



Marko Teittinen/AL

15.11.2018

EMPLOYMENT CERTIFICATE

On request, I confirm that **Juha-Matti Tilli** (born on 22.01.1987) has been employed by Nokia Finland group of companies during 12.1.2015 – 19.10.2018 in the following positions:

- Specialist
- Research Specialist

While working in his last role as Research Specialist during 01.04.2018 – 19.10.2018, his duties have included software development for large LTE and 5G research demo and validation platform. During this time he has had an independent role in researching latest 3GPP technologies (LTE) and early/internal 5G ideas and related documents and research optimal software technologies to transfer those into software design and implementation. His responsibilities have included multiple software components he has been fully responsible for and covering the whole software development cycle from design to testing and documentation as a part of larger project development team. His special focus area in the project was high performance user plane architecture from the design to real-time implementation.

Furthermore, he has been responsible for customer interaction by providing direct support (by e-mail) and demonstration duties at exhibition stand.

During his project assignments, he has been exposed to the following software development languages, environments and skills: Linux operating system in general, C programming language, GNU software development tools, shell scripts, Python, highly optimized multithreaded programming, socket programming, Jenkins test automation tools, Git version control systems, ProtoBuf, Wireshark and Valgrind.



During the years he has been exposed to numerous 3GPP protocols, network elements and LTE/5G network architecture in general. In context of this he has experience of telecommunication technologies and architectures of control and user plane split, data transmission technologies, fast packet access mechanisms, physical and virtual network interface technologies, TCP, UDP and IP communication, Open Source software (e.g. Open Data Plane, netmap and DPDK) virtualization and cloudification techniques, virtual machines, load balancing concepts and software defined network principles.

He has authored or co-authored multiple invention reports (patents pending). He has also authored multiple conference papers.

Juha-Matti Tilli has performed his duties with excellent working skills and behavior. He possesses world class competencies in computer architectures, Linux operating system and TCP/IP concepts, algorithms, techniques and their implementation and security aspects. Overall, his capacity to understand complex theoretical problems, research them and their solutions and to quickly transfer them into working implementation and prototypes is extraordinary. His productivity overall is in exceptionally high level. However, some more routine or more repetitive tasks are not among his strongest assets.

The reason for the termination of the employment relationship is employee's resignation.

Nokia Solutions and Networks Oy

Human Resources

Anne-Maarit Leppäkoski
Anne-Maarit Leppäkoski
HR Operations Expert