Shubham Kumar

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SUMMARY

Telecom researcher with experience working on 5G systems, network security, and open-source technologies. Skilled in writing technical documentation, preparing architectural diagrams, and contributing to collaborative engineering projects. Has presented at public forums, conducted technical workshops, and supported outreach efforts for open telecom initiatives. Familiar with standards development processes and comfortable working across academic, industry, and community environments. Currently contributing to projects focused on 5G, post-quantum security, and blockchain-based network authentication.

WORK EXPERIENCE

Mentor — April 2025 - Present

LF Decentralised Trust Mentorship Program, Remote

- Leading a mentorship project exploring blockchain-based OAuth 2.0 authorization for NF authentication in 5G core networks.
- Guiding 1 mentee for smart contract development and integration with open-source 5G cores.
- Overseeing performance benchmarking and security evaluation of decentralized vs. traditional models.
- Contributing to technical documentation and research insights to LFDT community and future Telecom security standards.

Maintainer — March 2023 - Present

NgKore Community, New Delhi, India

- Developed in-depth technical documentation on 5G Core automation using Kubernetes Operators, including architecture-level diagrams.
- Created technical content on SR-IOV, DPDK, and AF_XDP for high-performance packet processing in 5G environments.
- Shared research insights and contributed xFAPI technical blogs to the O-RAN community, addressing L1-L2 interoperability challenges.

5G & Cloud Solutions Architect — June 2024 - May 2025

CORAN LABS PVT. LTD., New Delhi, India

- Led R&D across O-RAN (MAC, RLC, PDCP, RRC, SDAP), advanced 5G architectures, blockchain-based authentication, and Kubernetes-native 5G core deployments.
- LDPC encoding modifications to Intel FlexRAN for support of OSC DU-High interoperability, reducing processing time by 20%.
- Maintainer of the xFAPI project, enabling L1-L2 interface interoperability in O-RAN deployments.
- Managed 2 cross-functional engineering teams for RAN development and blockchain integration.
- Worked on a range of projects in 5G RAN automation, blockchain-based authentication, and integrating emerging technologies into telecom solutions.
- Led external communications including co-authoring a PQC-5G security report submitted to ITU and securing a granted patent (IN 561622).

Contributor & Technical Writer — February 2022 - April 2025

Magma India Community, New Delhi, India

- Prepared technical breakdowns of 5G Core architectures (Magma, OAI, Free5GC) with NF-level (AMF, SMF, UPF) call flows and diagrams.
- Explained 5G-AKA, NR frame structure, reference signals with call flows and detailed diagrams.
- Magma 5G HN Milenage Algorithm explained with Diagrams and Code Snippets along with 3GPP mapping.
- Published 3GPP Standard-Based 5G Core Comparison of OAI, Free5GC, Open5GS, and Magma.

Research Engineer **January 2022 - February 2024**

University of Delhi, New Delhi, India

- Deployed end-to-end 5G testbeds using SDRs (USRP B210, X410, N310) and commercial O-RUs (LiteON, Benetel).
- Containerized and orchestrated 5G Core Network Functions (NFs) using Kubernetes for scalable, cloud-native deployments.
- Evaluated open-source 5G Core and RAN stacks (Free5GC, Open5GS, OAI, SD-Core, SRSRAN, OSC) with various simulators (UERANSIM, gnbSIM, PacketRusher).
- Deployed private cloud with Proxmox VE, Xen Hypervisor, Canonical Multipass, VMWare
- Performed benchmarking using TreX, DPDK-based pkt-gen and other network testing tools.
- Conducted 3 workshops on cloud computing for students and researchers.

SKILLS

- **Cloud & DevOps:** Kubernetes, Docker, Helm, Git, CI/CD Pipeline, GitHub Actions, Ansible, Shell Scripting, Linux, Xen, VMWare, Multipass, Proxmox VE, Agile tools (Jira, Trello, Atlassian, Confluence)
- **Networking:** 5G Core, O-RAN, SR-IOV, DPDK, AF_XDP, Load Balancing
- **Security:** mTLS, IPSec, OAuth 2.0, RBAC, Network Policies
- **Programming Languages:** C++/C, Go, Python
- **Marketing & Communication:** Technical Writing, Public speaking, Community engagement, Team Leadership, Problem Solving, Training and mentoring, Project Management, Quick Learning

ACCOMPLISHMENTS

- **Patent Holder** (IN 561622) – Post-Quantum Security for User Identity in Next-Generation Networks.
- **Co-author, Technical Report (TR)** on "Securing the 5G Core using Post-Quantum Cryptography" – Submitted to the TEC (Telecommunication Engineering Center).
- Presenter at Hyperledger Telecom SIG Meeting for LFDT Mentorship proposal.
- Mentored participants during the "eBPF Bootcamp with Private 5G" at Cloud Native India Security Meetup (Coredge.io, Noida, India).
- Speaker at Cloud Native India Security Meetup (Google, Gurgaon, India) for leveraging eBPF within the 5G Core.
- Speaker at Kubernetes Security Meetup discussing Lawful interception in 5G networks.
- Host and Speaker at OpenInfra, Cloud Native, Magma & Hyperledger Days, DU, New Delhi.
- Volunteer at 5G Super Blueprint Day, Magma India.

CERTIFICATION

- Kubernetes for the Absolute Beginners - Hands-on Tutorial
- Learn-By-Doing Kubernetes Network Policies
- Shell Scripts for Beginners
- AWS Educate Getting Started with Compute
- Kubernetes: Package Management with Helm
- Docker Training Course for the Absolute Beginner
- 5G Architecture, Design, Protocols, Evolution, & Deployment
- 5G Lab for Service Based Architecture & Signaling
- Open RAN (ORAN) architecture, evolution & deployment - 5G

EDUCATION

Bachelors of Science in Computer Science **2021-2024**

University of Delhi, New Delhi, India

LANGUAGES

- English (B2)
- Hindi (Native)