5G NSA Release Signaling

“Call Drop Failures Possible Causes & Troubleshooting Methods”

NSA Series#2

Optimization

Technology

Mohamed Eladawi

CONTENT

SN Release procedure
"Call Flow"

5G Possible Root Causes
of Retainability Issues

5G NSA Drop Analysis Guide

Retainability identification
from KPIs

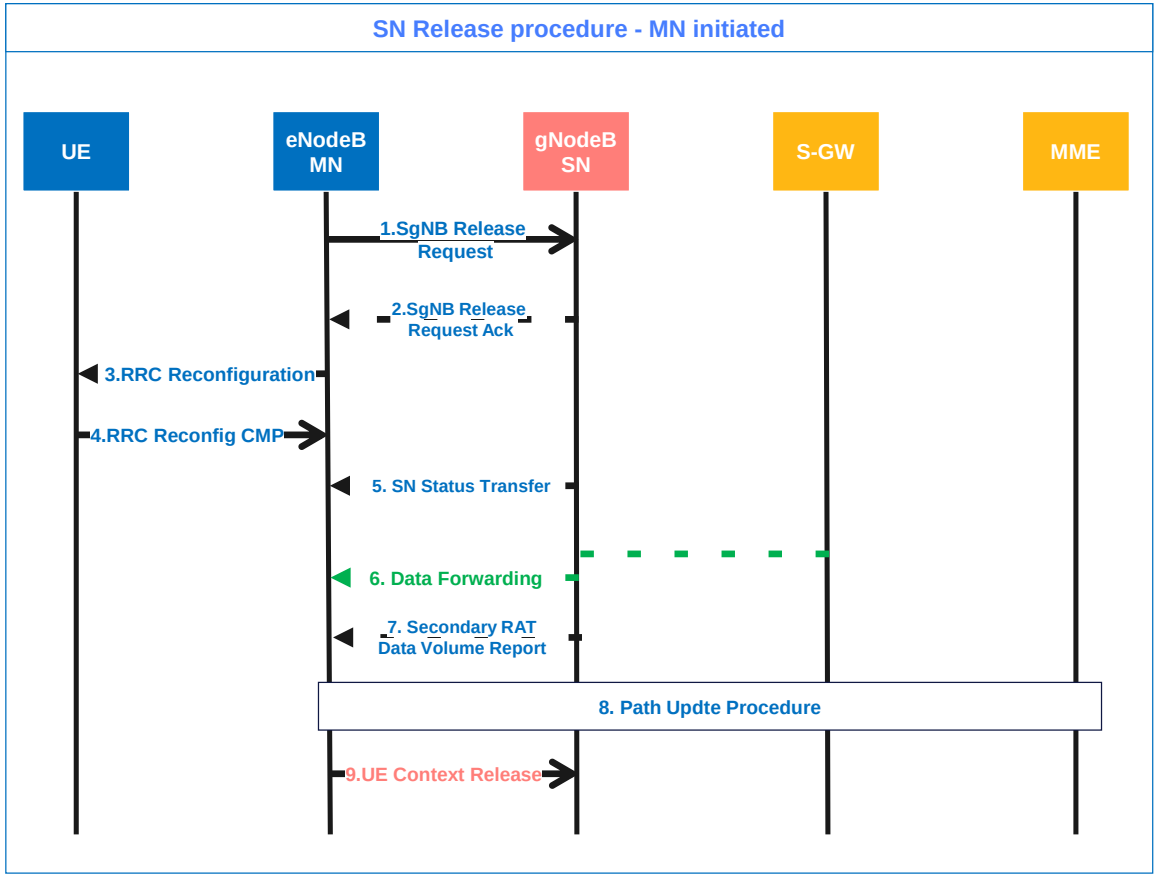
5G Call Drop related
Parameters & Features

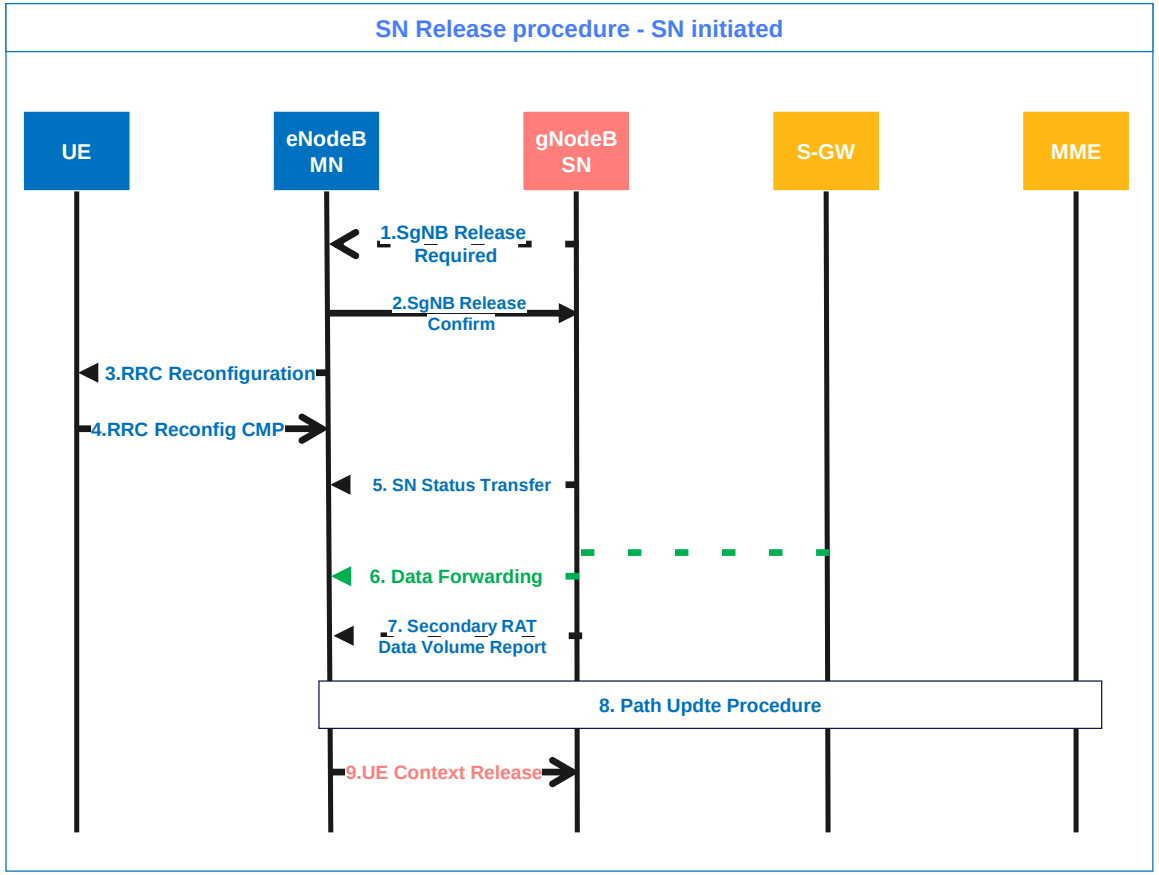
SN Release procedure(Normal Release)

The Following is the most common causes for the Normal Release messages

- MN Initiated SgNB Release **Request** includes Value Cause: radioNetwork: **"User Inactivity“ or "MCG Mobility“.**
- SN Initiated SgNB Release **required** includes Value Cause: readioNetwork: **"User Inactivity“ or "SCG Mobility“ or "Action Desirable for Radio Reasons“.**

Or it might include others cause such as "Handover Desirable for Radio Reasons", "Load Balancing“, etc.





3GPP TS 37.340 version 15.5.0 Release 15 (Page 34 onwards)
3GPP TS 38.423 version 16.2.0 Release 16 (Page 221 to 223)

***All 3GPP Release causes will be added to the video description**

SN Release procedure(Abnormal Release)

