Scalable Fault Management of Evolved Radio Access for 4G Networks

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Abstract:

There has been a tremendous growth in wireless communication technology over the past decade. 2G and 3G are the dominant defacto-techniques for wide area cellular telephone networks. The Fourth-Generation (4G) communications system is the next attempt to achieve and expand the predominant position within this sector. Objectives are increased data rate, simplified hand-off scenario across heterogeneous networks, pure packet switched network, improved quality of service support and seamless connectivity across networks.

To fulfill these new objectives, a more complex interaction between the components as well as additional components is required. This, on the other hand, introduces more challenges in the field of network management. It is still one of the most important aspects, that the network is maintainable.

Nowadays cellular network failure management works in a centralized manner. All relevant alarms – alarms with major impact – are pushed to a centralized system in a uncoordinated fashion. Since 4G networks introduce an additional level of complexity, it is conceivable that the quantity of alarms will also increase. Besides the amount of alarms, the complexity of alarms and their complex relation will hinder the task of a contemporary problem solution.

This thesis will propose a novel approach for an decentralized and distributed event correlation and synchronization framework. It correlates and suppresses events on a local basis, synchronizes within the network and exchanges relevant information within involved nodes to gain additional information and inform the management instance. The gained benefits are improved network stability and reduced operation costs through minimized faults.

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