**3GPP TSG-SA WG Meeting #94-e S1-211012**

**Electronic Meeting, May 10 – May 20, 2021**

Title: Resolution of Editor’s NOTE and consolidation of remaining requirements in TR 22.835.

Agenda Item: 7.6.1. [FS\_EASNS]

Source: LG Electronics

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*Abstract: This contribution discusses remaining editor’s notes in 22.835 and proposed updates.*

## 1. Resolution of Editor’s note.

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| PR with Editor’s note | Discussion | Proposal |
| Editor's notes: The following requirement is related to the ongoing discussion in other WGs and will be considered during consolidation phase taking into account the output from other WGs:  [PR.5.1.6-1] When a UE is located in an area where there is no authorized network slice for the UE, the 5G system shall support a mechanism to efficiently enable the UE to minimize power consumption (e.g., cell search, cell measurement). | According to agreed RAN Slicing WID [1], RAN will specify SIB-based indication of the network slices for cell reselection. The objective in [1] is:

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| *1. Support slice based cell reselection, specify mechanisms and signalling including [RAN2]**a. To assist cell reselection, broadcast the supported slice info of the current cell and neighbour cells, and cell reselection priority per slice in system information message.* *b. To assist cell reselection, include slice info (with similar information as in SI message) in RRCRelease message.* |

As shown above, the RAN work focuses on the identification of available slices in the neighbor cells, while the PR focuses on power saving aspect when the slice is not available. Thus, [PR5.1.6-1] is not supported in Rel-17. This case is already covered in Rel-17 in 23.501, 5.15. RAN3 will complete normative work in Q4, so this requirement can be considered covered in Rel-17. | Remove the Editor’s NOTE, and move [PR.5.1.6-1] to 5.1.5.[PR.5.1.6-1] When a UE is located in an area where there is no authorized network slice for the UE, the 5G system shall support a mechanism to efficiently enable the UE to minimize power consumption (e.g., cell search, cell measurement). |
| Editor's notes: The following requirements are related to the ongoing discussion in other WGs and will be considered during consolidation phase taking into account the output from other WGs:  [PR.5.2.6-1] When a UE moves from an area where there is at least one authorized network slice for the UE to an area where there is no authorized network slice for the UE, the 5G system shall be able to minimize impact on the applications provided over the network slice to be released (e.g., relocation of the application from one network slices to other network slices or termination of the application).[PR.5.2.6-2] When more prioritized network slice becomes available, the 5G system shall be able to minimize the time until the prioritized network slice is provided to the UE, while minimizing impact on the applications provided over the network slices to be released | Similar to the comment above, [1] will discuss cell ‘re-’selection based on network slice.However, [1] will not address the case when the UE moves into area where there is no available slice and will not address how to minimize application impact. In addition, this aspect is beyond RAN scope and needs to be addressed considering overall system architecture. The modified req now addresses the case RAN3 et al are looking at in Rel-17 - when the currently in use slice is no longer available. This case has already been addressed in 23.501, section 5.15.5.3 and TS 23.503. RAN3 will complete normative work in Q4, so this requirement can be considered covered in Rel-17.On the other hand, for [PR.5.2.6-2], this requirement seems to be dependent on the outcome of RAN progress in Rel-17. I.e, the cell ‘re-‘selection based on network slice can minimize the time until when the UE is provided with the desired network slice. | Remove Editor’s note. Generalize [PR.5.2.6-1] and move to 5.2.5. Delete [PR.5.2.6-2].Proposed update to [PR.5.2.6-1]:[PR.5.2.6-1] When a UE moves from an area where an authorized network slice for the UE is provided to an area where the network slice is not provided, the 5G system shall be able to minimize impact on the applications provided over the network slice to be released (e.g., relocation of the application from one network slices to other network slices or termination of the application). |
| [PR.5.6.6-1] The 5G system shall enable a roaming UE with a single PLMN subscription to access network slices from more than one VPLMN simultaneously, when the UE requires simultaneous access to multiple network slices and the network slices are not available in a single VPLMN. [PR.5.6.6-2] The HPLMN shall be able to authorise a roaming UE with a single PLMN subscription to access network slices from more than one VPLMN simultaneously.[PR.5.6.6-3] The HPLMN shall be able to provide a UE with permission and prioritisation information of the VPLMNs the UE is authorised to use for accessing specific network slices.NOTE: The above requirements would depend on certain UE capabilities assumptions, e.g. the ability to connect to more than one PLMN simultaneously.Editor's Note: The above requirements should be revisited in next meeting. Whether the simultaneous access is towards two PLMNs instead of multiple PLMNs, and whether the different PLMNs can be VPLMNs, need further study. | [TBC: Apple may update this row or use separate tdoc for discussion] | [TBC: Apple may update this row or use separate tdoc for discussion] |
| 5.7.6 Potential New Requirements needed to support the use caseEditor’s Note: Potential requirements T.B.D.  | Let’s delete the Editor’s note, if there is no proposal on this section. | Delete the Editor’s note. |
| [PR.5.9.6-1] 5G system shall support a mechanism to minimize service interruption for a UE when different radio resources are configured for a network slice in different geographical areas and when the UE crosses the geographic area boundaries.Editor’s Note: This requirement needs to be checked later. | Whether this PR can be supported or not seems to be dependent on the outcome of RAN2/3. . | Remove the Editor’s note.Move the potential requirement into section 5.9.5 and re-check the requirement when Rel-17 is finished. |