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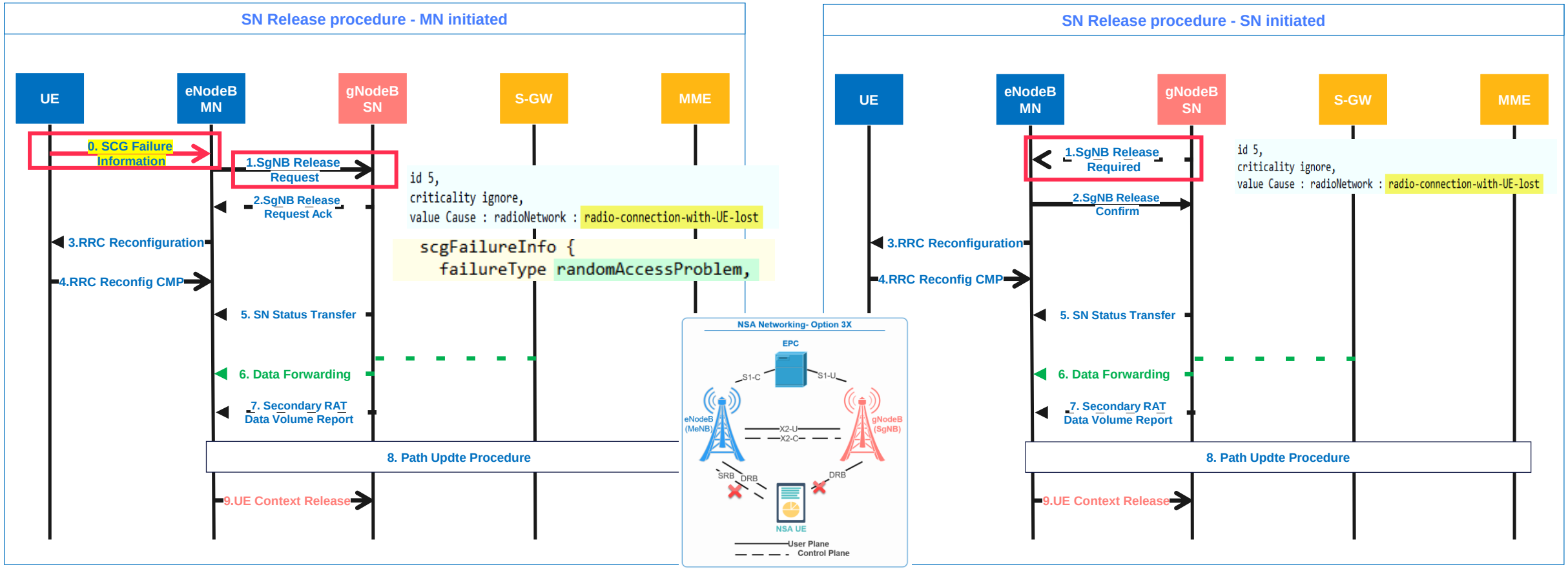
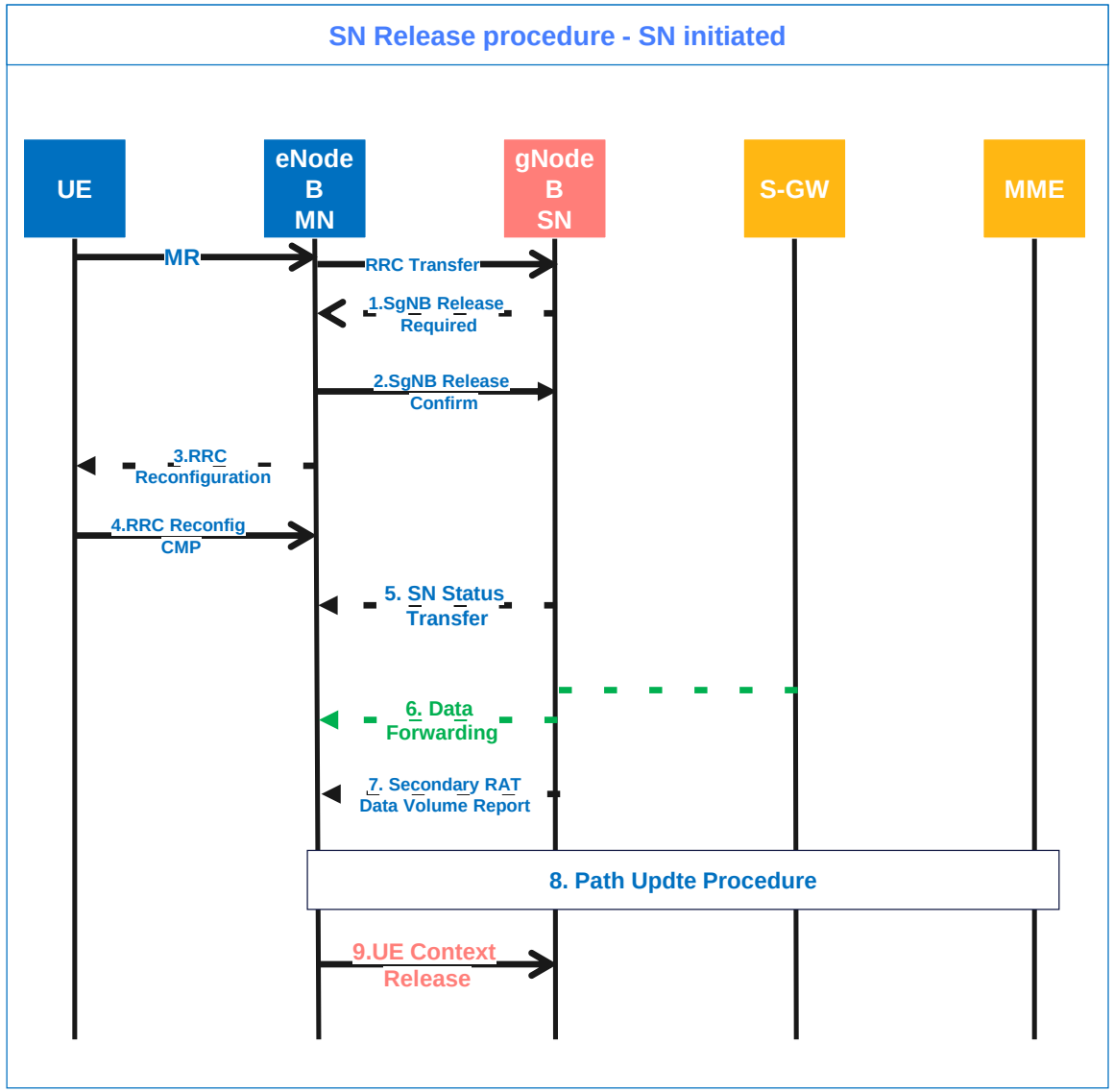
- The detection of NR Radio Link Failure (RLF) can be carried out by either the UE(MN) or the gNodeB (SN).
- A 5G Call Drop (RLF) is identified and declared through various factors, including transmission issues, core problems, 5G Downlink (DL) and Uplink (UL) radio frequency (RF) issues, UE capability issues, 4G RF issues (RRC Reestablishment), and lastly, configuration issues.



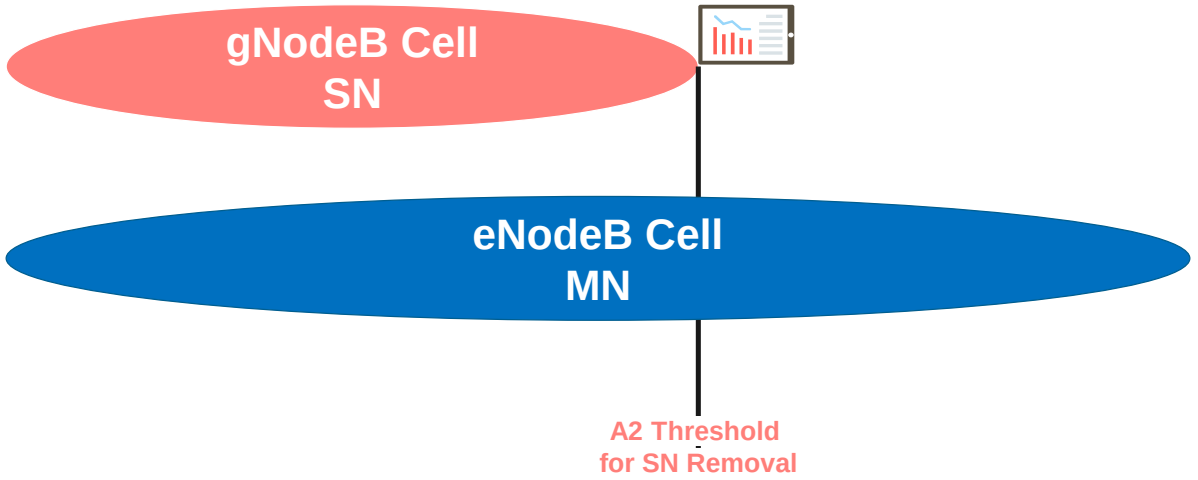
3GPP TS 37.340 version 15.5.0 Release 15 (Page 34 onwards)
3GPP TS 38.423 version 16.2.0 Release 16 (Page 221 to 223)

SN Release procedure (Normal Release due to Action-Desirable for Radio Network)



When the signal quality of the Primary Serving Cell (PSCell) consistently diminishes, and there is no suitable neighboring cell identified for a PSCell handover, the decision to delete the PSCell can be triggered by event A2

```
id 5,
criticality ignore,
value Cause : radioNetwork : action-desirable-for-radio-reasons
```



3GPP TS 38.423 definition

Radio Network Layer cause	Meaning
Handover Desirable for Radio Reasons	The reason for requesting handover is radio related.

3GPP TS 37.340 version 15.5.0 Release 15 (Page 34 onwards)
3GPP TS 38.423 version 16.2.0 Release 16 (Page 221 to 223)

SN Release procedure (Normal Release due to MCG or SCG Mobility)

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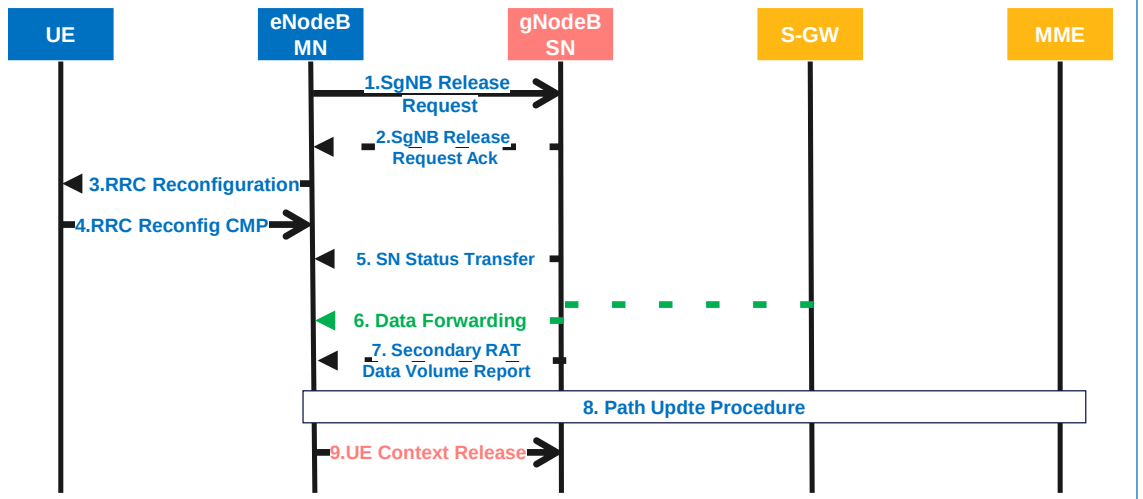
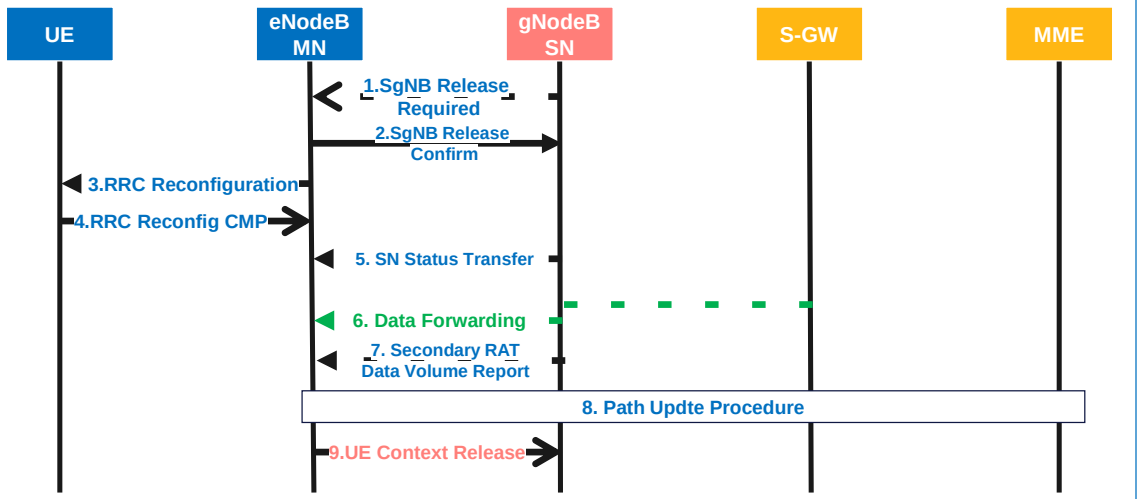
SN Release procedure - MN initiated



