MWB: Make-without-Break Seamless Handovers for Distributed Mobility Management Schemes

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The ever-increasing demand of mobile internet traffic is pushing operators to look for solutions to increase the available bandwidth per user and per unit of area. At the same time, they need to reduce the load in the core network at a reasonable cost in their future 5G deployments. The huge success of powerful hand-held devices and the deployment of faster heterogeneous radio access technologies, like IEEE 802.11n and the Long Term Evolution (LTE), have led to the familiar concept connected anywhere, anytime. Reports show that the mobile traffic growth will not decelerate, but, conversely, it will increase 11-fold from 2013 by the end of 2018.

Taking in to account the requirements for large traffic in the core, ubiquitous connectivity at high data rate network and the rise of the extremely dense wireless access networks (distributed nature of the mobile networks) of the future 5G networks Distributed Mobility Management for flat network architecture is emerging as a valid framework to design future mobile network architectures. Even though Routing based DMM improves the routing optimization and reduces the scalability issues when compared with the centralized mobility management, through the traffic anchoring distribution at the Access Routers (ARs), the handover optimization, which also demands for fast and soft handovers to reduce/eliminate the handover latency and the respective packet loss, is not properly addressed.

Using seamless handovers, in order to reduce or even eliminate the handover latency, without new entities, signaling messages or even packets buffering/bicasting, could be used in order to overcome the above problem. A make-without-break approach that lets the MN to execute the handover to a new IP network, without breaking the previous connection, reducing or eliminating the packet loss. Thus, the ongoing traffic sessions might be maintained through a previous Access Point (AP), while the signaling for the MN configuration in the new network is performed through the new AP.

Most of the current trend in the seamless handover solutions for mobile IP networks use techniques based on make-before-break, to overcome the limitation of the standard break-before-make approaches and provide seamless handovers. In standard break-before-make solutions, the MN does not prepare the configurations in the new network in the overlapping region of the two APs. In make-before-break solutions, such as the case of Fast Handover for Mobile IPv6 or Fast Handover for Proxy Mobile IPv6, the MN needs to be able to estimate/predict whether to perform the handover, which brings extra complexity to calculate the optimal times.

With respect to these approaches, the make-without-break with DMM schemes has the following requirements to achieve: no additional signaling or data cost to operator and mobile user; no new network entities involved; no prediction; no packet duplication and no buffering or reordering; and low or null packet loss during the handover execution. The main goal is to provide seamless IP session continuity, just introducing some functionalities in the MN to provides a double logical connection

Solution II

Multi-Area OSPF Based DMM

As the cause for high handover latency and high signaling overhead is the BGP protocol, the previous routing-based DMM could be enhanced by using multi-area OSPF protocol instead of BGP protocol. Since OSPF protocol has fast convergence time, compared to BGP protocol, and sends route updates only when there is topological change, the updates could be communicated among Routers and DMM GWs. This will improve the performance of the network.