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INTERACTION BETWEEN THE MS AND BS BY USING NEW ARCHITECTURE OF MULTI-STANDARD BASE STATIONS

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ВЗАЄМОДІЯ МІЖ МС І БС З ВИКОРИСТАННЯМ НОВОЇ АРХІТЕКТУРИ МУЛЬТИСТАНДАРТНИХ БАЗОВИХ СТАНЦІЙ

У статті наводиться модифікований механізм взаємодії між мобільною і базовою станцією за допомогою нової архітектури базової станції, яка допоможе ефективно використовувати спільні ресурси при збереженні встановлених вимог до якості.

The alternative architecture for the multi-access network (as shown in Figure 1) is different from the existing, it has a cooperation sub-layer. Each operator has one physical network infrastructure and provides full control / management over it. The physical infrastructure of each radio operator is fully virtualized and the cognitive layer implements algorithms of self-optimization of using radio resources.

The cooperation sub-layer provides resource sharing among operators (Figure 1). The protocol objects belonging to this level located in the network of each operator and communicate with them via the Internet. The main purpose of this is to spread the requests for additional radio resources that may be issued by one operator to others when its network saturated.

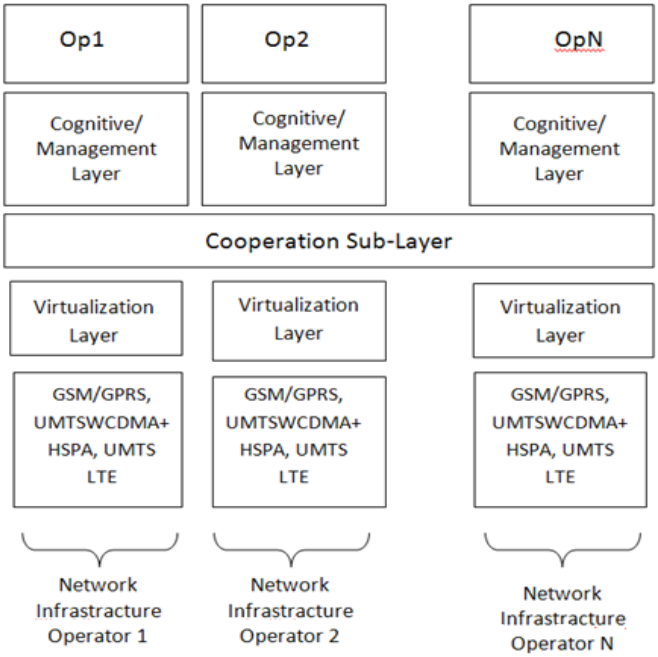

Figure1. The proposed network architecture for multi-access network

In order to facilitate BS management, a virtualization layer was entered to abstract existing wireless technologies to cognitive mechanism (control mechanism). This allows simplifying the "Description" spectrum available resources in terms of QoS (error rate, delay and jitter) and data rate. This abstraction of the physical layer simplifies the description of cognitive algorithms and controls algorithms, ranging from destruction detailed descriptions of each physical layers. The cognitive layer sends a request to the virtual layer to assign channels with specific characteristics, expressed in terms of QoS, achieved speeds and frequency errors, etc. The Protocol inside the virtual layer controls access to the radio resources taking into account the needs of users, QoS requirements and the possible information describing position of the consumer in cells, channel quality, the power required for transmission, interference situation and status of the clustering in cell.

In the latter case, implicitly assumes that the protocol procedures of multi-standard terminals to communication with BS were modified to include information about the used technology.

The former solution based on disconnecting the signaling channel could be used to provide communication between old terminals through multi-standard BS. For example: if multi-standard BS receives a service request via GSM signaling channel and its conditions are very favorable, it may reject the request paging channel GSM, turn off the alarm carrier GSM and UMTS enable transmission.Thus, BS implicitly makes the terminal look for another technology.

Recently, there is a tendency to move to more cost-effective and cheaper options for implementation of network interfaces, so many vendors that produce base station controllers and SGSN, provide an opportunity to realize Gb interface based on IP transport - Gb over IP. This interface helps to connect base stations controllers directly to SGSN.

In "clear" form Gb interface is implemented only for 2G architecture, so, to implement the interface between the controller and SGSN base stations - BSC, and for 3G (UMTS), and to implement the interface between SGSN and RNC (en) the controller needs Iu-PS interface, with its inside is a division plane signaling (control) - Control Plane and plane data subscribers - User Plane. To support multiple technologies SGSN must be combined, that is SGSN architecture must support both 2G (for Gb interface) and 3G (for Iu-PS). In this case, you can simultaneously connect both controllers BSC and RNC controllers, but it will be another RNC protocol stack and some other procedures, but these controllers can be fully customized to frequency 2G.

The virtualization and cooperation layers provide support for these technologies without replacing equipment. On interaction between mobile terminal and service node, then how to update data of mobile terminallocation and establishing a logical connection is shown in Figure 2

It includes 6 steps:

Step 1. Mobile terminal UE after inclusion through controller RNC sends the command ATTACH REQUEST (connection request) to the service node SGSN.

Step 2. The service node SGSN requests subscriber's authentication identified by IMSI, in the home register HLR. Authentication request is transmitted by protocol MAP.

Step 3. Home register HLR via AUC represents subscriber's authentication parameters to the service node SGSN.

Step 4. In case of successful execution of the procedure of authentication service node SGSN asks the home register HLR subscriber profile and says home register HLR ID value cell Cell_ID, in which the user terminal UE located to update HLR's record on the subscriber's location.

Step 5. Home register HLR in response to the request node SGSN sends service subscriber profile parameters (list of connected services and enabled access point APN, data quality, static IP address allocation subject to network operator).

Step 6. The service node SGSN sends the mobile terminal UE message ATTACH ACCEPT, reporting on progress accomplished in the UMTS network connection procedure message ATTACH COMPLETE (connection completed).

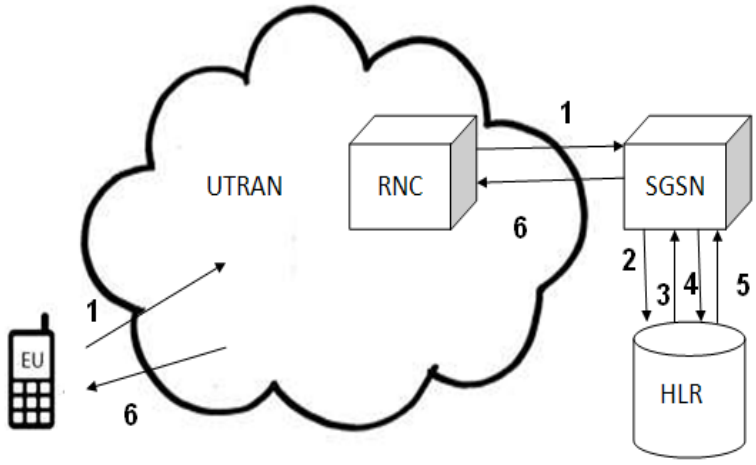

Figure 2. The procedure for updating location information of mobile terminal and establishing a logical connection between the mobile terminal and service node

Conclusion. In the paper the original network architecture characterized by additional abstract level named Cooperation Sub-Layer allowing us to operate easily with different standards is suggested. The architecture of multi-standard BS has been improved and the changes of interaction between the MS and BS by using a new architecture and procedure of updating data of mobile terminal location that allows resource sharing among operators have been proposed.

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