**3GPP TSG-CT WG1 Meeting #123-eC1-20vxxx**

**Electronic meeting, 16-24 April 2020**

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| *CR-Form-v12.0* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **24.501** | **CR** | **2153** | **rev** | **2** | **Current version:** | **16.4.1** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **x** | Radio Access Network |  | Core Network | **x** |

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| ***Title:*** | Service area restrictions in an SNPN | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Nokia, Nokia Shanghai Bell, Ericsson | | | | | | | | | |
| ***Source to TSG:*** | C1 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | Vertical\_LAN | | | | |  | ***Date:*** | | | 2020-04-22 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-16 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) Rel-12 (Release 12)* *Rel-13 (Release 13) Rel-14 (Release 14) Rel-15 (Release 15) Rel-16 (Release 16)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Service area restrictions should be applicable. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Extension of the applicability of 3GPP access service area restrictions.  It is noteworthy that the list type “list of TAIs belonging to different PLMNs” is not applicable in an SNPN. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | It is unclear whether 3GPP access service area restrictions are applicable in an SNPN or not. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 5.3.5.2.3, 9.11.3.49 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

#### 5.3.5.2 3GPP access service area restrictions

The service area restrictions consist of tracking areas forming either an allowed area, or a non-allowed area. The tracking areas belong to either the registered PLMN or its equivalent PLMNs in the registration area. The allowed area can contain up to 16 tracking areas or include all tracking areas in the registered PLMN and its equivalent PLMN(s) in the registration area. The non-allowed area can contain up to 16 tracking areas. The network conveys the service area restrictions to the UE by including either an allowed area, or a non-allowed area, but not both, in the Service area list IE of a REGISTRATION ACCEPT message or a CONFIGURATION UPDATE COMMAND message.

If the network does not convey the service area restrictions to the UE in the Service area list IE of a REGISTRATION ACCEPT message, the UE shall treat all tracking areas in the registered PLMN and its equivalent PLMN(s) in the registration area as allowed area and delete the stored list of "allowed tracking areas" or the stored list of "non-allowed tracking areas"

When the UE receives a Service area list IE with an allowed area indication during a registration procedure or a generic UE configuration update procedure:

a) if the "Type of list" included in the Service area list IE does not indicate "all TAIs belonging to the PLMNs in the registration area are allowed area", the UE shall delete the old list of "allowed tracking areas" and store the tracking areas in the allowed area as the list of "allowed tracking areas". If the UE has a stored list of "non-allowed tracking areas", the UE shall delete that list; or

b) if the "Type of list" included in the Service area list IE indicates "all TAIs belonging to the PLMNs in the registration area are allowed area", the UE shall treat all tracking areas in the registered PLMN and its equivalent PLMN(s) as allowed area and delete the stored list of "allowed tracking areas" or the stored list of "non-allowed tracking areas".

When the UE receives a Service area list IE with a non-allowed area indication during a registration procedure or a generic UE configuration update procedure, the UE shall delete the old list of "non-allowed tracking areas" and store the tracking areas in the non-allowed area as the list of "non-allowed tracking areas". If the UE has a stored list of "allowed tracking areas", the UE shall delete that list.

If the UE is successfully registered to a PLMN and has a stored list of "allowed tracking areas":

a) while camped on a cell whose TAI is in the list of "allowed tracking areas", the UE shall stay in, or enter, the state 5GMM-REGISTERED.NORMAL-SERVICE and is allowed to initiate any 5GMM and 5GSM procedures; and

b) while camped on a cell which is in the registered PLMN or a PLMN from the list of equivalent PLMNs and whose TAI is not in the list of "allowed tracking areas", the UE shall enter the state 5GMM-REGISTERED.NON-ALLOWED-SERVICE, and:

1) if the UE is in 5GMM-IDLE mode over 3GPP access, the UE:

i) shall not perform the registration procedure for mobility and periodic registration update with Uplink data status IE except for emergency services or for high priority access; and

ii) shall not initiate a service request procedure except for emergency services, high priority access, responding to paging or notification or indicating a change of 3GPP PS data off UE status; and

2) if the UE is in 5GMM-CONNECTED mode or 5GMM-CONNECTED mode with RRC inactive indication over 3GPP access, the UE:

i) shall not perform the registration procedure for mobility and periodic registration update with Uplink data status IE except for emergency services or for high priority access; and

ii) shall not initiate a service request procedure except for emergency services, high priority access or for responding to paging or notification over non-3GPP access; and

iii) shall not initiate a 5GSM procedure except for emergency services, high priority access or indicating a change of 3GPP PS data off UE status.

