

**Change of the location of the network subsystem  
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**Abstract:** A generalized net is used to construct a model which describes the process of changing of the location of the network subsystem.

**Keywords:** Generalized nets, mobile communication, modelling.

### **1. Introduction**

In this paper was described a Generalized Nets (GN) [1, 2] model of changing of the location of the network subsystem.

Global system for mobile communication (GSM) [3, 4] is a globally accepted standard for digital cellular communication. GSM is the name of a standardization group established in 1982 to create a common European mobile telephone standard that would formulate specifications for a pan-European mobile cellular radio system operating at 900 MHz. It is estimated that many countries outside of Europe will join the GSM partnership [3].

When given telephone-consumer left the broadcast area of one mobile station (Mobile Station Controller MSC) he must be transferred to another mobile post. He is a needed of a Base Station Controller (BSC) that he executes operating and telecommunication functions for that goal by as governing an one or more base stations. As well is necessary and Mobile Station Controller (MSC). Some of her functions are to surrender the mobile subscriber between the cells, to manage temporarily the resident subscribers, to exert control on the mobility of the subscribers as leads on their location of the net. The important part of the system is as well so called Home Location Register (HLR) that constitutes a base in data of information of the users. It as well has as well a register that temporarily stores the information about the subscribers, are impelled, in the net. This register is the so called temporarily surpassing subscribers visitor location register (VLR).

After accepting request for change to the location-lifted subscriber, new VLR claims data from the check of genuineness of aged VLR. Aged VLR guarantees at new VLR the data from the confirmation of genuineness that is initially provided by the center for check of the genuineness Subscriber Authentication Centre (AUC). It informs HLR that the cell has shifted the area of VLR to BSC of alteration of location, new VLR after sending acknowledgment. HLR expects it to erase the corresponding subscriber's data from senior VLR so. New VLR receives all subscriber's data thereupon simultaneously. The performance is testified respectively by as well aged VLR on new VLR to the two commands as well. HLR testifies to new VLR that the subscriber's data is updated. The routine for change on the location can be obscured from VLR as well, from HLR as well.

### **2. GN model**

Figure 1 shows the generalized net model of changing of the location of the network subsystem.

Generalized net is presented by set of transitions:

$$A = \{ Z_1, Z_2, Z_3, Z_4 \},$$

where transition are described by following processes:

$Z_1$ -Work of BSC;

$Z_2$ -Work of the new VLR;

$Z_3$ -Work of HLR;

$Z_4$ -Work of the aged VLR.

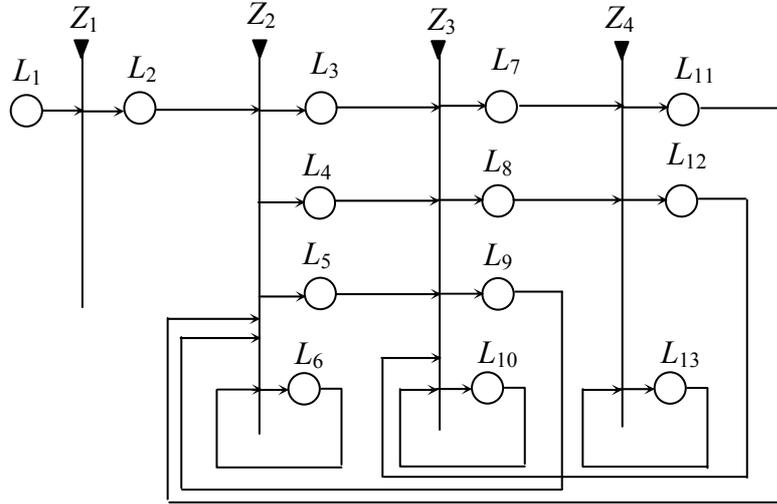


Figure 1. Generalized net model of changing of the location of the network subsystem

Initially in places  $L_6$ ,  $L_{10}$  and  $L_{13}$  stay the next  $\alpha$ -tokens:

- in place  $L_6$  -  $\alpha_6$ -token with characteristic "New visitor location register";
- in place  $L_{10}$  -  $\alpha_{10}$ -token with characteristic "Home Location Register";
- in place  $L_{13}$  -  $\alpha_{13}$ -token with characteristic "Old visitor location register".

