

An update from BAPCO Vice President Andy Rooke

I wanted to update you with the findings of the true 112 testing that is going on in Luxembourg and Portugal. These tests are important, as these are two of the few fully ready Public Safety Answering Points (PSAP) in Europe (full upgrade, full capability and been through conformity).

There are two significant issues coming to the fore in live 112 tests with embedded SIM in a line fit eCall system.

1. SIM numbering

The new SIMS are coming out with a 15-digit configuration. The impact of this is that in normal operation the eCall will be triggered and transmitted correctly, however the call will fail when there is a request for a resend of data or reconnection of the voice call.

Investigations have revealed that the call fails for the following reason. Most PABX or CAD system are configured to handle telephone numbers of no more than 15-digit length. The new SIMS are that length but are also roaming SIMS, so when the request for resend of data or Call Back is initiated, the PSAP systems seem to do the following:

- a) add a zero for the outside line
- b) add zero zero for an international call

These actions create a number string of between 16 and 18 digits. To compensate the PSAP systems are currently automatically removing digits from the right of the number string, thus corrupting the number.

The solution is to ensure that the system always removes digits from the left of the string and this problem will be mitigated.

In the UK, the PSAP, BT is aware of this issue and has issued guidance to mitigate the problem in the short term with their existing equipment and in the future when they move to a new platform

2. Domestic V Roaming SIMs

The issue was detected during the end-to-end tests performed in Portugal when using SIM cards from the 3 MNOs that operate in Portugal.

When an eCall is initiated using a domestic SIM that can't register to its own mobile network (e.g. lack of network coverage, overload or other technical problems) it will use another available mobile network. In these cases, the PSAP receives the IMEI instead of the SIM card number. This situation makes it impossible for any call back to the initiating vehicle because the PSAP doesn't know the caller number.

During testing when using a roaming SIM card, it was able to register on any of the Portuguese mobile networks and the PSAP would always receive the SIM card number. In these particular cases, the PSAP will be able to make a call back to the vehicle because it will be aware of the caller number.

As far as we understand this difference in behaviour is related to the fact that the domestic SIM cards belong to mobile operators that don't have roaming agreements between them but in return, when the vehicle is using a roaming SIM card (e.g. when

someone is travelling outside the geographical coverage area of the "home network") the caller number is always transmitted to the PSAP because normally there are roaming agreements between all major mobile networks and the Portuguese MNOs.

Given these circumstances it will be better to use a roaming SIM card than a domestic one, from an operational point of view. Of course, there is the financial aspect of a call back to an international card.

In our opinion this can only be properly tackled with the involvement of the Regulators for Electronic Communications.

An Update on Ghost Handsets

During the first eCall tests in Portugal in 2015 it was noticed that some mobile phones when calling 112 mimicked eCall calls. They were very surprised and worried about this issue, started doing some research on the subject and concluded that many cell phones that were available in the market were factory misconfigured. When calling 112, those cell phones set all, or some, of the emergency bits to 1. This includes the manual and the automatic eCall bit.

In these cases the mobile networks misinterpret this kind of call as being eCalls, when in fact the calls were actually not made from cars but from mobile phones that called 112 with real emergency calls.

To sort out this problem the best solution was the recall of the cell phones which were non-compliant with the emergency setup standard but this was an impossible task for the PSAPs.

The workaround solution already adopted by two of the Portuguese mobile network operators was to consider as eCalls only those calls that have all the emergency bits set to 0 and the bits corresponding to manual eCall or automatic eCall set to 1.

Use of this workaround means any call to 112 that has the bits corresponding to manual eCall or auto eCall set to 1 and any other emergency bits also set to 1, will not be perceived by the mobile networks as an eCall and thus will be considered a standard call to 112.

In addition to the solution described above, nowadays Portuguese MNOs only include in their packages mobile phones that are submitted to tests and trials that prove that they have the emergency standard bits correctly configured.

The issue of Ghost handsets continues across Europe as more networks become enabled. Ireland has been the latest to investigate this issue using the Portuguese solution. Having now experienced a ghost 112 eCall myself without any mitigation it is unacceptable.

In the UK, the suggested fix is already in place at the switch level for most MNOs. Others use a switch supplier that has not seen the issue.