SN Release procedure - SN initiated



3GPP TS 37.340 version 15.5.0 Release 15 (Page 34 onwards)

3GPP TS 38.423 version 16.2.0 Release 16 (Page 221 to 223)

```
id 5,
criticality ignore,
value Cause : radioNetwork : mCG-Mobility
```

Non-Anchor

```
id 5,
criticality ignore,
value Cause : radioNetwork : sCG-Mobility
```

MN or SN

3GPP TS 37.340 version 15.5.0 Release 15 38 ETSI TS 137 340 V15.5.0 (2019-05)

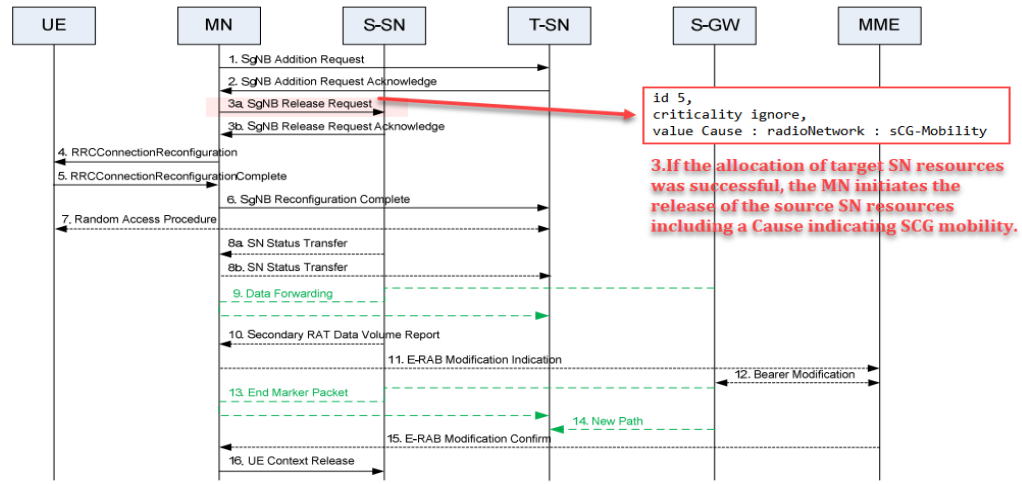


Figure 10.5.1-1: SN Change – MN initiated

3GPP TS 38.423 definition

Radio Network Layer cause	Meaning
MN Mobility	The procedure is initiated due to relocation of the M-NG-RAN node UE context.
SN Mobility	The procedure is initiated due to relocation of the S-NG-RAN node UE context.

SN Release procedure (Normal Release due to SgNB User inactivity timer)

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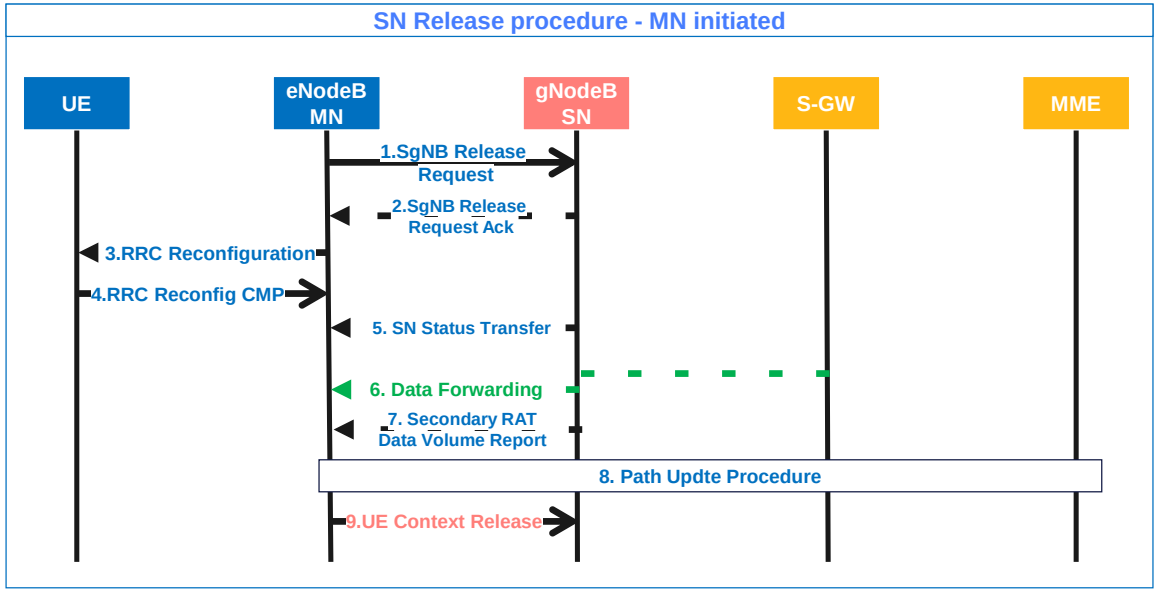

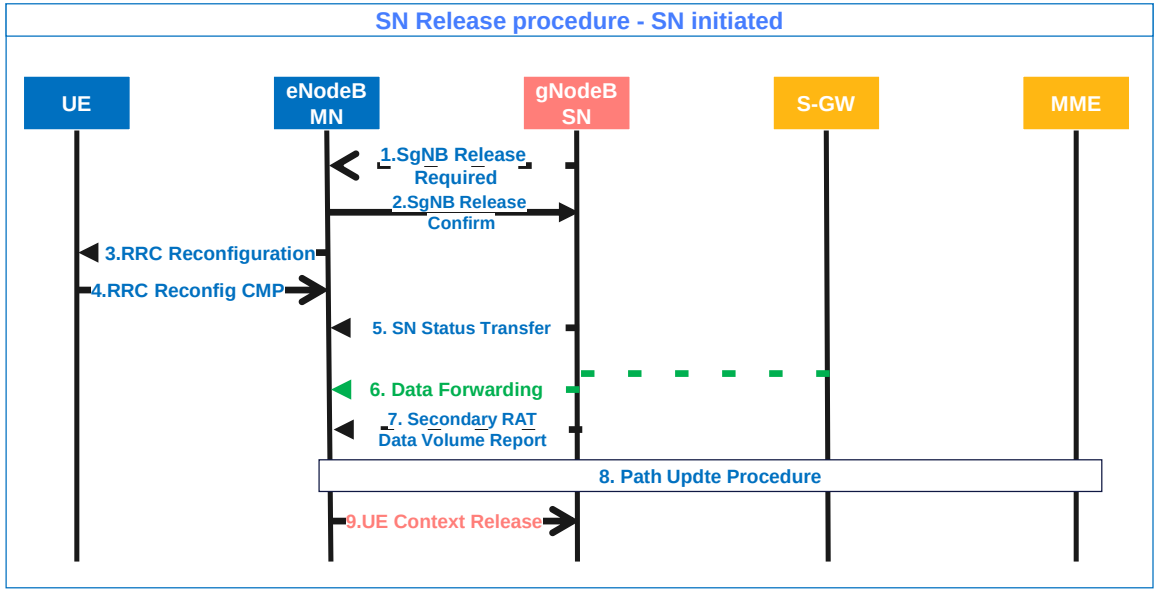

The SgNB release due to inactivity timer can be triggered by MN or SN based on the network parameters when the SgNb is in the inactive state

```
id 5,
criticality ignore,
value Cause : radioNetwork : user-inactivity
```

3GPP TS 38.423 definition

Radio Network Layer cause	Meaning
User Inactivity	The action is requested due to user inactivity on all PDU Sessions. The action may be performed on several levels: • on UE Context level, if NG is requested to be released in order to optimize the radio resources; or S-NG-RAN node didn't see activity on the PDU session recently. • on PDU Session Resource or DRB or QoS flow level, e.g. if Activity Notification indicate lack of activity In the current version of this specification applicable for Dual Connectivity only.

