# A Dual Preamble Random Access Protocol for Reducing Access Congestion in Disaster Situations

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***Abstract*— In long term evolution (LTE) systems, the random access (RA) protocol is used for initial access. Since the protocol is designed based on contention, the congestion on physical RA channel (PRACH) can get worse severely as the number of contending user equipments (UEs) increases. On the other hand, when a disaster occurs, we expect that a huge number of access attempts and traffic bursts rush to LTE systems, and these are likely to block each other, which can lead to excessive access delay and packet loss. In this paper, we propose a novel RA scheme for solving the congestion on the PRACH of LTE system. In the scheme, UEs attempt to access the LTE network by using not a single access preamble but two preambles simultaneously. As a result, we get the same effect as the number of preambles is logically increased. Although the congestion can be reduced with the proposed scheme, it can bring about unnecessary resource overhead. We formulate an optimal problem, by which we can maximize the system performance considering both the congestion control and the resource overhead. The simulation results show that the proposed scheme well resolves the congestion while reducing the overhead as much as possible.**

***Keyword*— Random access protocol, Initial access, Cellular networks, Disaster communication, Long term evolution**

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