

TEMPORARY HIGH PRIORITY ACCESS BASED ON GEOGRAPHICAL  
LOCATION AND TIME OF DAY

INVENTOR:

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**Title:** Temporary High Priority Access based on geographical location and time of day.

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**Background:**

Access Class Barring (ACB) is a congestion control mechanism designed for limiting the number of simultaneous access attempts from certain UEs. The main purpose of ACB is to redistribute the access request of UEs over time to reduce the number of access requests per Random Access Opportunity (RAO) window. This helps avoid massive-synchronized access requests to RACH. In order to implement the above, all UEs are assigned to 16 access classes (AC) from 0 to 15, which is stored in the UE's SIM/USIM information (**EF\_ACC field in the USIM**).

AC 0 to 9 is assigned to general users.

AC 10 is for emergency calls (911)

AC 11 to 15 are assigned/reserved for special or high priority access users( eg. Public safety authorities like police, fire departments or Network Operator technicians).

Each UE determines its barring status with the information provided in the SIB message (SIB2 in LTE). ACB is applied to UEs before they perform RACH procedure and it is useful only for relieving sporadic periods on congestion, when a massive number of UEs are attempting to access the network at a given time but the system is not continuously congested.

As part of 3GPP Release 13, Access Control for Data Connectivity was considered, where priority handling of individual applications is prioritized.

The Access Class Barring mechanism works well for busy hour and planned events like music concerts, sporting events, New Year eve at New York Times square when the network is not continuously congested.

**Problem you are trying to solve:**

During disasters like forest fires, hurricanes, tornadoes, earthquakes, building collapse or factory explosions, it is human behavior to make voice calls to check on or report on safety of individuals or constantly check streaming newsfeeds. This can cause congestion in the network. Under such conditions, prioritized subscribers (government, military, first responders) and access to emergency services should still be allowed while voice calls and other bandwidth consuming services (real-time service like voice/video or data services) are restricted.

While search and rescue/ recovery actions are in progress, disaster events can cause damage to the RAN network and degrade the service provided in the geographical area and it may be a while before the network service are fully restored and the search and rescue/recovery actions are completed. This results in a situation where the network is constantly congested.

Many citizen volunteers and volunteers of organizations like Red Cross, Doctors without Borders are on the ground helping with recovery and will be impacted by the Access Class

Barring restrictions, which affects their ability to effectively perform search and rescue, recovery actions. **The Access Control Class of every UE is programmed in the SIM Card (the EF\_ACC field in the USIM). It is NOT possible to dynamically update this field in the physical SIM card. It requires physical removal of the SIM from the UE for reprogramming of the USIM field in the SIM card adding additional logistical challenges.**

**Idea/Solution:**

We propose a mechanism for UE with SIM card programmed with Access Class 0 to 9 to temporarily request High Priority Access to the Network based on geography and time of day. The Access class barring control flow for a general UE with Access class 0 to 9 is shown below in Figure 1.

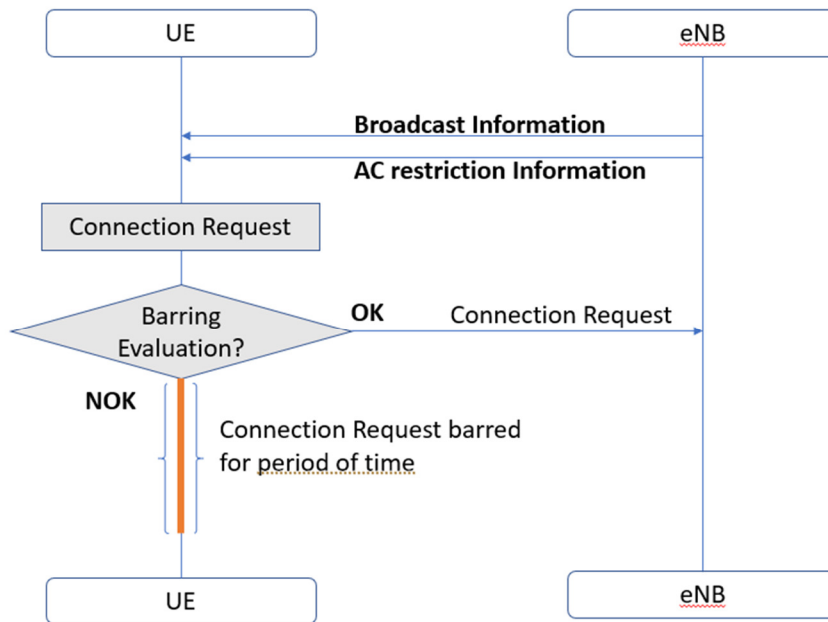


Figure 1. Access class barring control flow.

