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## **FAST LOGICAL CHANNEL DISABLING FOR USER EQUIPMENT INCLUDING EMBEDDED SUBSCRIBER IDENTIFICATION MODULE CARDS**

### **Abstract**

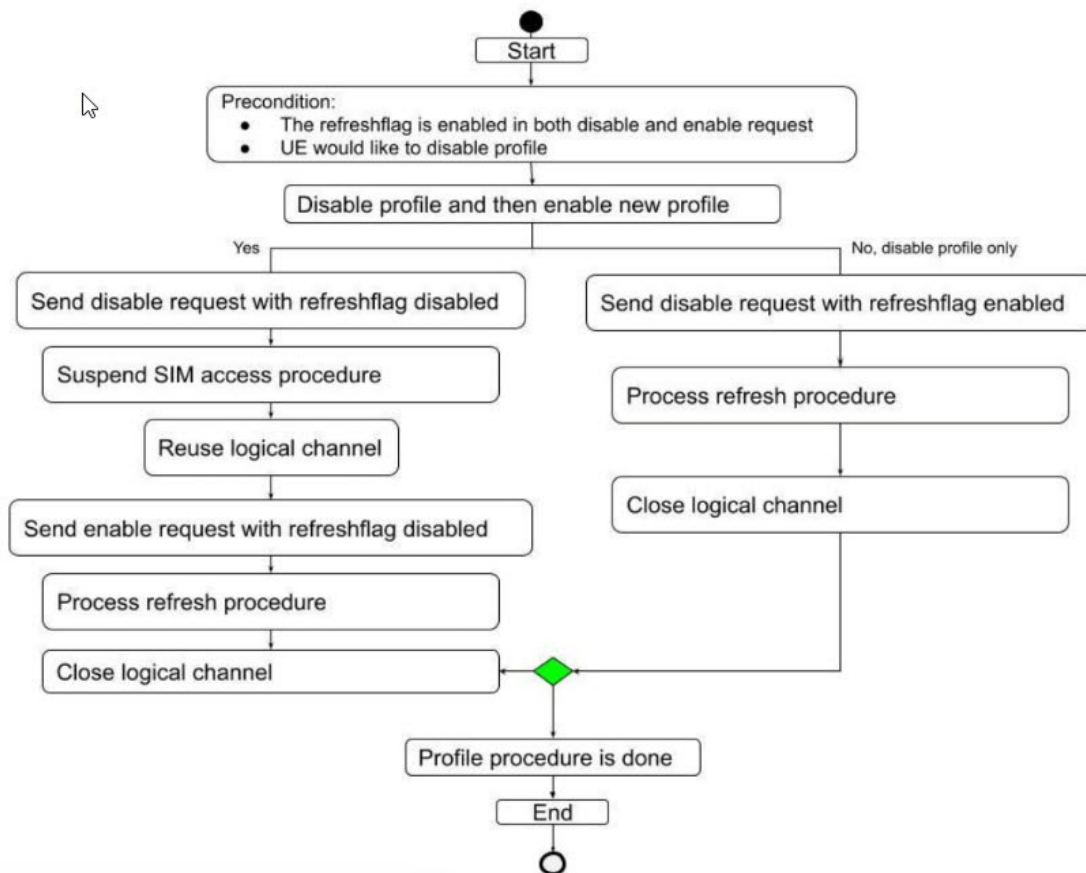
A user equipment (UE) can include multiple subscriber identity modules (SIMs) to enable connections to different telecommunications networks. For each connection to these different networks, the UE employs a corresponding channel profile to maintain and transmit over a logical channel. In order to rapidly change channel profiles and thus change connections from one network to another, the UE can employ a process with a reduced number of refreshflag commands, reducing the number of refreshes associated with changing connections. The UE thereby increases overall efficiency of the switching process and reduces the time required for such transitions.

### **Background**

Currently, when user equipment (UE) such as mobile devices or, more generally, mobile equipment (ME) seeks to switch to a different carrier network, the user must select and enable a new profile. When attempting to use a new carrier, the flow of command sequences between such user equipment (UE) and the corresponding SIM requires the ME to disable an existing profile and enable a new profile. The disabling of an existing profile requires that the user equipment (UE) send to its SIM a disable profile command with a refreshflag enabled, resulting in execution of a refresh process at the UE. Afterwards, the UE enables a profile for the new network (the network being switched to) by sending an enabled profile command with a refreshflag enabled, which triggers another refresh procedure. Thus, to switch networks, the UE executes the refresh process twice, which ultimately adds unnecessary time to complete the process of enabling a logical channel on the new network.

## Description

As described further below, to enhance efficiency during a network switch and to improve the user experience, when the UE attempts to disable the current network profile, an application processor (AP) can check the request and, based on the request, implement a process to either disable a profile only or to both disable an existing profile and enable a new profile. However, in order to execute this process, certain preconditions must be satisfied to initiate either process as shown in Fig. 1 below:



**FIG. 1**

When the UE attempts to disable a profile, the AP associated with the UE will check to confirm whether either one of two different but related preconditions have been satisfied.

Generally, the choice of whether to disable a profile only or to disable a profile and then enable a new profile depends on whether a logical channel is to be reused. The process achieves a time advantage due to the elimination of a refresh command during each of these disable processes.

The first precondition checked is whether a refreshflag has been enabled in both disable and enable requests. The second precondition checked is whether the UE attempts to only disable a profile. When the second precondition is satisfied, then the UE will follow the current procedure involving the sending of a disable request with a refreshflag enabled. A refresh procedure will then be processed, the logical channel associated with the profile established between the UE and the SIM card will be closed, and the profile procedure will then conclude.

Alternatively, if the first precondition is satisfied, then the UE will send a profile disable request with the refreshflag disabled. After sending the request, the UE will suspend a SIM card access procedure to prevent the existing profile from accessing the SIM card. Once the UE receives an “OK” acknowledgement for the disable request, the UE will suspend the SIM access procedure. In suspending access, the UE will need to terminate the ongoing proactive command session and deny SIM access for the disabled profile. Once executed, the UE can send an error message to current proactive sessions and stop SIM access for the currently disabled profile. Once suspended, the same logical channel can be made available for reuse by a different profile.

The process for channel reuse is performed in two stages, the first requiring the UE to close the logical channel after processing a disable profile procedure, and the second requiring the UE to request opening the logical channel to enable a different profile. This two-step process, however, can differ by vendor depending upon whether a single embedded SIM (eSIM) or a multiple eSIM implementation is adopted. Upon completion of the profile disable process, the UE

will then send an enable request with a “refreshflag” disabled. This command sequence will cause the UE to process a refresh procedure for the reused logical channel. Once the refresh procedure is completed, the UE will close the logical channel to prevent use by another UE on the network.

## **References**

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