

# Discussion on Study on System improvement for Enhanced Access to and Support of Network Slice

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LG Electronics

## Background

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- ❑ **SA1 almost completed the study of FS\_EASNS**
  - Study on Enhanced Access to and Support of Network Slice, SP-200571
  
- ❑ **Corresponding work item is approved in SA#91e**
  - Enhanced Access to and Support of Network Slice, SP-210210
  - Target completion: TSG#93e (Sep, 2021)
  
- ❑ **Following slides show new requirements and proposed objectives for the each requirements**

## SA1 requirements – CPRs

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- ❑ [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).
  - Study how to steer a UE to different radio resources considering ongoing traffic of each network slice and preference from the UE
- ❑ [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).
  - Study how to minimize service interruption time when the UE changes access from one network slice to another network slice
- ❑ [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).
  - Study how to minimize access time to a network slice when a UE moves into an area where the network slice is supported
- ❑ [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.
  - Study how to provide information of prioritized VPLMNs provide network slices a UE wants to use and how to steer the UE to the VPLMNs.
- ❑ [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.
  - Study how to acquire radio resource information for a network slice to generate charging information

## SA1 requirements – CPRs suggested by SA1 Rapporteur

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- ❑ [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).
  - Scope of RAN WGs
  
- ❑ [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).
  - Study how to minimize impact on application e.g. support of application relocation to other PDU session or support of notification for graceful 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).
  - Can be considered together with CPR-001
  
- ❑ [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.
  - Can be considered together with CPR-001
  
- ❑ [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).

  - Study how to enforce resource restriction for network slice when relay is used

# Summary

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## ❑ Objectives

- When a UE can access to multiple network slices that cannot be used simultaneously due to radio resource restrictions (e.g. slices are deployed in different frequency bands)
  - Study how to steer a UE to different radio resources considering ongoing traffic of each network slice and preference from the UE.
  - Study how to minimize service interruption time when the UE changes access from one network slice to another network slice.
  - Study how to minimize access time to a network slice when a UE moves into an area where the network slice is supported.
- When a UE is roaming and serving VPLMN does not provide a network slice the UE wants to use
  - Study how to provide information of prioritized VPLMNs provide network slices a UE wants to use and how to steer the UE to the VPLMNs
- When a UE moves out of an area where ongoing network slice is not supported
  - Study how to minimize impact on application e.g. support of application relocation to other PDU session or support of notification for graceful termination of the application
- Study how to acquire radio resource information for a network slice to generate charging information
- Study how to enforce resource restriction for network slice when relay is used

## ❑ Based on above objectives, SID is proposed in S2-2104029.

- Objectives may further updated based on SA1 EASNS work.
  - Please refer potential requirements in Annex
- This study covers leftovers of Rel-17 eNS\_Ph2 study and work if deemed necessary.

## Annex. SA1 requirements – PRs (for information) (1/2)

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- ❑ [PR.5.1.6-2] When a UE is located in an area where there is at least one authorized network slice for the UE, the 5G system shall be able to minimize the time for the UE to access the network slices which is most suitable based on e.g., location of the UE, active applications, UE capability, frequency used by the network slice.
- ❑ [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
- ❑ [PR.5.3.6-1] 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 allow the UE to access the most suitable network slice (e.g. based on the ongoing applications).
- ❑ [PR.5.3.6-2] 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 support the minimized interruption when the UE changes the access from one network slice to another network slice. (e.g. based on changes of active applications).
- ❑ [PR.5.4.6-1] 5G system shall minimize signaling exchange and service interruption when there is a change in the allowed radio resources (e.g. RATs) for a network slice.
- ❑ [PR.5.5.6-1] 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.

## Annex. SA1 requirements – PRs (for information) (2/2)

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- ❑ [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.
- ❑ [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.
- ❑ [PR.5.10.6-1] 5G system shall be able to minimize service interruption when configured radio resource (e.g. frequency range) for a network slice changes.
- ❑ [PR.5.11.6-1] In case a third party has requested provision of a network slice using specific radio resources for the network slice, 5G system shall be able to generate charging information regarding the used radio resources e.g. used frequency bands.