If the UE is successfully registered to a PLMN and has a stored list of "non-allowed tracking areas":

a) while camped on a cell which is in the registered PLMN or a PLMN from the list of equivalent PLMNs and whose TAI is not in the list of "non-allowed tracking areas", the UE shall stay in, or enter, the state 5GMM-REGISTERED.NORMAL-SERVICE and is allowed to initiate any 5GMM and 5GSM procedures; and

b) while camped on a cell whose TAI is in the list of "non-allowed tracking areas", the UE shall enter the state 5GMM-REGISTERED.NON-ALLOWED-SERVICE, and:

1) if the UE is in 5GMM-IDLE mode over 3GPP access, the UE:

i) shall not perform the registration procedure for mobility and periodic registration update with Uplink data status IE except for emergency services or for high priority access; and

ii) shall not initiate a service request procedure except for emergency services, high priority access, responding to paging or notification or indicating a change of 3GPP PS data off UE status; and

2) if the UE is in 5GMM-CONNECTED mode or 5GMM-CONNECTED mode with RRC inactive indication over 3GPP access, the UE:

i) shall not perform the registration procedure for mobility and registration update with the Uplink data status IE except for emergency services or for high priority access; and

ii) shall not initiate a service request procedure except for emergency services, high priority access or for responding to paging or notification over non-3GPP access; and

iii) shall not initiate a 5GSM procedure except for emergency services, high priority access or indicating a change of 3GPP PS data off UE status.

The list of "allowed tracking areas", as well as the list of "non-allowed tracking areas" shall be erased when:

a) the UE is switched off; and

b) the UICC containing the USIM is removed or an entry of the "list of subscriber data" with the SNPN identity of the SNPN is updated.

When a tracking area is added to the list of "5GS forbidden tracking areas for roaming" or to the list of "5GS forbidden tracking areas for regional provision of service" as specified in the subclauses 5.5.1.2.5 or 5.5.1.3.5, the tracking area shall be removed from the list of "allowed tracking areas" if the tracking area is already present in the list of "allowed tracking areas" and from the list of "non-allowed tracking areas" if the tracking area is already present in the list of "non-allowed tracking areas".

\*\*\*\*\* Next change \*\*\*\*\*

#### 9.11.3.49 Service area list

The purpose of the Service area list information element is to transfer a list of allowed tracking areas for an allowed area or a list of non-allowed tracking areas for a non-allowed area from the network to the UE.

The coding of the information element allows combining different types of lists. The lists of type "00" and "01" allow a more compact encoding, when the different TAIs are sharing the PLMN identity. The lists of type "11" indicate all TAIs of the PLMNs in the registration area are allowed area.

The Service area list information element is coded as shown in figure 9.11.3.49.1, figure 9.11.3.49.2, figure 9.11.3.49.3, figure 9.11.3.49.4, figure 9.11.3.49.5 and table 9.11.3.49.1.

