBER and detectability of eavesdropping. The expected outcome is a set of reference architectures, operational protocols, and resilience guidelines suitable for scientific publication and future deployment efforts.

Your immediate leader will be the Head of the Communication Technology Unit at the Department of Information Security and Communication Technology. The workplace will be located in Trondheim.

About the project

The PhD work will be carried out within the Centre for Quantum Communication Networks and Applications (QCNA) which is establishing Norway's first experimental test network for quantum communication for accelerating research on quantum-secure communications and the future quantum internet. Within this context, the candidate will contribute to QCNA's broader mission of developing next-generation quantum cryptographic protocols, investigating error-correction techniques for distributed quantum applications, and advancing architectures and protocols for the emerging quantum internet. The project will be embedded in a strong competence-building environment (training researchers, contributing to university courses, and industry upskilling) and a consortium including SimulaMet, SINTEF Digital, NTNU, Aalborg University, Okinawa Institute of Science and Technology, Telenor, and Toshiba Europe, offering an exceptional setting for impactful and collaborative PhD research.

Duties of the position

- Complete the doctoral training and successfully obtain a PhD degree
- Conduct high-quality research within the scope outlined for the position
- Publish scientific results in recognized venues and contribute to their public dissemination
- Actively participate in the [Networking](#) research group and its ongoing research activities
- Engage in international activities such as conferences and/or undertake research stays at foreign educational institutions
- Teaching and supporting of learning activities in courses related to networking
- Contribute to career-development activities that support your progress as an independent researcher

Be prepared for changes to your work duties after employment.

Required selection criteria

- Applicants must hold a relevant master's degree in telecommunications, computer networks, computer science, or a closely related field, with a strong background in computer networking and distributed systems, including protocol stacks and network performance concepts. The degree must correspond to a five-year Norwegian degree programme, including 120 ECTS credits at the master's level.
- Candidates who are currently completing a master's degree may also apply, provided that the degree is completed and documented before the position begins, and no later than 1-st of November 2026. Eligible candidates may, where applicable, pursue an Integrated PhD programme. Further information is available on [Integrated PhD](#).
- Applicants must have a strong academic background from your previous studies and have an average grade from your Master's degree study, or equivalent education, which is equal to B or better compared to [NTNU's grading scale](#). If you do not have letter grades from previous studies, you must have an equally good academic foundation. If you have a weaker grade background, you may be considered if you can document that you are particularly suitable for a PhD education.
- Applicants must meet the requirements for admission to the to the [PhD program in Information Security and Communication Technology](#).
- Applicants who do not master a Scandinavian language or are not native English speakers must provide evidence of good English language skills, written and spoken. The following tests can be used as such documentation: TOEFL, IELTS or Cambridge Certificate in Advanced English (CAE) or Cambridge Certificate of Proficiency in English (CPE). Minimum scores are:
 - TOEFL: 600 (paper-based test), 92 (Internet-based test).
 - IELTS: 6.5, with no section lower than 5.5 (only Academic IELTS test accepted).
 - CAE/CPE: grade B or A

PLEASE NOTE: For detailed information about what the application must contain, see paragraph "About the application".

The appointment is to be made in accordance with [NTNUs guidelines for recruitment positions](#) and [Regulations for the degrees philosophiae doctor \(ph.d.\) and philosophiae doctor \(ph.d.\) in artistic development work at the Norwegian University of Science and Technology \(NTNU\)](#) for general criteria for the position.

Preferred selection criteria

- Knowledge of quantum communication / quantum information fundamentals (e.g., entanglement, fidelity/noise, quantum repeaters)
- Experience with network modelling, performance analysis, or simulation-based evaluation
- Background in optimization, resource allocation, scheduling, or graph-based network analysis
- Exposure to resilience, reliability engineering, or security analysis (including adversarial/threat modelling)
- Familiarity with quantum network simulation tools (e.g., NetSquid, SimulaQron) or related frameworks
- Good oral and written presentation skills in Norwegian/Scandinavian equivalent level
- A project outline containing proposals for an overall description of research questions, theoretical perspectives, methodological design for the project and progress plan (maximum 1000 words/3 pages)

Personal characteristics

We are looking for someone who:

- Is curious, structured, and able to work independently on complex research problems
- Collaborates well in interdisciplinary teams and contributes to a positive research environment
- Communicates clearly and enjoys scientific writing and dissemination
- Is motivated to build competence across networking, systems, and emerging quantum technologies

In the evaluation of which candidate is best qualified, emphasis will be placed on education, experience and personal suitability, as well as motivation, in terms of the qualifications specified in the advertisement.

We offer

- An exciting job with an important [mission](#) in society
- Developing tasks in a strong and international professional environment
- Career guidance and [follow-up during the PhD period](#)
- Open and inclusive working environment with committed colleagues
- Favorable terms as a member of the [Norwegian Public Service Pension Fund \(SPK\)](#)
- Norwegian language training at a basic level [\(A2\)](#)

As a PhD Candidate at NTNU, you will have access to [employee benefits](#).

Diversity

Diversity is a strength, and at NTNU we aim to be an employer that reflects the diversity in society and that makes use of the potential of the population's collective skills. Our vision is [Knowledge for a better world](#) and [our values are creative, critical, constructive and respectful](#). We believe that an organization that is equal, diverse, and gender-balanced is essential for us to achieve our goals.

