

3GPP TSG RAN#93e  
Electronic Meeting, Sept. 13 - 17, 2021  
Agenda: 9.0.3  
RP-211962



## CA/DC further enhancements for Rel-18

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# Overall view for CA/DC enhancements in Rel-18



- Summary of RAN Rel-18 workshop on CA/DC enhancements
  - » As summarized in RWS-210659, CA/DC enhancements is listed as one of additional RAN1/2/3 candidate topics for Rel-18
    - 📶 **14. Additional RAN1/2/3 candidate topics, Set 1:**
      - UE power savings
      - Enhancing and extending the support beyond 52.6GHz
      - CA (Carrier Aggregation)/DC (Dual-Connectivity) enhancements (e.g., MR-MC (Multi-Radio/Multi-Connectivity), etc.)
      - Flexible spectrum integration
      - RIS (Reconfigurable Intelligent Surfaces)
      - Others (RAN1-led)
    - » About 22 companies (contributions and Q&As) provided views on CA/DC enhancements with wide interest to support, including operators, network vendors, UE vendors, etc.
    - » Potential scopes for CA/DC enhancements proposed in company contributions, including
      - Extending MR-DC to MR-MC (about 10 companies proposed)
      - Other further enhancements on CA/DC (about 7 companies proposed)
- In our view, **CA/DC enhancements** is one of the essential topics for Rel-18.
  - » CA/DC enhancements could be handled as a **higher priority** topic for Rel-18
  - » We suggest a **dedicated WI** for CA/DC enhancements in Rel-18

# Motivation for Extending MR-DC to MR-MC (1/2)

## ■ Motivation

- » Due to the high 5G frequency bands up to 100GHz and with the gradual 4G frequency refarming, Multi-layer overlapping deployment will be a normal behaviour for future network.
- » The emergence of new applications and services, such as AR/XR, HD live video, requires not only **higher bandwidth and capacity**, but also **higher quality of service and user experience assurance**.
- » For future network deployment, **MR-MC** can be considered as an approach to provide operator with more flexible, effective and uniform network control and radio resource management.

## ■ MR-MC for **higher bandwidth and capacity** requirements

- » CA requires co-located and overlaid or higher backhaul quality.
- » DC can provide radio resources for a UE jointly in non-ideal backhaul scenario.
- » By the extension of MR-MC, **multi SNs** can help increase bandwidth and capacity significantly in hotspot and overlapping areas.

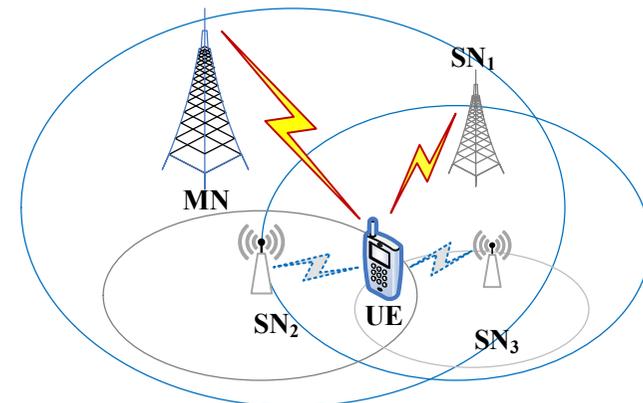
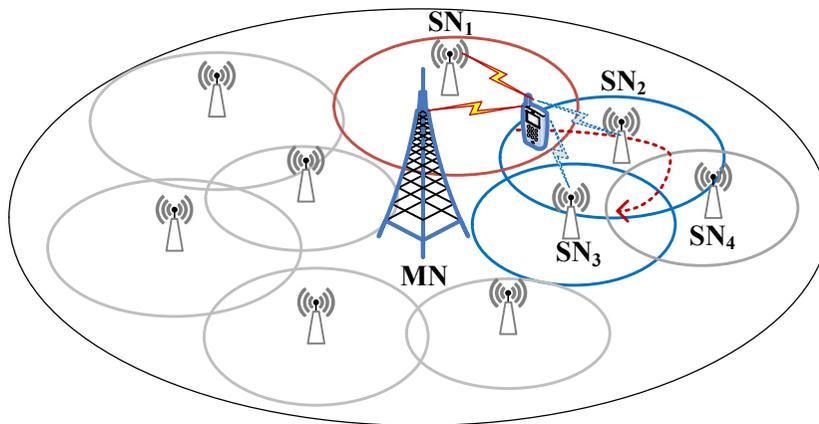


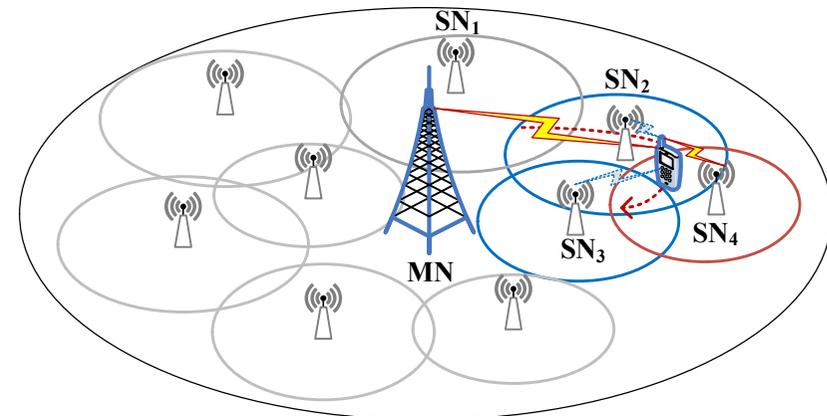
Fig. Multi-layer deployment

## Motivation for Extending MR-DC to MR-MC (2/2)

- MR-MC also focuses on guaranteeing **higher quality of service and user experience**
  - » For high and low frequency hybrid network, when UE is moving across multi high frequency SNs (e.g. FR2 or up to 100GHz), frequent SCG changes may reduce the user experience.
  - » Preconfiguring multi SNs can help maintain the data rate and service continuity of the UE.
  - » Fast and dynamic activation/ deactivation among multi SNs can help reduce latency comparing to SCG changes.