The given UE seeking HPA access in a classified disaster area will decode the SIB2 broadcast message. The field “ac-BarringForSpecialAC”, a bit string of size of 5 bits is decoded to determine HPA class to use. The UE then sends a Connection Request using this HPA Access class to the eNB as shown in Figure 2 below. This HPA access is granted for a specified time in the localized service area. The UE subscription in the Core Network is updated to validate the temporary grant of the HPA access to the UE in the localized service area.

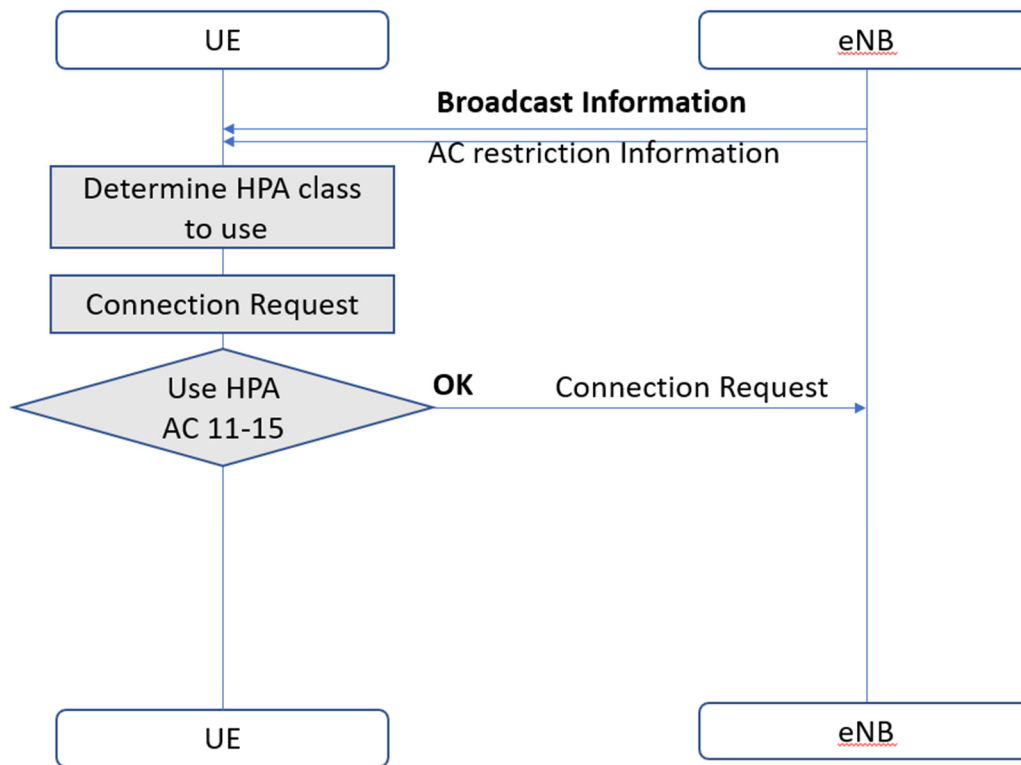


Figure 2. Temporary Access class barring control flow.

**Advantages of Using proposed method:**

The proposed mechanism provides a mechanism for providing temporary high priority access to users in a disaster area or localized service area.

**Existing Solutions:**

None. Not aware of any.

**Applicability:**

This applies to 4G LTE and 5G NR. I have just used 4G LTE as example.

**Specifications:** 3GPP TS 22.011, TS 36.331, TS 38.331, TS 24.301.