

Zero Touch Rolling Upgrade Cloud-native Network Functions

Thi Lua Bui*, Hoang Phuong Thao Do*, Xuan Chinh Nguyen*, Van Hiep Hoang*,
Thanh Tung Bui*, Thi Phuong Thao Hoang**

*Viettel High Technology, Viettel Group, Hanoi, Vietnam

**Viettel Networks, Viettel Group, Hanoi, Vietnam

(luabt, thaodhp, chihn4, hiephv3, tungbt16, thaohtp2)@viettel.com.vn

Abstract - As Cloud-Native Functions (CNFs) become increasingly crucial in modern telecommunications architecture, the demand for efficient, reliable, and uninterrupted upgrade processes has grown more urgent. Traditional upgrade mechanisms often require manual intervention and can lead to service downtime, negatively impacting Quality of Service (QoS) and breaching strict Service Level Agreements (SLA).

To address these challenges, in this paper, we introduce the Zero Touch Upgrade solution for CNF — an automated upgrade solution designed to eliminate human intervention and minimize downtime. Our approach integrates intelligent orchestration systems, continuous monitoring, and rollback mechanisms to ensure seamless transitions between software versions without service disruption. By leveraging Kubernetes-based service mesh and container orchestration, we ensure high availability, scalability, and adherence to the Zero Downtime principle. Experimental results from our Viettel Online Charging System (vOCS) demonstrate significant improvements in upgrade performance, system reliability, and user experience, proving the solution's effectiveness in dynamic and critical telecommunications environments.

Keyword - CNF, Zero Touch Upgrade, Rolling Upgrade, Monitor, KPI, Online Charging System

Thi Lua Bui received his B.Sc. degree in Software Engineering in 2021 from Posts and Telecommunications Institute of Technology, Vietnam. She is currently a software deployment engineer in Viettel High Technology, Viettel Group. She has many years of experience with cloud computing, cloud native platform. Her research focus on algorithm, operation system, cloud computing.



Hoang Phuong Do Thao is currently a software deployment engineer in Viettel High Technology - Viettel Group, graduating from the Posts and Telecommunications Institute of Technology in 2021. She has many years of experience with cloud computing and cloud native platforms, especially for telecommunications. Her research interests include networking, cloud computing.



Xuan Chinh Nguyen is currently a software deployment engineer at Viettel High Technology - Viettel Group, graduated from the Hanoi University of Industry in 2019. He has many years of experience with cloud computing and cloud native platforms, especially for telecommunications. His research interests include networking, cloud computing, network security, the Future Internet.





Van Hiep Hoang received his B.Sc. degree in Software Engineering in 2020 from Posts and Telecommunications Institute of Technology, Vietnam. He is currently a software deployment engineer at Viettel High Technology - Viettel Group. He is very experienced with many years working with cloud computing in both infrastructure and applications domain. Specially, he focuses on cloud native, high performance systems in Telecommunication Core Network.



Thanh Tung Bui was graduated in Information Technology in 2021 from Posts and Telecommunications Institute of Technology, Vietnam. Currently, he is a software deployment engineer in orchestration platform department at Viettel High Technology, Viettel Group. He has many years of experience with cloud computing and cloud native platforms, especially for telecommunications. His research focus on high performance computing, operating system, networking, cloud computing, network security.



Thi Phuong Thao Hoang is currently a planing engineer in Viettel Networks, Viettel Group. She has many years of experience in research and development of 5G core systems such as online charging system. Her research interests include telecommunications core networks, cloud computing.