

A Feasibility Study on the Roaming Capability of Mission Critical Communication in 3GPP Wireless Cellular Networks with Legacy Public Safety Communication. (MA)

Group communication is an essential feature for any police force to accomplish their mission. The so-called *Push-to-Talk* group calls are necessary for every team that needs to communicate with each other, without wasting time on setting up the call. The connection needs to be established in under 300ms for 95% of all *mission critical push-to-talk (MCPTT)* requests [1,2]. Therefore, almost all legacy public safety communication networks have implemented this strict requirement to broadcast, for example, the team leader's commands. It is obviously desirable to have such a feature in the public networks as well. The requirements for IP based MCPTT features were first established in the legacy OMA PoC [3] before being adopted by the release 13 of the 3GPP [2]. The 3GPP standardization efforts also specify requirements for the future inter-working conditions of the 3GPP cellular networks with legacy public safety communication networks such as TETRA. The necessary roaming for future interim hybrid networks presents a special challenge for strict latency requirements in the mission critical communication. For this reason, the next generation public safety radio networks need to adapt gradually and might migrate more and more of their functionality into the commercial networks. Push-to-Talk features in public LTE networks can already be experienced on any android or iOS device using the Zello App[4]. Analyzing the key performance indicators (KPI) of mission critical communications on consumer phones especially under roaming conditions is a good indicator how much technical effort is necessary to achieve full compliance to the requirements of the legacy safety critical communication networks. The goal of this thesis is to estimate the technical gap of the current public telecommunication network for the usage in a safety critical environment.

Task to be accomplished in this thesis might be the following:

1. Research of the requirements and feasibility of mission critical communication in public LTE/5G networks and commercially available mobile equipment, e.g. for the integration into the OpenAirInterface software packages
2. Discussion of the principle *mission critical push-to-talk (MCPTT)* group calls and the required system architecture evolution under roaming conditions with public safety communication networks
3. Set-up of a testing environment for a repeatable measurement procedure to determine the statistical distribution on the latency KPIs of PTT calls via public 3GPP wireless cellular networks using android phones and the Zello App[4].
4. Measurement of KPIs such as the PTT access time (1), end-to-end PTT access time (2), mouth-to-ear latency (3) and late call entry latency (4)
5. Determination of the KPIs' statistical distribution and upper boundary (95% percentile).
6. Assessment of the KPIs under roaming conditions in public networks as prerequisite for the potential roaming including the public safety communication networks
7. Evaluation of the results and applicability to the requirements of public safety networks
8. Possible Outlook regarding end-to-end encryption and proximity of group call participants affecting latency performance

If you are interested in this thesis contact us and let's discuss:

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References:

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