The Service area list is a type 4 information element with a minimum length of 6 octets and a maximum length of 114 octets. The list can contain a maximum of 16 different tracking area identities.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Service area list IEI | | | | | | | | octet 1 |
| Length of service area list contents | | | | | | | | octet 2 |
| Partial service area list 1 | | | | | | | | octet 3  octet i |
| Partial service area list 2 | | | | | | | | octet i+1\*  octet l\* |
| … | | | | | | | | octet l+1\*  octet m\* |
| Partial service area list p | | | | | | | | octet m+1\*  octet n\* |

Figure 9.11.3.49.1: Service area list information element

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Allowed type | Type of list | | Number of elements | | | | | octet 1 |
| MCC digit 2 | | | | MCC digit 1 | | | | octet 2 |
| MNC digit 3 | | | | MCC digit 3 | | | | octet 3 |
| MNC digit 2 | | | | MNC digit 1 | | | | octet 4 |
| TAC 1 | | | | | | | | octet 5 |
| TAC 1 (continued) | | | | | | | | octet 6 |
| TAC 1 (continued) | | | | | | | | octet 7 |
| … | | | | | | | | … |
| TAC k | | | | | | | | octet 3k+2\* |
| TAC k (continued) | | | | | | | | octet 3k+3\* |
| TAC k (continued) | | | | | | | | octet 3k+4\* |

Figure 9.11.3.49.2: Partial service area list – type of list = "00"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Allowed type | Type of list | | Number of elements | | | | | octet 1 |
| MCC digit 2 | | | | MCC digit 1 | | | | octet 2 |
| MNC digit 3 | | | | MCC digit 3 | | | | octet 3 |
| MNC digit 2 | | | | MNC digit 1 | | | | octet 4 |
| TAC 1 | | | | | | | | octet 5 |
| TAC 1 (continued) | | | | | | | | octet 6 |
| TAC 1 (continued) | | | | | | | | octet 7 |

Figure 9.11.3.49.3: Partial service area list – type of list = "01"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Allowed type | Type of list | | Number of elements | | | | | octet 1 |
| MCC digit 2 | | | | MCC digit 1 | | | | octet 2 |
| MNC digit 3 | | | | MCC digit 3 | | | | octet 3 |
| MNC digit 2 | | | | MNC digit 1 | | | | octet 4 |
| TAC 1 | | | | | | | | octet 5 |
| TAC 1 (continued) | | | | | | | | octet 6 |
| TAC 1 (continued) | | | | | | | | octet 7 |
| MCC digit 2 | | | | MCC digit 1 | | | | octet 8\* |
| MNC digit 3 | | | | MCC digit 3 | | | | octet 9\* |
| MNC digit 2 | | | | MNC digit 1 | | | | octet 10\* |
| TAC 2 | | | | | | | | octet 11\* |
| TAC 2 (continued) | | | | | | | | octet 12\* |
| TAC 2 (continued) | | | | | | | | octet 13\* |
| … | | | | | | | |  |
| MCC digit 2 | | | | MCC digit 1 | | | | octet 6k-4\* |
| MNC digit 3 | | | | MCC digit 3 | | | | octet 6k-3\* |
| MNC digit 2 | | | | MNC digit 1 | | | | octet 6k-2\* |
| TAC k | | | | | | | | octet 6k\*-1 |
| TAC k (continued) | | | | | | | | octet 6k\* |
| TAC k (continued) | | | | | | | | octet 6k+1\* |

Figure 9.11.3.49.4: Partial service area list – type of list = "10"

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |  |
| Allowed type | Type of list | | Number of elements | | | | | octet 1 |
| MCC digit 2 | | | | MCC digit 1 | | | | octet 2 |
| MNC digit 3 | | | | MCC digit 3 | | | | octet 3 |
| MNC digit 2 | | | | MNC digit 1 | | | | octet 4 |

Figure 9.11.3.49.5: Partial service area list – type of list = "11"

