TSG-RAN Meeting #17 ***RP-020512***
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Title: **Early UE handling proposal**
Source: **NEC**
Document for: **Discussion**
Agenda:

Early UE handling

This document is a discussion document on the different approaches and protocol mechanisms in order to handle the issue of faulty UE. This document performs a technical analysis of the AS and NAS protocols in an attempt to find a way forward for RAN to make the necessary decisions in the choice for the possible methods identified in [1]. NEC believes that a UE identifier (such as IMEI-SV) should be considered as a method for resolving such issues on a long term basis due to the fact that significant changes may be needed on the Network side. However NEC recognises that other methods may be required in addition to IMEI-SV in the short term. This technical note assumes that IMEI-SV has to be known in the network (somewhere RNC/MSC/SGSN) but doesn't resolve how it will be supplied to the RNC.

Problem analysis of protocols

If a solution is to be based on a UE identity (such as IMEI-SV) it is important to note that if problems occur during the connection to the network up to and including the point where the UI identity is available then the use of a UE identity to resolve problems in the network is problematic and at most useless. Furthermore, it would seem important (from both the operator view point and network view point) that the retrieval of such information from the mobile should be made such that it poses the least threat to the network from intrusion and thus the retrieval of such information should be made both ciphered and integrity protected.

Mechanisms before IMEI-SV is available

It should be noted that the IMEI-SV (see 23.003) is 16 decimal digits (that is a payload of : 64 bits (16*4bits): 8 octets which can be eventually coded as a binary number giving a payload of approx 56 bits : 7 octets giving a saving of at most 1 octet). This payload is difficult to transmit early enough in the RRC connections set-up procedures before resources such as DCH are allocated by UTRAN and thus problems could be encountered before it is provisioned.

When looking at the Uu protocols (for AS and NAS) many features and procedures can be initiated between the UE and RNC/CN well before the IMEI-SV can be retrieved (i.e. for NAS: Authentication, Identification and for AS: Signalling resource allocation to CELL FACCH/CELL DCH, Ciphering, Integrity, handover, Compressed mode, Measurements etc).

NEC believe due to the complexity in the initial stages of RRC connection set-up and up to the allocation of RABs a mechanism should be in place to ensure that basic attachment can be assured. This mechanism can either be either 4.1 or 4.10 or a combination of the two - see [1].

Mechanism 4.1 (a TR on UE faults, like 09.94) would be used in cases that a pure network solution could be found that is acceptable from an operator and network view point. This mechanism already exists in GSM.

Mechanism 4.10 (the hooks, see [3]), this is complementary to 4.1 and may be initiated in cases where the faulty procedure (documented by 4.1) is necessary to ensure some feature which the operator absolutely needs (for example: for radio efficiency reasons).

Mechanisms after IMEI-SV is available
It should be safe to assume that IMEI-SV should be available before RABs are set-up on the Iu interface and before handover is triggered to GSM or relocation to another CN node.

Thus any mechanism for retrieval of the IMEI-SV information must be fast enough to be reliable in these cases (as it is assumed that the information will be passed by UTRAN protocols).

Conclusions

NEC believe that a three pronged approach is necessary:

- 4.1 where problems can be solved by a network fix
- 4.10 for fixing problems encountered during connection phases
- 4.3 or 4.4 for fixing UE problems retrospectively . 4.5 appears to be too late for the long term solution as no significant UE changes could be acceptable at this stage.

NEC sees that any fixes are likely to be available in UTRAN before CN so we see that solution 4.1 can be seen to be a solution for currently available mobiles. Solution 4.10 can be see as a solution for new mobiles coming into networks that support this method and thus can be perceived as a short term solution.

IMEI-SV solution are likely to be implemented later and thus can be seen as a mid term solution which will allow features to be enabled in the network for mobiles that are not affected by a mobile fault.

NEC therefore would like to propose the production of a work item based on IMEI-SV as specified in [2] in the case where no decision can be reached in RAN#17.

References

[1] RP-020449 Methods to handle early mobiles (Vodafone)

[2] RP-020513 WID : Early UE handling using IMEI-SV based solutions

[3] RP-020514 Early UE handling using 4.10 solution