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3GPP TS 38.423 version 16.2.0 Release 16 (Page 221 to 223)

NSA Troubleshooting Guide: Possible Root Causes of Retainability Issues

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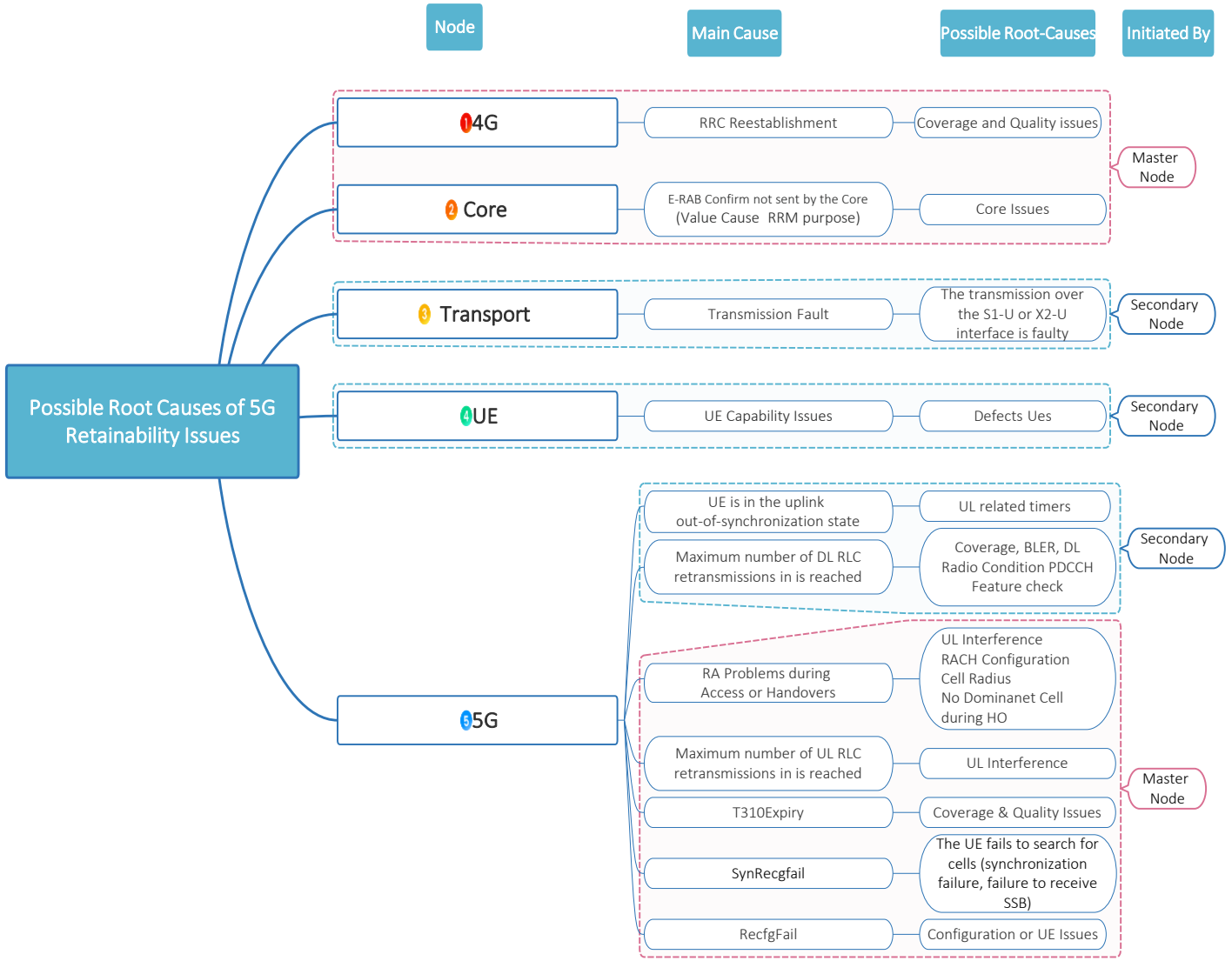
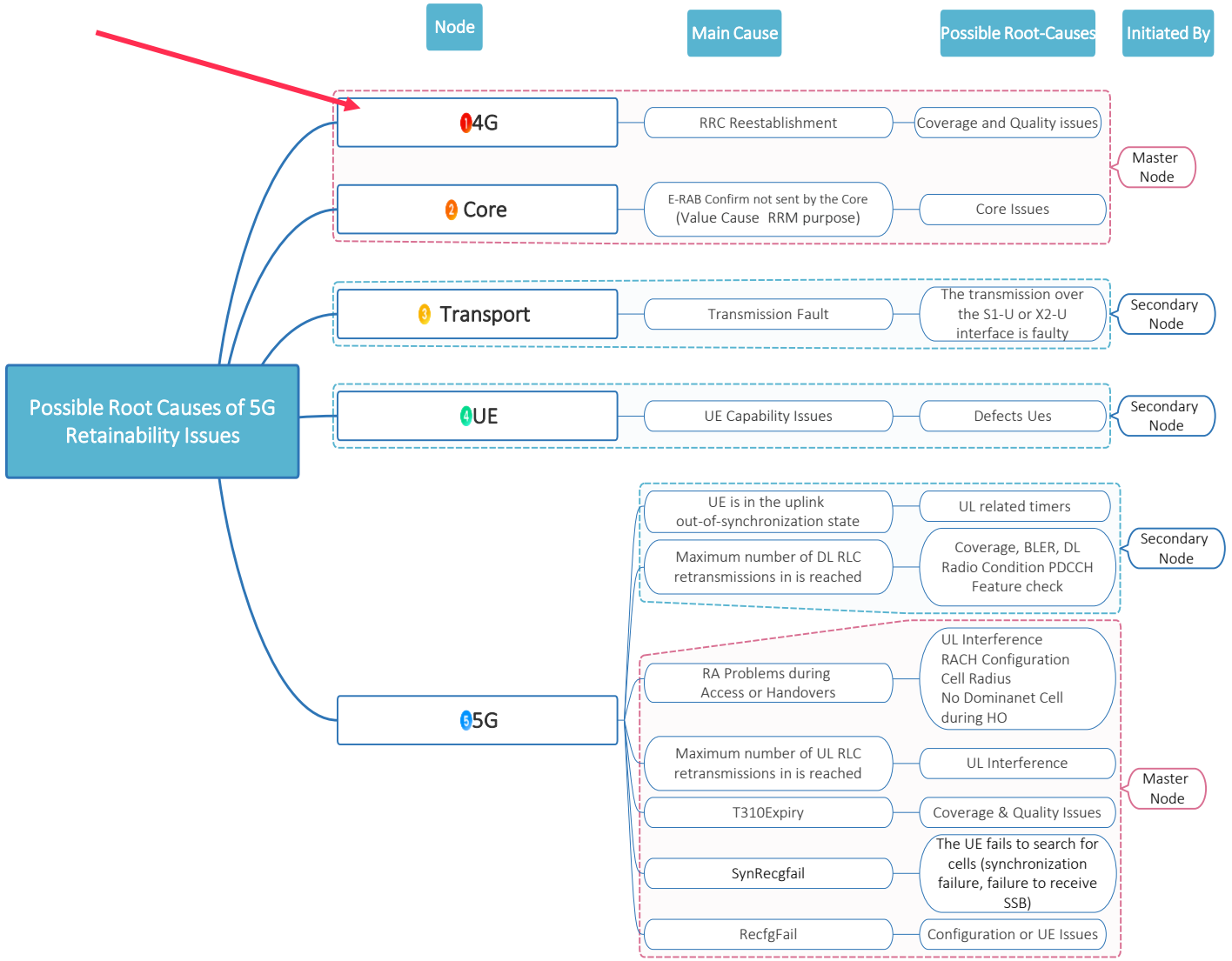
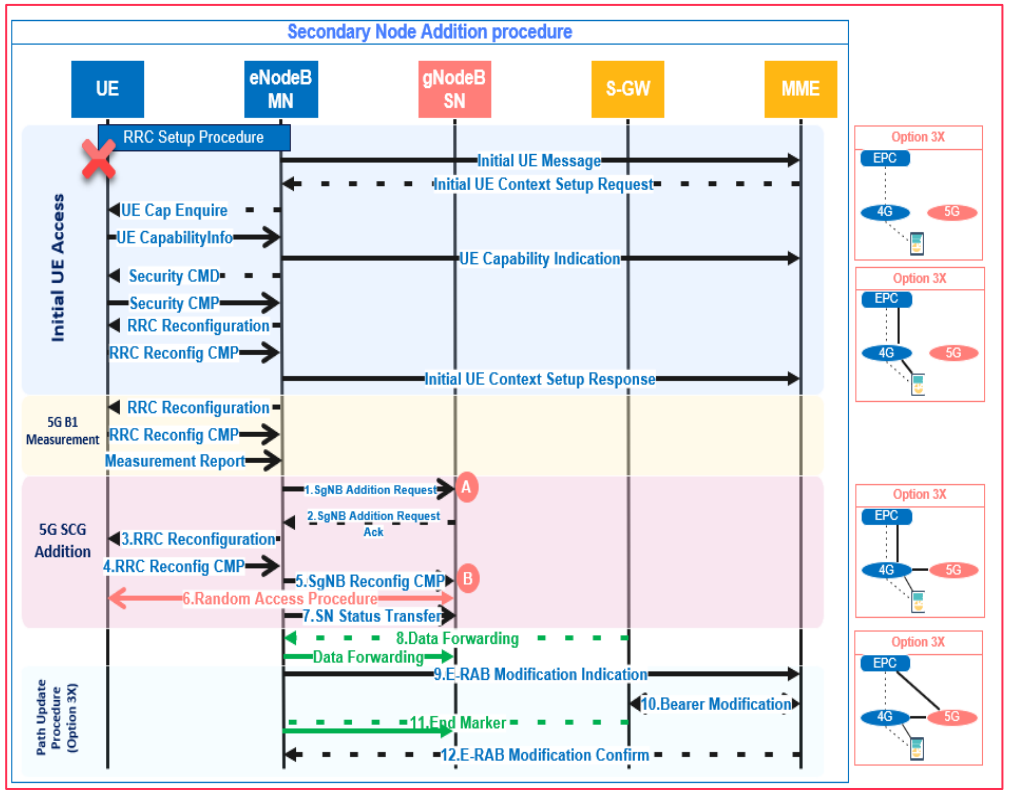


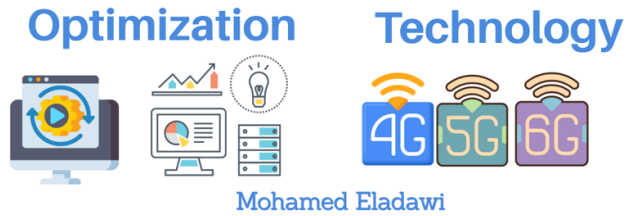
- The detection of NR Radio Link Failure (RLF) can be carried out by either the UE(MN) or the gNodeB (SN).
- A 5G Call Drop (RLF) is identified and declared through various factors, including and not limited to the following:

1. 4G RF issues (RRC Reestablishment)
2. Core problems
3. Transmission issues
4. 5G Downlink (DL) and Uplink (UL) radio
5. frequency (RF) issues
6. UE capability issues
7. Configuration issues.