Table 9.11.3.49.1: Service area list information element

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Value part of the Service area list information element (octets 3 to n) | | | | | |
|  | | | | | |
| The value part of the Service area list information element consists of one or several partial service area lists. The length of each partial service area list can be determined from the 'type of list' field and the 'number of elements' field in the first octet of the partial service area list. | | | | | |
| The "Allowed type" fields in all the partial service area lists shall have the same value. For allowed type "0", TAIs contained in all partial service area lists are in the allowed area. For allowed type "1", TAIs contained in all partial service area lists are in the non-allowed area.  The UE shall store the complete list received. If more than 16 TAIs are included in this information element, the UE shall store the first 16 TAIs and ignore the remaining octets of the information element. | | | | | |
|  | | | | | |
|  | | | | | |
| Partial service area list: | | | | | |
|  | | | | | |
| Allowed type (octet 1) | | | | | |
| Bit | | | | | |
| 8 |  |  | | | |
| 0 |  | TAIs in the list are in the allowed area | | | |
| 1 |  | TAIs in the list are in the non-allowed area | | | |
|  | | | | | |
| Type of list (octet 1) | | | | | |
| Bits | | | | | |
| 7 | 6 |  | | | |
| 0 | 0 | list of TACs belonging to one PLMN, with non-consecutive TAC values | | | |
| 0 | 1 | list of TACs belonging to one PLMN, with consecutive TAC values | | | |
| 1 | 0 | list of TAIs belonging to different PLMNs (see NOTE) | | | |
| 1 | 1 | All TAIs belonging to the PLMNs in the registration area are in the allowed area | | | |
|  | | | | | |
| Number of elements (octet 1) | | | | | |
| Bits | | | | | |
| 5 | 4 | 3 | 2 | 1 |  |
| 0 | 0 | 0 | 0 | 0 | 1 element |
| 0 | 0 | 0 | 0 | 1 | 2 elements |
| 0 | 0 | 0 | 1 | 0 | 3 elements |
| to | | | | |  |
| 0 | 1 | 1 | 0 | 1 | 14 elements |
| 0 | 1 | 1 | 1 | 0 | 15 elements |
| 0 | 1 | 1 | 1 | 1 | 16 elements |
|  | | | | | |
| All other values are unused and shall be interpreted as 16, if received by the UE. | | | | | |
|  | | | | | |
| For type of list = "00" and number of elements = k: | | | | | |
|  | | | | | |
| octets 2 to 4 contain the MCC+MNC, and | | | | | |
| for j = 1, …, k: | | | | | |
| octets 3j+2 to 3j+4 contain the TAC of the j-th TAI belonging to the partial list, | | | | | |
|  | | | | | |
| For type of list = "01" and number of elements = k: | | | | | |
|  | | | | | |
| octets 2 to 4 contain the MCC+MNC, and | | | | | |
| octets 5 to 7 contain the TAC of the first TAI belonging to the partial list. | | | | | |
| The TAC values of the other k-1 TAIs are TAC+1, TAC+2, …, TAC+k-1. | | | | | |
|  | | | | | |
| For type of list = "10" and number of elements = k: | | | | | |
|  | | | | | |
| for j = 1, …, k. | | | | | |
| octets 6j-4 to 6j-1 contain the MCC+MNC, and | | | | | |
| octets 6j-1 to 6j+1 contain the TAC of the j-th TAI belonging to the partial list. | | | | | |
|  | | | | | |
| For type of list = "11": | | | | | |
|  | | | | | |
| Allowed type shall be coded as "0" and number of elements shall be ignored, and octets 2 to 4 | | | | | |
| containing the MCC+MNC can be ignored.  If allowed type is coded as "1", it shall be interpreted as "0". | | | | | |
|  | | | | | |
|  | | | | | |
| MNC, Mobile network code | | | | | |
|  | | | | | |
| The coding of this field is the responsibility of each administration but BCD coding shall be used. The MNC shall consist of 2 or 3 digits. If a network operator decides to use only two digits in the MNC, MNC digit 3 shall be coded as "1111". | | | | | |
|  | | | | | |
| TAC, Tracking area code | | | | | |
|  | | | | | |
| In the TAC field bit 8 of the first octet is the most significant bit and bit 1 of the third octet the least significant bit. | | | | | |
| The coding of the tracking area code is the responsibility of each administration. Coding using full hexadecimal representation may be used. The tracking area code consists of 3 octets. | | | | | |
| NOTE: If the "list of TAIs belonging to different PLMNs" is used, the PLMNs included in the list need to be present in the list of equivalent PLMNs. This type is not applicable in an SNPN. | | | | | |