3GPP TSG RAN WG3 #7 **Tdoc R3-99B44**
Sophia Antipolis, France, September 20-27, 1999.

Agenda Item: 6.1

Title: CN Domain Indicator and TS 23.121 Requirements

Date: September 20-27, 1999

Source: Motorola

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1. Introduction

During the Helsinki RAN WG3 meeting, it was decided to add a new Information Element "CN Domain Indicator" to the Access Stratum part of the RRC messages to indicate which CN domain the Non Access Stratum ("Direct Transfer") message belongs to. In the downlink, the SRNC would insert this IE into the AS portion of the RRC Direct Transfer message. In the uplink, the UE would do the same, enabling the SRNC to decide which domain the NAS Direct Transfer message should be routed to.

It was pointed out during the discussions in the Helsinki Iu SWG meeting, that this decision could make it difficult meeting one of the key requirements set forth in TS 23.121 [1] - specifically the one related to the migration of services from CS domain to PS domain. It states:

> *"As future evolution may lead to the migration of some services from the CS-domain to the PS-domain without changes to the associated higher-layer protocols or functions. UMTS release 99 shall provide the flexibility to do this in a way that is backwards compatible with release 99 UEs provided this does not introduce significant new complexity or requirements in the system."*

Regarding the Domain Distribution Function, it states:

> *"The UTRAN shall contain a "domain distribution function" to route transparent application-level control signalling from the UE to the correct core network domain. The UE shall indicate the type of application being addressed (eg via a protocol discriminator). The UTRAN shall map this on to the correct Iu instance to forward the signalling. "*

In order to meet the above-mentioned requirement and to comply with the statement regarding the Domain Distribution Function, this contribution proposes enhancements to the usage of CN Domain Indicator Information Element.

2. Discussion

In the UE terminated communication sessions, the CN Domain Indicator in the RANAP Paging message would be copied into the RRC Paging message. This would be used by the UE to fill in the CN Domain Indicator in the AS portion of the subsequent uplink RRC Direct Transfer message. The SRNC would use this to route the RANAP Direct Transfer message to the correct CN Domain.

In the UE originated communication sessions, it is entirely up to the UE to decide which CN Domain Indicator to use in the RRC Direct Transfer messages. Presumably, this decision would be made based on the type of application and/or service the end-user had requested. For instance, if a regular speech is the service requested, then the UE would probably choose the CS domain. This association of services to a CN domain needs to be enhanced so that a given application or service need not be statically associated to a particular domain, thus satisfying the requirement mentioned in section 1. Specifically, the UE needs to have information regarding the capabilities of each CN domain so that it can select the domain it wants to be serviced by.

3. Enhancement

System Information messages broadcast to UEs can contain information as to what services and applications are being provided by each CN domain. Existing RRC System Information broadcast message is organized on a per-CN domain basis, thus adding a new domain capability Information Element to this message is relatively straight forward. Based on this CN domain capability, as well as the requested service/application, user preference, and subscription information, the UE will select the CN Domain. This will be used as the CN Domain Indicator in all the RRC Direct Transfer messages from UE to the SRNC.

Since System Information messages can be changed on a per location area basis, this gives operators flexibility to migrate services transparently – both on a localized area basis as well as on service basis, thus satisfying the requirement. For example, sites in a location area can be migrated to PS domain while keeping the rest of the network intact. Another example could be that certain services (e.g. SMS) could be migrated to PS domain while other services (e.g. speech) are still in CS domain.

This scheme preserves the strict separation of Access and Non-Access Stratum portion of the messages. In other words, there is no need for the UTRAN to inspect NAS portion of the messages. It preserves existing functionality of the Domain Distribution Function all the while satisfying TS 23.121.

4. Proposal

Based on the discussion above, the following modifications are proposed to section 7.2.4.11 of TS 25.401 [2]:

7.2.4.11 CN Distribution function for Non Access Stratum messages

In the RRC protocol, messages from the NAS shall be transparently transferred within the Access Stratum using the Direct Transfer procedure. In the two CN scenario, a distribution function in the UE and the SRNC shall handle a CN discriminator to direct messages to the appropriate NAS entity i.e. the appropriate Mobility Management instance in the UE domain and the appropriate CN domain.

In the downlink direction, the signaling bearers addressing shall be used to identify the originating CN domain (e.g. from CN node originating address). The process performed by the distribution function simply consists in adding one CN discriminatior to the value corresponding to the originating CN domain and passing the NAS message to the underneath protocol layers for transparent transfer to the UE.

In the uplink direction, the UE will select the CN Domain based on the CN domain capability that is broadcast over the System Information message, as well as other criteria such as the user preference, the requested service/application, and subscription information. It will insert this CN Domain Indicator (i.e., CN discriminator) into AS portion of the RRC Direct Transfer message. The process performed by the distribution function in the SRNC consists in removing the CN Domain Indicator (i.e., CN discriminator) inserted by the peer UE function and distribute the NAS message to the corresponding RANAP instance for transfer over Iu interface.

This function is located in both the UE and in the SRNC.

5. References

[1] TS 23.121, “Architectural Requirements for Release 1999”, v 3.0.0

[2] TS 25.401, “UTRAN Overall Description”, v 1.3.1