NSA Troubleshooting Guide: Possible Root Causes of Retainability Issues- 4G related







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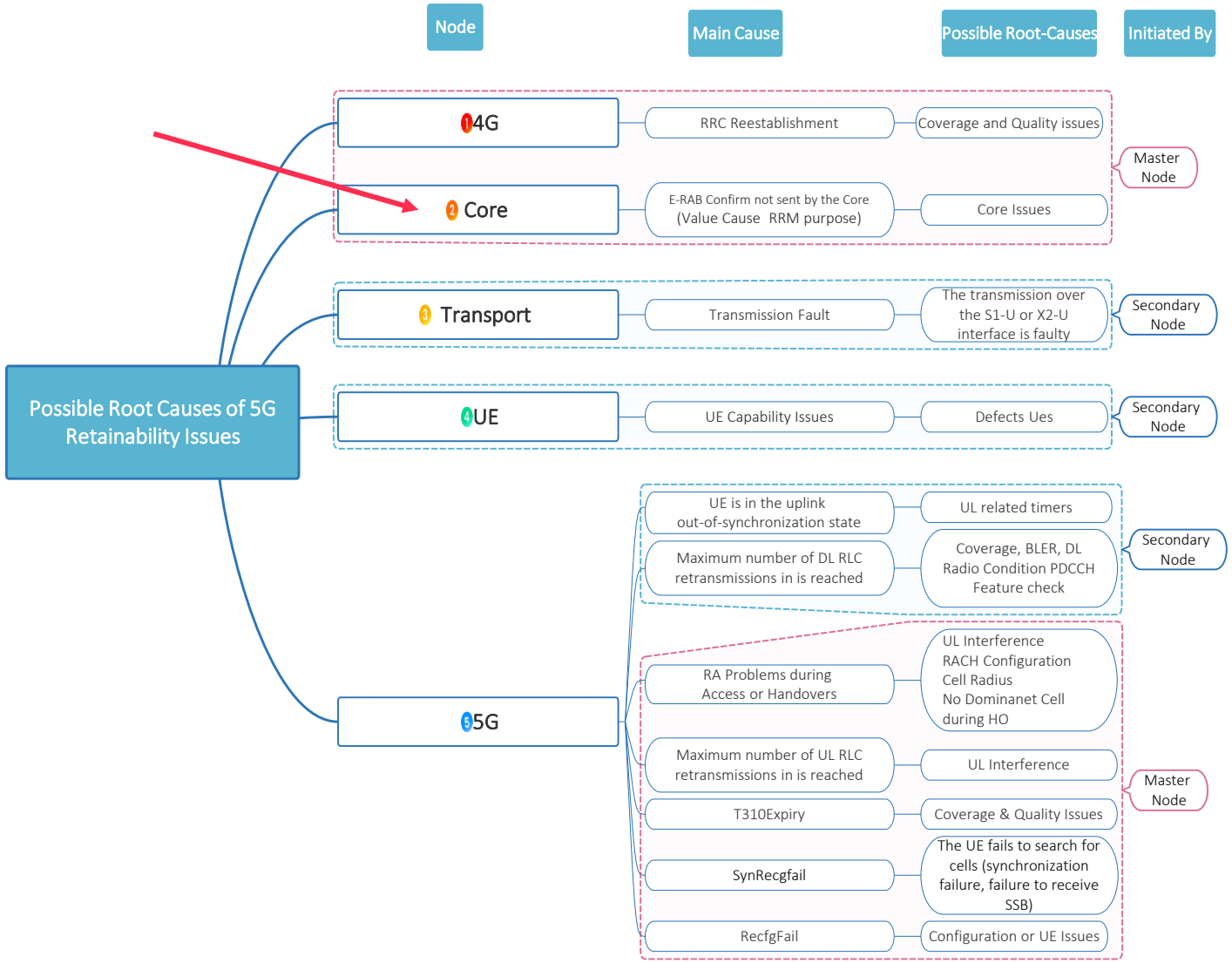
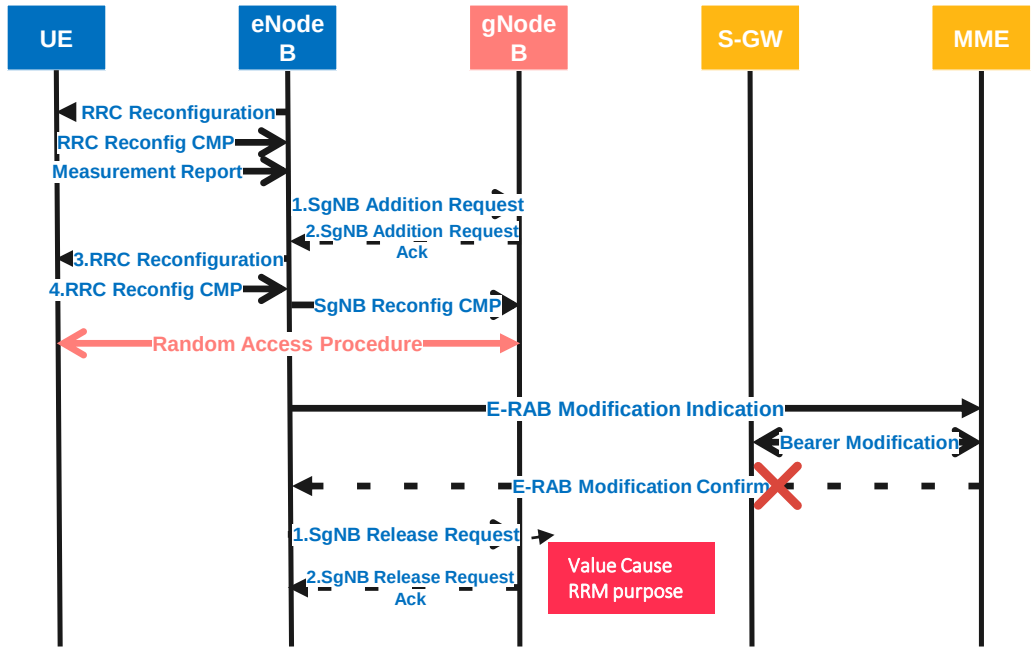
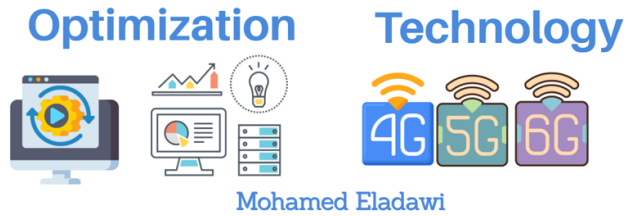
NSA Troubleshooting Guide: Possible Root Causes of Retainability Issues- Core related







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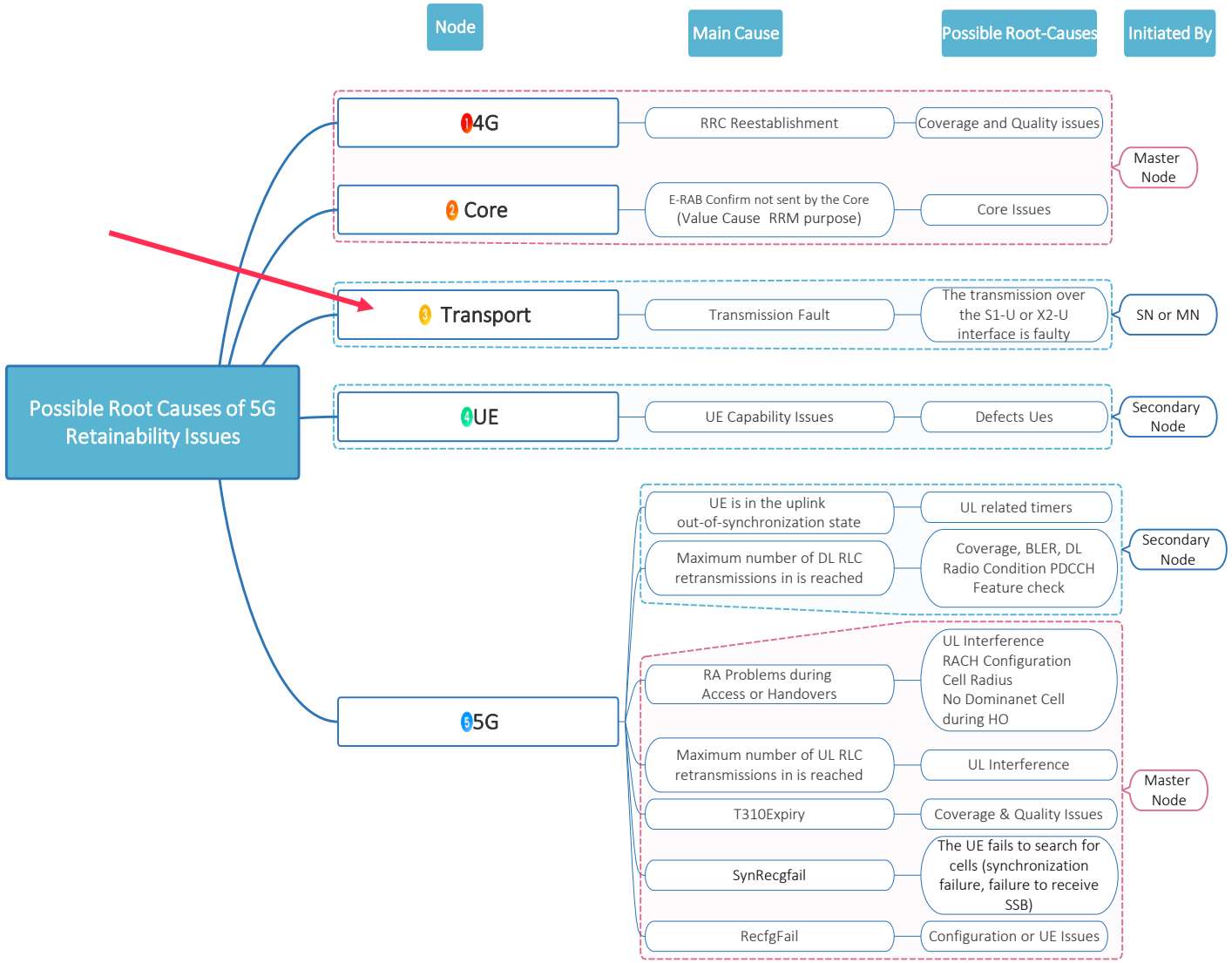
NSA Troubleshooting Guide: Possible Root Causes of Retainability Issues- Transport