Configured: SN1, SN2, SN3; Activated: SN1



Configured: SN2, SN3, SN4; Activated: SN4

# Potential scope for MR-MC

- Potential scope for MR-MC
  - » Support **at most 2 simultaneous UL transmissions** and potential extension to 3 DL receptions in Rel-18 to reduce the complexity and cost of MR-MC from UE and network side.
  - » Specify mechanisms and signalling for multi cell groups management, including
    - **Fast and dynamic SCG activation and deactivation**, such as extending Rel-17 efficient SCG activation / deactivation mechanism to multi SCGs
    - **Fast cell group switching**, such as preconfiguring multi SCGs and switching between MCG/ SCGs dynamically based on network indication / preconfigured events
    - **UL selective activation mechanism**, such as dynamic UL switching

# Potential scope for MR-MC

## ■ Potential scope for MR-MC

» Specify other aspects for MR-MC, including

- Bearer management, such as new bearer type, split bearer etc.
- UE capability management, such as UE capability sharing or coordination etc.
- UE uplink power control

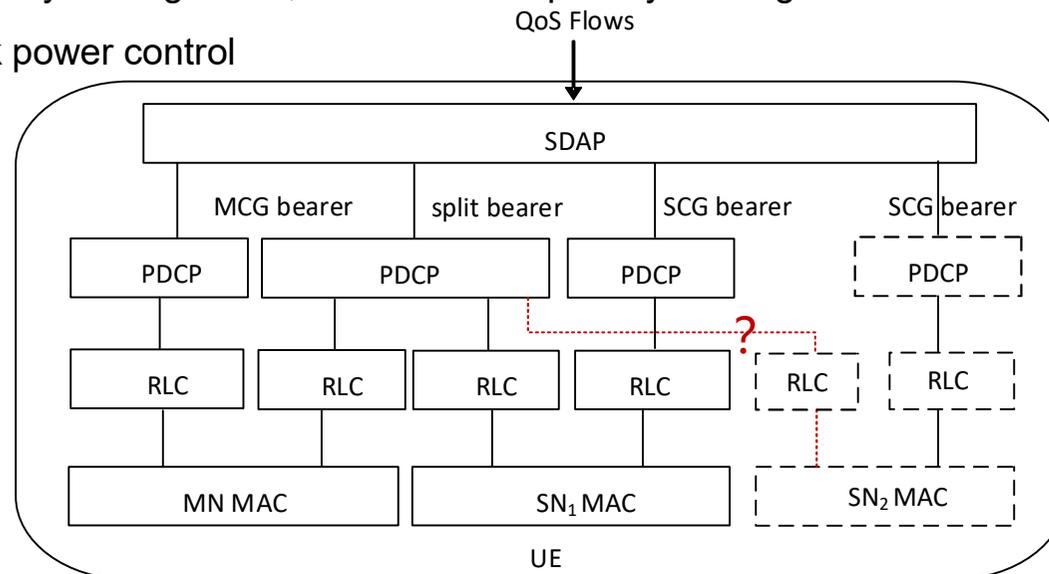


Fig. Radio Protocol Architecture for MCG, SCG and split bearers from UE side

# Other further enhancements on CA/DC



## ■ Other further CA/DC enhancements for FR2

### » Motivation

- FR2 CA/DC cell selection and UE measurement report delay cause great user throughputs degradations. Further enhancement to reduce SCell setup delay would be needed for FR2
- For dormant SCell in FR2, RACH is needed to get the best beam due to the lack of UL SRS transmission, which increases SCell activation latency in FR2.
- In FR2, RLF on PCell may happen more frequently. It is necessary to minimize reestablishment caused by RLF on PCell.

### » Potential scopes

- Early measurement enhancement to balance UE power consumption and SCell setup delay
- Fast SCell activation enhancement, such as supporting UL SRS transmission for dormant SCell
- RLF enhancement, such as MN/SN role switching

# Potential scope summary for R18 CA/DC enhancements



- Potential scope for Rel-18 CA/DC enhancements
  - » Specify the architecture, interface, UP and CP protocols for extending MR-DC to MR-MC [RAN2, RAN3]
    - Support at most 2 simultaneous UL transmissions and potential extension to 3 DL receptions
  - » Specify mechanisms and signalling for multi cell groups management, including [RAN2, RAN3, RAN1]
    - Fast and dynamic SCG activation and deactivation
    - Fast cell group switching, including MN/SN role switching
    - UL selective activation mechanism
  - » Specify other aspects for MR-MC, including [RAN2, RAN3, RAN1]
    - Bearer management, such as new bearer type, split bearer etc.
    - UE capability management, such as UE capability sharing or coordination etc.
    - UE uplink power control
  - » Specify other aspects for further enhancements on CA/DC, including [RAN2, RAN3, RAN1]
    - Early measurement enhancement to balance UE power consumption and SCell setup delay
    - Fast SCell activation enhancement, such as supporting UL SRS transmission for dormant SCell



Thanks!

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