This tokens will be in their own places during the whole time during which the GN functions.

The  $\alpha_1$ -tokens enter the generalized net via place  $L_1$  with initial characteristic "New user".

$$Z_1 = \langle \{L_1\}, \{L_2\}, \frac{L_1}{L_2 \mid True}, \wedge(L_1) \rangle,$$

The tokens that enter place  $L_2$  do not obtain new characteristics.

$$Z_2 = \langle \{L_2, L_{11}, L_9, L_6\}, \{L_3, L_4, L_5, L_6\}, R_2, \vee(L_2, L_{11}, L_9, L_6) \rangle,$$

	$L_3$	$L_4$	$L_5$	$L_6$
$L_2$	False	False	False	True
$R_2 = L_{11}$	False	False	False	True
$L_9$	False	False	False	True
$L_6$	$W_{6,3}$	$W_{6,4}$	$W_{6,5}$	True

where:

$W_{6,3}$  = "There is no information for the user";

$W_{6,4}$  = "The user is signed out";

$W_{6,5}$  = "The user is added to the new VLR".

The tokens that enter places  $L_3$ ,  $L_4$  and  $L_5$  obtain characteristics respectively:

"Request to the HLR";

"Information to the HLR" and

“Added user to the new VLR”.

$$Z_3 = \langle \{ L_3, L_4, L_5, L_{10}, L_{12} \}, \{ L_7, L_8, L_9, L_{10} \}, R_3, \vee (L_3, L_4, L_5, L_{10}, L_{12}) \rangle,$$

	$L_7$	$L_8$	$L_9$	$L_{10}$
$R_3 = L_3$	<i>False</i>	<i>False</i>	<i>False</i>	<i>True</i>
$L_4$	<i>False</i>	<i>False</i>	<i>False</i>	<i>True</i>
$L_5$	<i>False</i>	<i>False</i>	<i>False</i>	<i>True</i>
$L_{10}$	$W_{10,7}$	$W_{10,8}$	$W_{10,9}$	<i>True</i>
$L_{12}$	<i>False</i>	<i>False</i>	<i>False</i>	<i>True</i>

where:

$W_{10,7}$  = “The new user is found”;

$W_{10,8}$  = “The identification for the old VLR is sent”;

$W_{10,9}$  = “There is an identification for the user”.

The tokens that enter places  $L_7$ ,  $L_8$  and  $L_9$  obtain characteristics respectively:

“Request from HLR to the old VLR”;

“Request for signing off to the HLR” and

“Identified user”.

$$Z_4 = \langle \{ L_7, L_8, L_{13} \}, \{ L_{11}, L_{12}, L_{13} \}, R_4, \vee (L_7, L_8, L_{13}) \rangle,$$

	$L_7$	$L_8$	$L_9$
$R_4 = L_3$	<i>False</i>	<i>False</i>	<i>True</i>
$L_4$	<i>False</i>	<i>False</i>	<i>True</i>
$L_5$	$W_{13,11}$	$W_{13,12}$	<i>True</i>

where:

$W_{13,11}$  = “There is a request for temporarily placement the users’ data on the new VLR”

$W_{13,12}$  = “There is a signing off user from the old VLR”.

The tokens that enter places  $L_{11}$  and  $L_{12}$  obtain characteristics respectively:

“Request for temporarily placement the users’ data on the new VLR” and

“Confirmation for the erased user to the HLR”.

## Conclusion

The generalized nets is used to describe the process of changing of the location of the network subsystem. The model allows the simulation and monitoring of the behavior and management of such a process.

## References

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