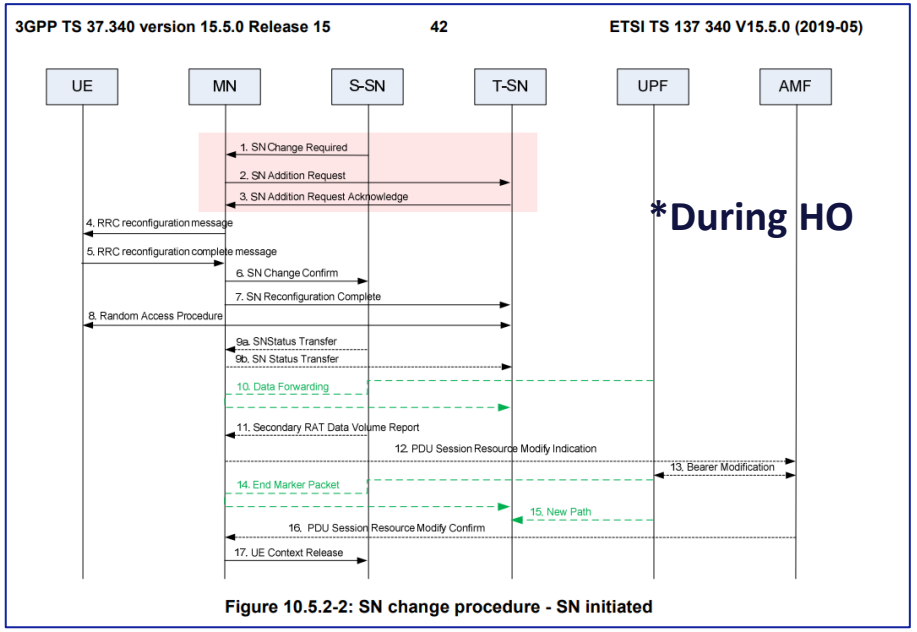
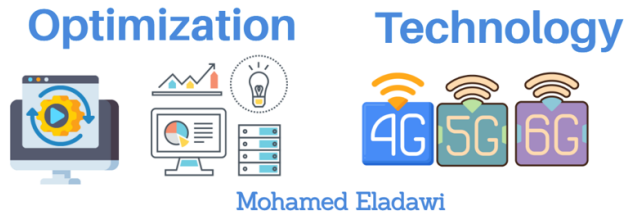
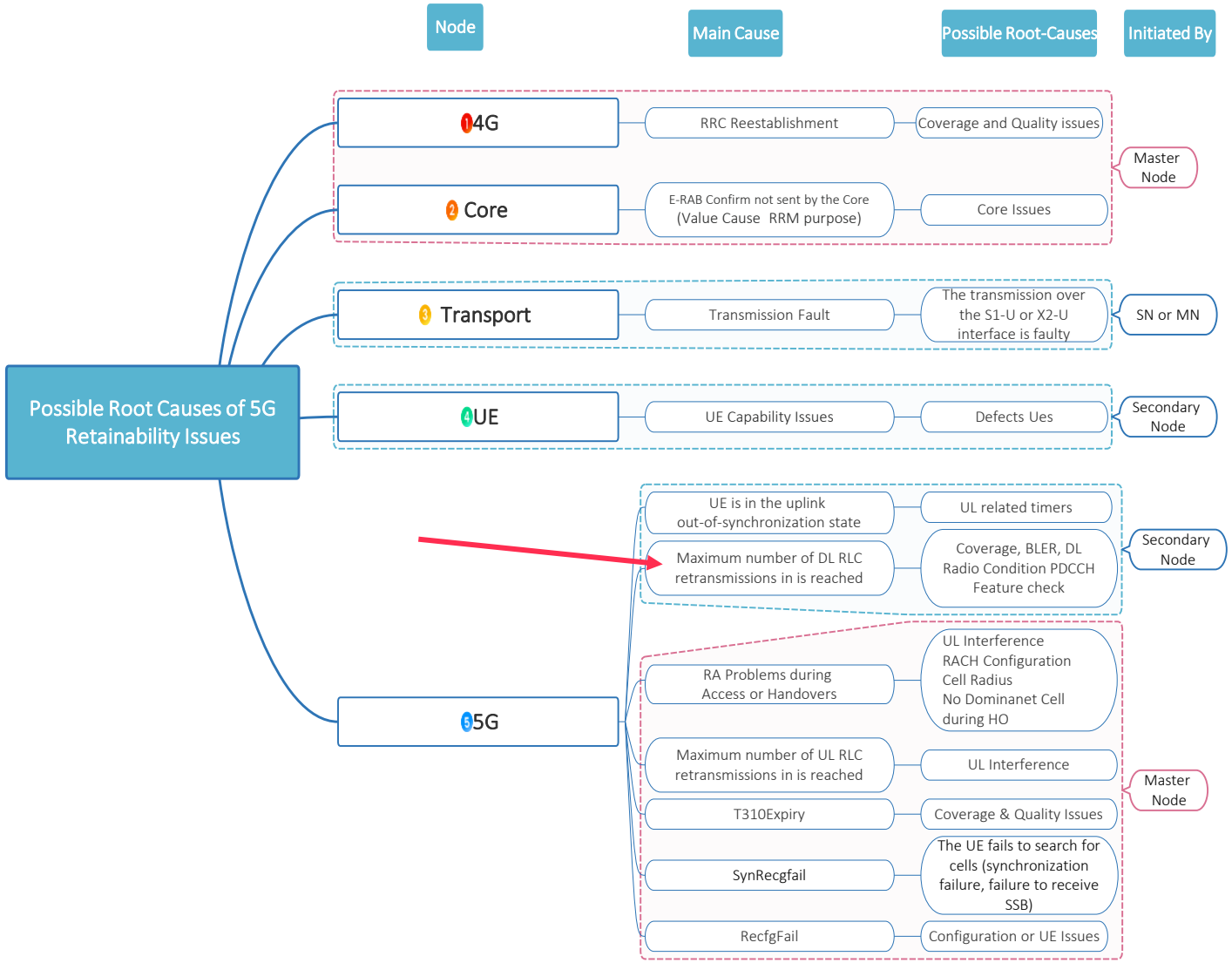
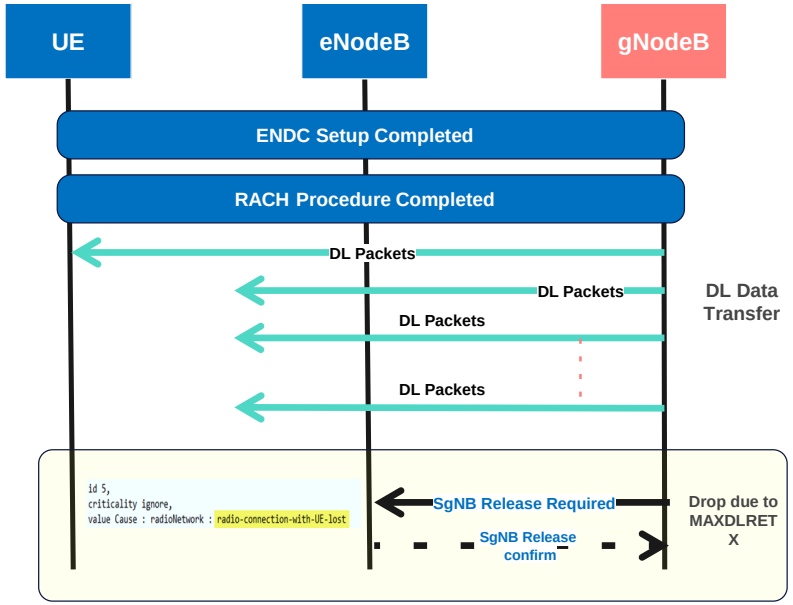


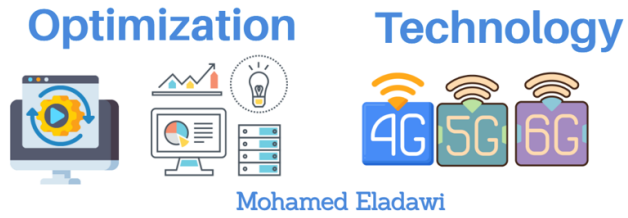
Figure 10.5.2-2: SN change procedure - SN initiated



