Solving Signaling Storm through Long-Term Evolution Refactoring

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ABSTRACT

The Long-Term Evolution (LTE) architecture is composed by interconnected hardware devices which provide a set of services to the final users, like handling the handoff between different base stations and prioritizing packet flows of premium users. Each device provides one or more of these services, and each service needs the state of the users' devices in order to be provided. Therefore this state is replicated in several elements of the architecture, and a lot of traffic among the network devices is needed in order to keep its consistency every time an update is needed. This issue is called signaling storm.

In order to solve the problem, we need to reduce the replication of the state of users' devices in the architecture. Our initial analysis of the signals behind the signaling storm has shown that this is possible by refactoring the elements in the LTE core [1]. We are studying the application of Network Function Virtualization and Software-Defined Networking on the LTE network in order to practically realize this refactoring. Our aim is to move most of the functionalities provided in a single logical controller, which instruct the forwarding devices accordingly to its decisions: in this way the replication of the state is limited to the physical elements in which the controller is deployed. We are also analyzing the impact of the publish-subscribe paradigm for keeping consistency of the replicated states in order to overcome the issues of the current request-response mechanism.

BODY

Refactoring LTE networks opens a gold mine of research problems and provides insights for laying the cornerstone for modular 5G networks.

REFERENCES

[1] H. Lindholm, L. Osmani, H. Flinck, S. Tarkoma, and A. Rao. State space analysis to refactor the mobile core. In *Proceedings of the 5th Workshop on All Things Cellular: Operations, Applications and Challenges*, AllThingsCellular '15, pages 31–36, New York, NY, USA, 2015. ACM.

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