## 2. Consolidation of remaining potential requirements.

At the previous meeting, S1-210425 was agreed as a result of consolidation. During the consolidation process, S1-210425 did not include:

* Potential requirements with Editor’s note
* New potential requirements added at SA1#93e.

Following tables lists these requirements.

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| Req # | Requirements in V18.0.0 of TR 22.835  | Comments. | Proposal |
| [PR.5.1.6-1]  | Editor's notes: The following requirement is related to the ongoing discussion in other WGs and will be considered during consolidation phase taking into account the output from other WGs: When a UE is located in an area where there is no authorized network slice for the UE, the 5G system shall support a mechanism to efficiently enable the UE to minimize power consumption (e.g., cell search, cell measurement). | This requirement is discussed in above section 1. | Proposed to capture this requirement:[CPR-006] When a UE is located in an area where there is no authorized network slice for the UE, the 5G system shall support a mechanism to efficiently enable the UE to minimize power consumption (e.g., cell search, cell measurement).See above, as a capability already included in Rel-17, this should not be added to CPR. |
| [PR.5.2.6-1] | Editor's notes: The following requirements are related to the ongoing discussion in other WGs and will be considered during consolidation phase taking into account the output from other WGs:  When a UE moves from an area where there is at least one authorized network slice for the UE to an area where there is no authorized network slice for the UE, the 5G system shall be able to minimize impact on the applications provided over the network slice to be released (e.g., relocation of the application from one network slices to other network slices or termination of the application). | This requirement is discussed in above section 1. | Proposed to use the updated requirement as discussed above:[CPR-007] When a UE moves from an area where an authorized network slice for the UE is provided to an area where the network slice is not provided, the 5G system shall be able to minimize impact on the applications provided over the network slice to be released (e.g., relocation of the application from one network slices to other network slices or termination of the application).See above, as a capability already included in Rel-17, this should not be added to CPR. |
| [PR.5.2.6-2] | Editor's notes: The following requirements are related to the ongoing discussion in other WGs and will be considered during consolidation phase taking into account the output from other WGs:  When more prioritized network slice becomes available, the 5G system shall be able to minimize the time until the prioritized network slice is provided to the UE, while minimizing impact on the applications provided over the network slices to be released | This requirement is discussed in above section 1. | As discussed above, this requirement is not consolidated. |
| [PR.5.6.6-1] | The 5G system shall enable a roaming UE with a single PLMN subscription to access network slices from more than one VPLMN simultaneously, when the UE requires simultaneous access to multiple network slices and the network slices are not available in a single VPLMN. NOTE: The above requirements would depend on certain UE capabilities assumptions, e.g. the ability to connect to more than one PLMN simultaneously.Editor's Note: The above requirements should be revisited in next meeting. Whether the simultaneous access is towards two PLMNs instead of multiple PLMNs, and whether the different PLMNs can be VPLMNs, need further study. | [Rapporteur] New Editor’s note was added at the previous meeting.Depends on other contribution on this topic. | [TBD] |
| [PR.5.6.6-2] | The HPLMN shall be able to authorise a roaming UE with a single PLMN subscription to access network slices from more than one VPLMN simultaneously.NOTE: The above requirements would depend on certain UE capabilities assumptions, e.g. the ability to connect to more than one PLMN simultaneously.Editor's Note: The above requirements should be revisited in next meeting. Whether the simultaneous access is towards two PLMNs instead of multiple PLMNs, and whether the different PLMNs can be VPLMNs, need further study | [Rapporteur] New Editor’s note was added at the previous meeting.Depends on other contribution on this topic. | [TBD] |
| [PR.5.6.6-3] | The HPLMN shall be able to provide a UE with permission and prioritisation information of the VPLMNs the UE is authorised to use for accessing specific network slices.NOTE: The above requirements would depend on certain UE capabilities assumptions, e.g. the ability to connect to more than one PLMN simultaneously.Editor's Note: The above requirements should be revisited in next meeting. Whether the simultaneous access is towards two PLMNs instead of multiple PLMNs, and whether the different PLMNs can be VPLMNs, need further study | [Rapporteur] New Editor’s note was added at the previous meeting.Depends on other contribution on this topic. | [TBD] |
| [PR.5.8.6-1] | The 5G system shall support a mechanism for a UE to select and access network slice(s) based on UE capability, ongoing application, and policy (e.g., application preference). | [Rapporteur] At the previous meeting, this requirement was updated and editor’s note was resolved | Proposed to use the requirement as it is. [CPR-008] The 5G system shall support a mechanism for a UE to select and access network slice(s) based on UE capability, ongoing application, and policy (e.g., application preference). |
| [PR.5.8.6-2] | The 5G system shall support a mechanism to optimize resources of network slices (e.g., due to operator deploying different frequency to offer different network slices) based on network slice usage patterns and policy (e.g., application preference) of a UE or group of UEs | [Rapporteur] At the previous meeting, this requirement was updated and editor’s note was resolved | Proposed to use the requirement as it is. [CPR-009] The 5G system shall support a mechanism to optimize resources of network slices (e.g., due to operator deploying different frequency to offer different network slices) based on network slice usage patterns and policy (e.g., application preference) of a UE or group of UEs |
| [PR.5.9.6-1]  | 5G system shall support a mechanism to minimize service interruption for a UE when different radio resources are configured for a network slice in different geographical areas and when the UE crosses the geographic area boundaries. | [Rapporteur] In section 1, this requirement is not any more a new PR. | As discussed above, this requirement is not consolidated. |
| [PR.5.13.6-1] | For traffic pertaining to a network slice offered via a relay node, 5G system shall use only radio resources (e.g. frequency band) allowed for the network slice.NOTE: Allowed radio resources (e.g., frequency band) may be different for direct network connections (between UE and NG-RAN) than for backhaul connections (between the relay node and the NG-RAN). | [Rapporteur] This requirement was updated at the previous meeting. | Proposed to use the requirement as it is. [CPR-010] For traffic pertaining to a network slice offered via a relay node, 5G system shall use only radio resources (e.g. frequency band) allowed for the network slice.NOTE: Allowed radio resources (e.g., frequency band) may be different for direct network connections (between UE and NG-RAN) than for backhaul connections (between the relay node and the NG-RAN). |
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## 3. Text Proposal.