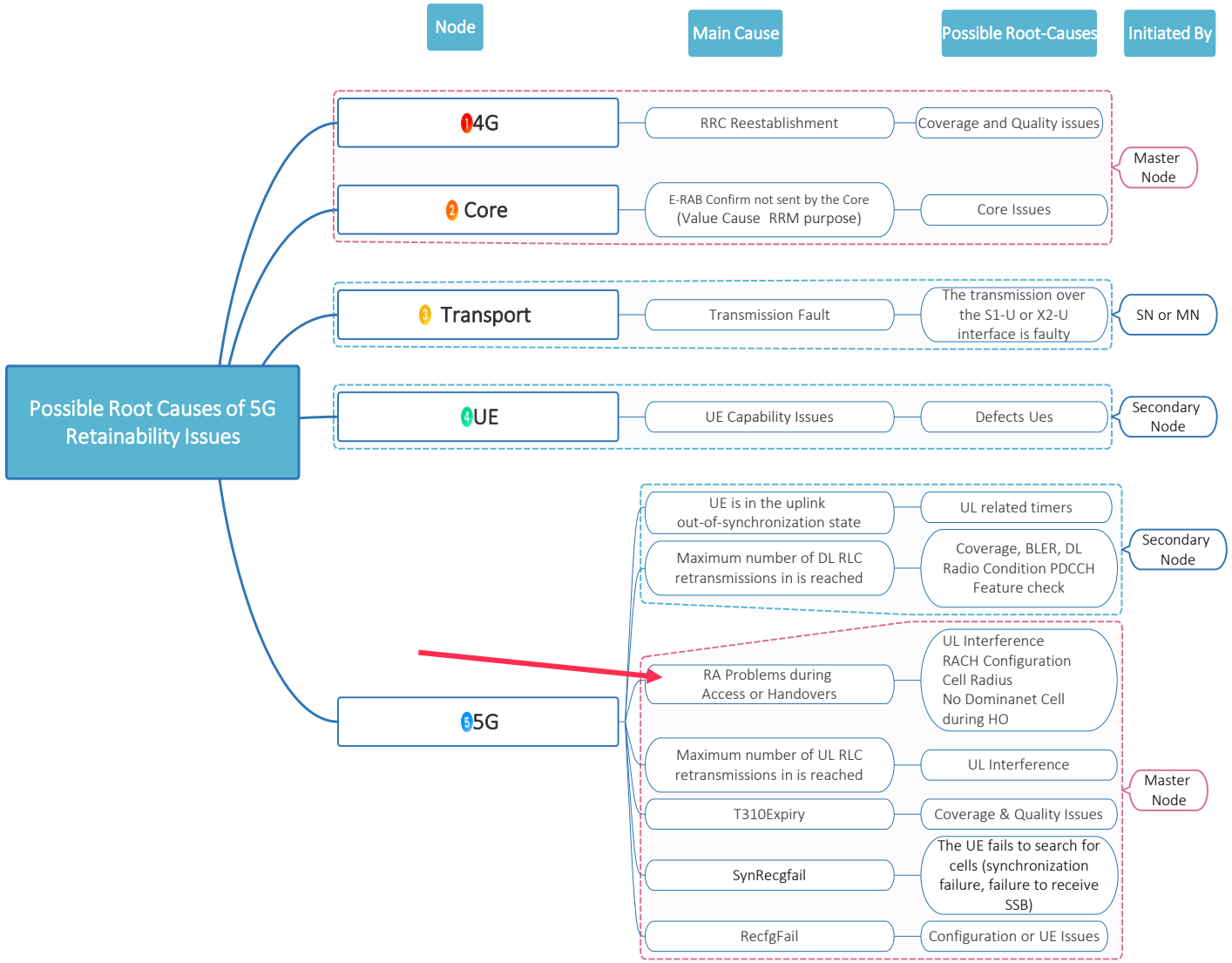
NSA Troubleshooting Guide: Possible Root Causes of Retainability Issues- MAXDLRTXReached

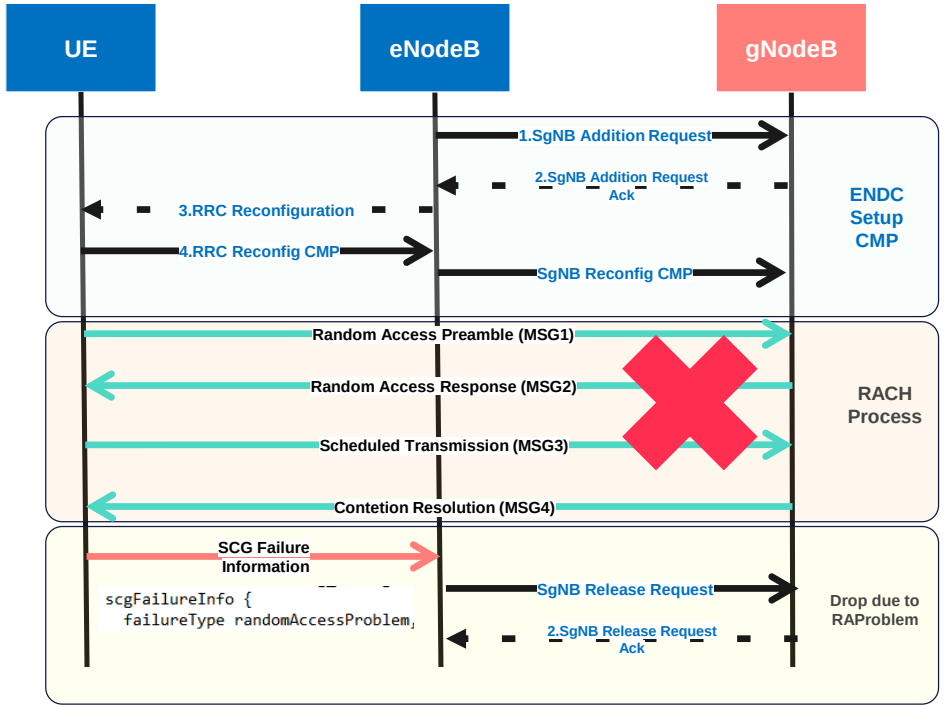






NSA Troubleshooting Guide: Possible Root Causes of Retainability Issues– RA Problems





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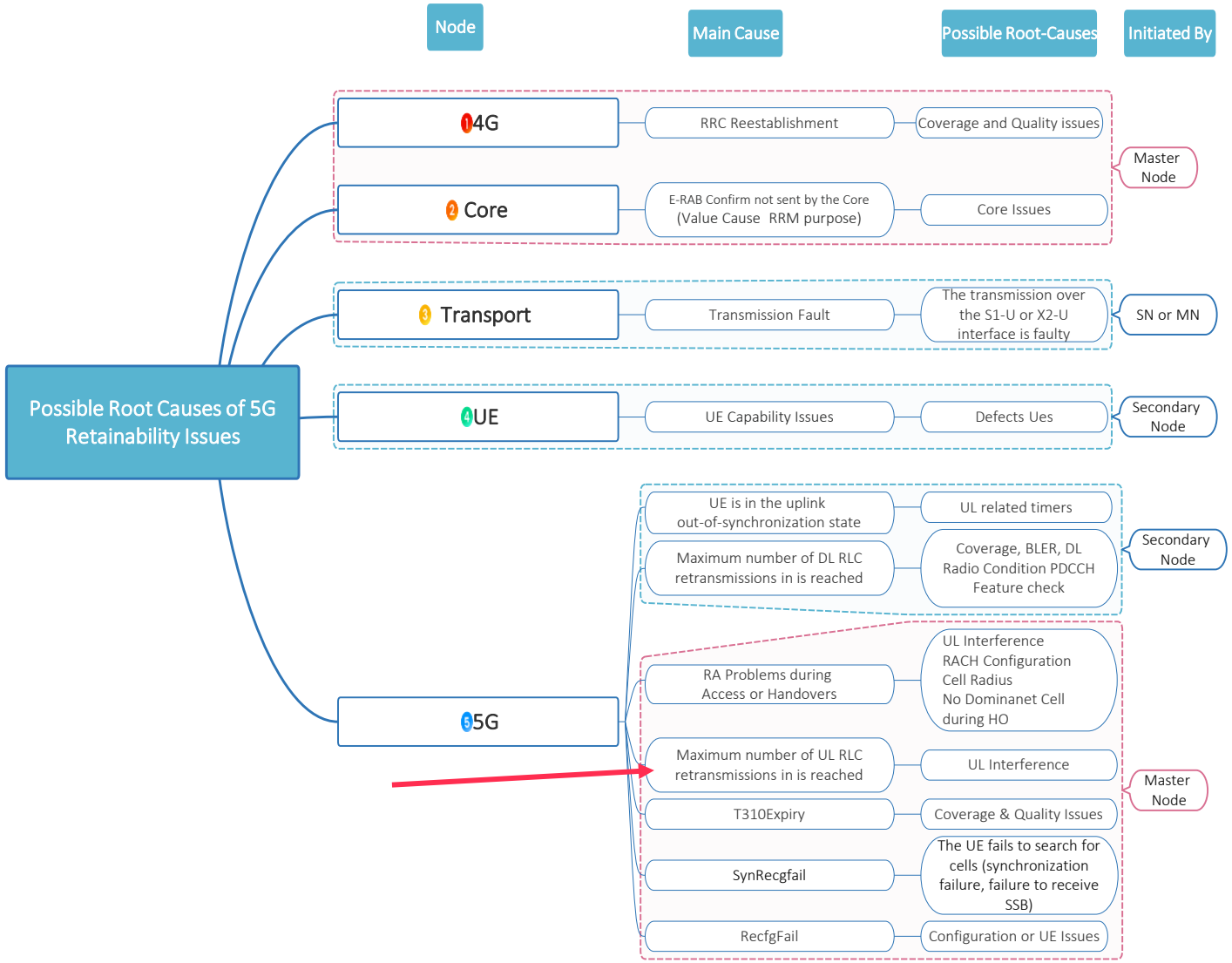
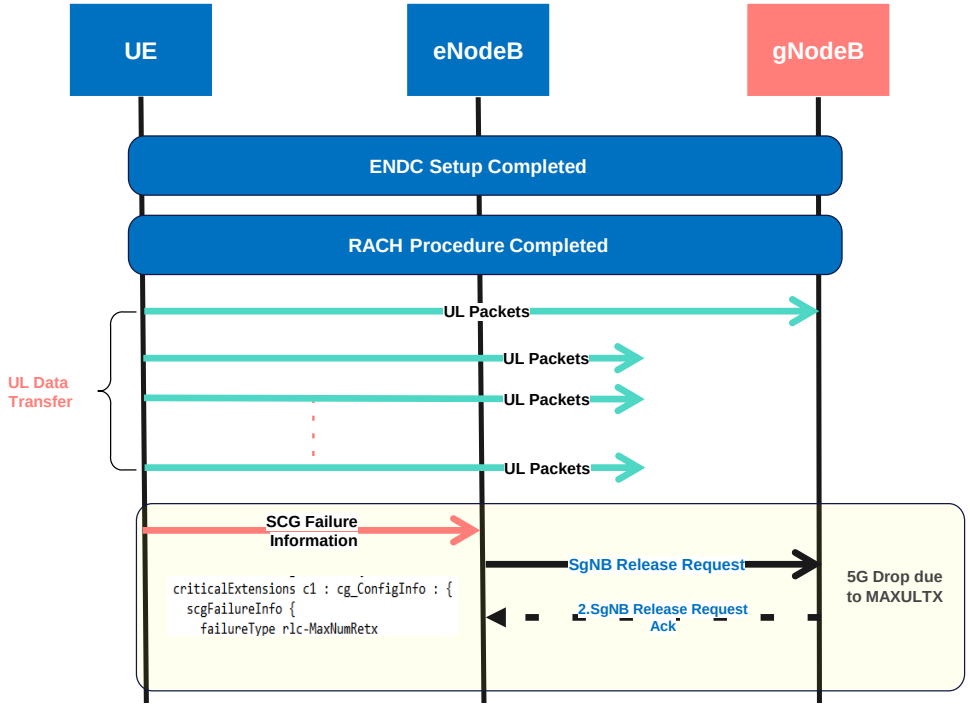
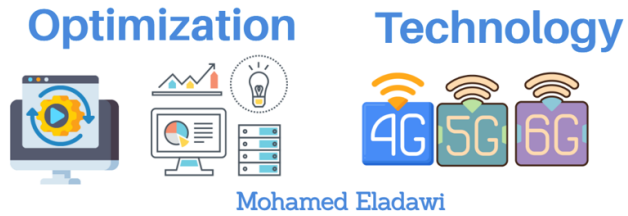
NSA Troubleshooting Guide: Possible Root Causes of Retainability Issues- MAXULRTXReached