We strive to attract employees with different skills, life experiences and perspectives to contribute to even better problem solving of our societal mission in research and education.

If you think this position is relevant and interesting, we encourage you to apply, regardless of gender, functional ability, and cultural background, or whether you have been out of work for a period of time.

At NTNU we want to increase the proportion of women in scientific positions. We have a number of [measures](#) to promote equality.

Salary and conditions

In the position of PhD Candidate, code 1017, your gross salary will normally be NOK 550 800,-per annum depending on qualifications and seniority. A 2% statutory contribution to the State Pension Fund is deducted from the salary.

The employment period is 4 years for the doctoral work including teaching duties. Integrated PhD study candidates are welcome to apply. More information on the Integrated PhD programme can be found [here](#).

For employment as a PhD Candidate, it is a prerequisite that you gain admission to the PhD programme in [subject area] (link to possible website) within three months of your employment contract start date, and that you participate in an organized doctoral programme through out the period of employment.

The position is conditional on external funding (remove if the position is not to be funded by external funds)

As an employee at NTNU, it is important that you keep yourself up to date with academic and organizational changes and adapt to them.

For the necessary professional and social interaction, it is a prerequisite that you are physically present and available to the institution on a daily basis.

The appointment is carried out in accordance with the principles of the [State Employees Act](#), and [Export control](#) (legislation that regulates the export of knowledge, technology and services). Candidates who, after assessment of the application and attachments, are considered to be in conflict with the criteria in the latter act, will not be able to be employed.

About the application

The attachments (including a description of your scientific work) must accompany the application as these documents form the basis of the application assessment. The documents must be in Norwegian/a Scandinavian language or English.

Please note: the application will only be assessed on the basis of the information we have received by the application deadline. Therefore, make sure that your application clearly shows how your skills and experience meet the criteria described above. The application and all attachments must be sent electronically via [Jobbnorge.no](#). If you are invited to an interview, you must bring certified copies of certificates and diplomas upon request.

The application must include:

- Transcripts and diplomas for Bachelor's and Master's degrees
- Curriculum Vitae (CV)
- Copy of Master's thesis. If you have recently submitted your Master's thesis, you can attach a draft of the thesis. Documentation of a completed Master's degree must be presented before taking up the position.
- Short letter of motivation (400 words/1 page)
- Publications or other relevant research work (if applicable)
- Certificates or other relevant documentation (if applicable)
- Link(s) to public GitHub repositories or other code portfolios demonstrating relevant programming experience (e.g., in C++, Python, or Java) (if available)
- If the thesis has been recently submitted, a draft may be attached.
- Names and contact information of three relevant referees

If all, or parts, of your education has been taken abroad, we also ask you to attach documentation of the scope and quality of your entire education, both Bachelor's and Master's education, in addition to other higher education. If your institution uses "diploma supplement" (normal for most European institutions), you must attach this. A description of the documentation required can also be found [here](#). If you already have a statement from [Norwegian Directorate for Higher Education and Skills \(HK-dir\)](#), please attach this as well.

Joint work will be considered. If it is difficult to identify your contribution to joint work, you must attach a brief description of your participation.

When assessing the best qualified, we emphasize necessary qualifications such as education, experience and personal suitability. Motivation for the position, ambitions, and potential for research will also count when assessing the candidates.

NTNU recognizes a wide range of academic contributions and has committed itself to [The San Francisco Declaration on Research Assessment](#) and [CoARA](#) (responsible assessment of research and recognition of a greater breadth of academic contributions in accordance with NTNU's social mission).

General information

A public list of applicants with name, age, job title and municipality of residence is prepared after the application deadline. If you wish to be exempt from entry on the public applicant list, this must be justified. Assessment will be made in accordance with [current legislation](#). You will be notified if the exemption is not granted.

If you think this position looks interesting and in line with your qualifications, you are welcome to apply.

If you have any questions about the position, please contact Associate Professor Besmir Tola, email: besmir.tola@ntnu.no.

If you have any questions about the recruitment process, please contact HR consultant Julie Lindland, email: julie.lindland@ntnu.no.

Application deadline: 15.05.2026.

For practical information about [working at NTNU](#), please visit [this webpage](#).

[The city of Trondheim](#) is a modern European city with a rich cultural scene. [Trondheim is the tech capital of Norway](#), with a population of 200,000. The Norwegian welfare state, including healthcare, schools, kindergartens and overall equality, is probably the best of its kind in the

world. Professional subsidized day-care for children is easily available. Furthermore, Trondheim offers great opportunities for education (including international schools) and possibilities to enjoy nature, culture and family life and has low crime rates and clean air quality.

NTNU - knowledge for a better world

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The Norwegian University of Science and Technology (NTNU) creates knowledge for a better world and solutions that can change everyday life.

Department of Information Security and Communication Technology

Research is vital to the security of our society. We teach and conduct research in cyber security, information security, communications networks and networked services. Our areas of expertise include biometrics, cyber defence, cryptography, digital forensics, security in e-health and welfare technology, intelligent transportation systems and malware. The Department of Information Security and Communication Technology is one of seven departments in the [Faculty of Information Technology and Electrical Engineering](#) .

Additional information

Place of service:

Høgskoleringen 1 7491 Trondheim (Trondheim Municipality)