Following is text proposal to 22.835.

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6 Potential Consolidated Requirements

Following are consolidated potential requirements.

[CPR-001] For a UE authorized to access multiple network slices of one operator which cannot be simultaneously used by the UE (e.g. due to radio frequency restrictions), the 5G system shall be able to support the UE to access the most suitable network slice in minimum time (e.g. based on the location of the UE, ongoing applications, UE capability, frequency configured for the network slice).

[CPR-002] For a UE authorized to access to multiple network slices of one operator which cannot be simultaneously used by the UE (e.g. due to radio frequency restrictions), the 5G system shall minimize service interruption time when the UE changes the access from one network slice to another network slice. (e.g. based on changes of active applications).

[CPR-003] 5G system shall minimize signaling exchange and service interruption time for a network slice, e.g. when restrictions related to radio resources change (e.g., frequencies, RATs).

[CPR-004] For a roaming UE activating a service/application requiring a network slice not offered by the serving network but available in the area from other network(s), the HPLMN shall be able to provide the UE with prioritization information of the VPLMNs with which the UE may register for the network slice.

[CPR-005] In case a third party has requested provision of a network slice using specific radio resources for the network slice, the 5G system shall be able to generate charging information regarding the used radio resources e.g. used frequency bands.

[CPR-006] When a UE is located in an area where there is no authorized network slice for the UE, the 5G system shall support a mechanism to efficiently enable the UE to minimize power consumption (e.g., cell search, cell measurement).

[CPR-007] When a UE moves from an area where an authorized network slice for the UE is provided to an area where the network slice is not provided, the 5G system shall be able to minimize impact on the applications provided over the network slice to be released (e.g., relocation of the application from one network slices to other network slices or termination of the application).

[CPR-008] The 5G system shall support a mechanism for a UE to select and access network slice(s) based on UE capability, ongoing application, and policy (e.g., application preference).

[CPR-009] The 5G system shall support a mechanism to optimize resources of network slices (e.g., due to operator deploying different frequency to offer different network slices) based on network slice usage patterns and policy (e.g., application preference) of a UE or group of UEs

[CPR-010] For traffic pertaining to a network slice offered via a relay node, 5G system shall use only radio resources (e.g. frequency band) allowed for the network slice.

NOTE: Allowed radio resources (e.g., frequency band) may be different for direct network connections (between UE and NG-RAN) than for backhaul connections (between the relay node and the NG-RAN).

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## 4. Proposal.

A CR [2] is provided based on the above section 3. It is proposed to approve [2].

## 5. Reference.

[1] RP-210912, WID\_RAN Slicing

[2] S1-211010, CR0001 to 22.835,