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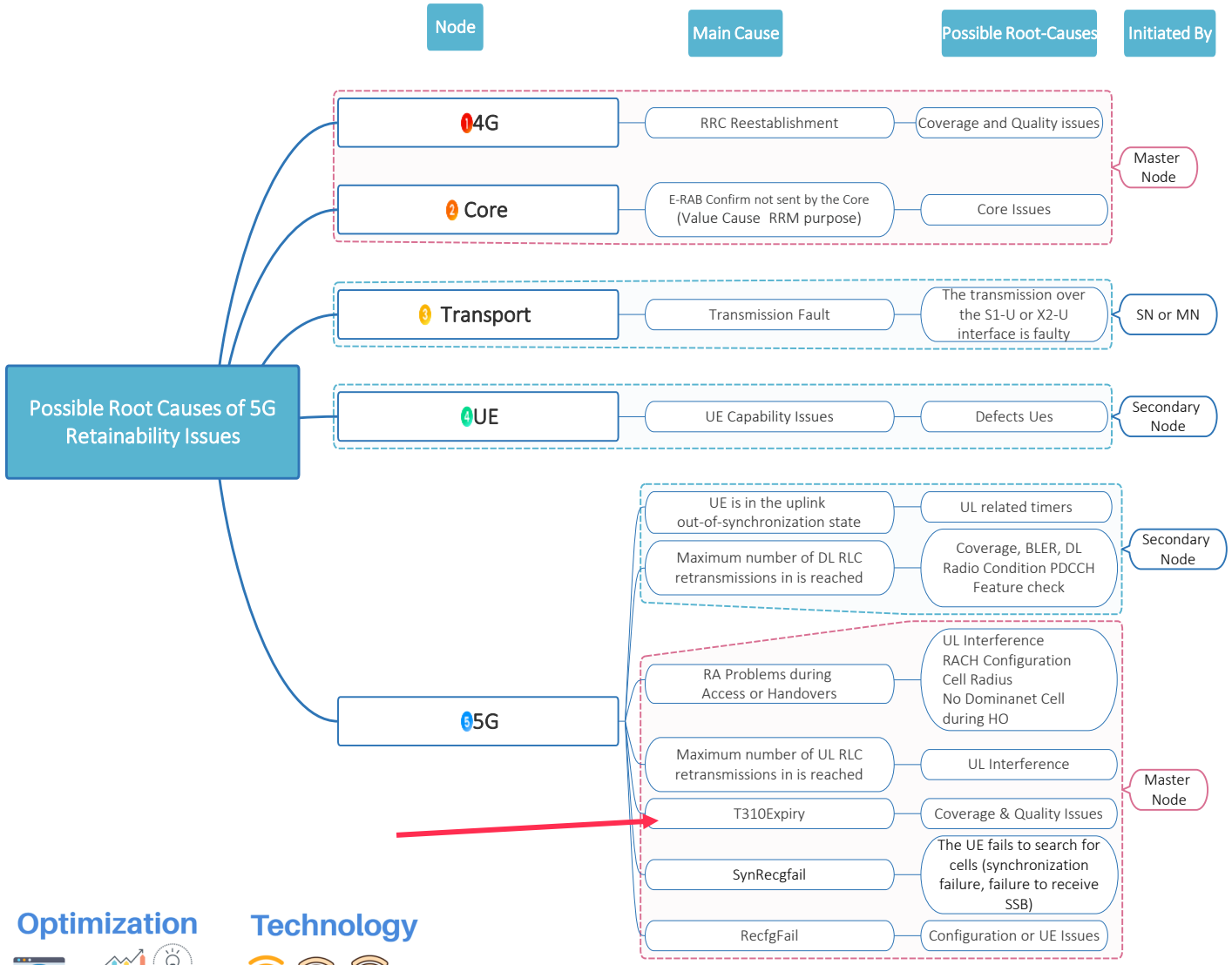
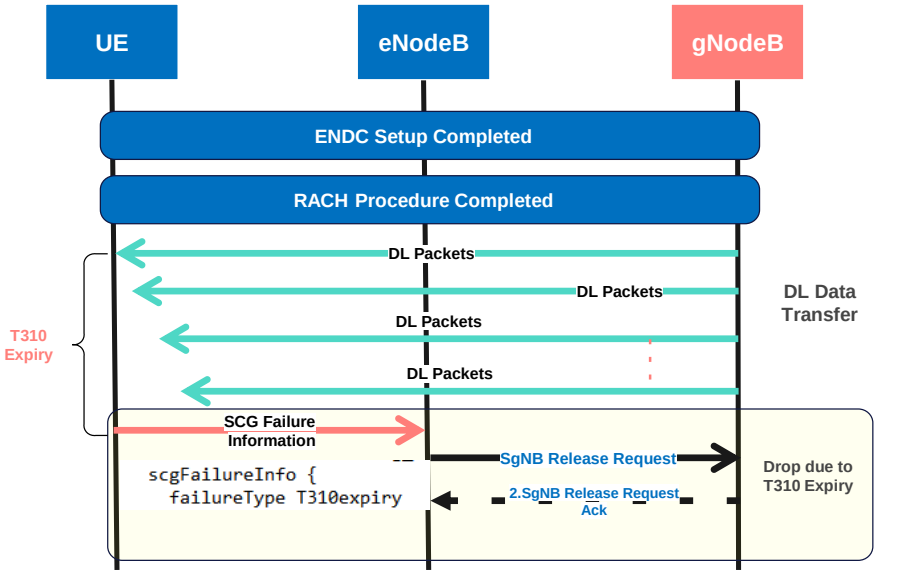
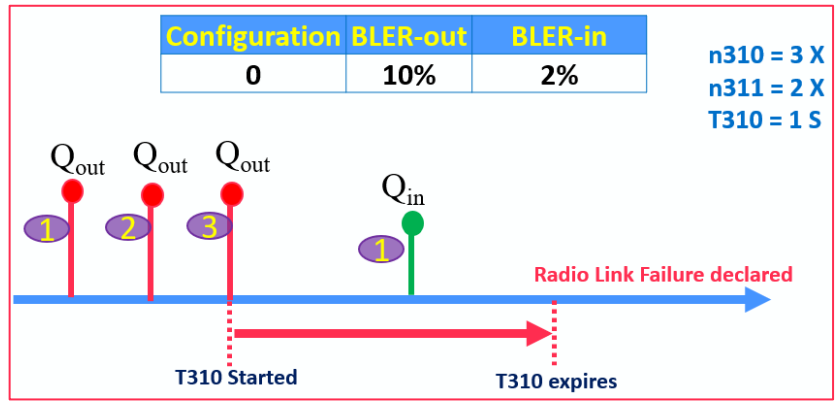
NSA Troubleshooting Guide: Possible Root Causes of Retainability Issues- T310Expiry







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NSA Troubleshooting Guide: Retainability identification from KPIs

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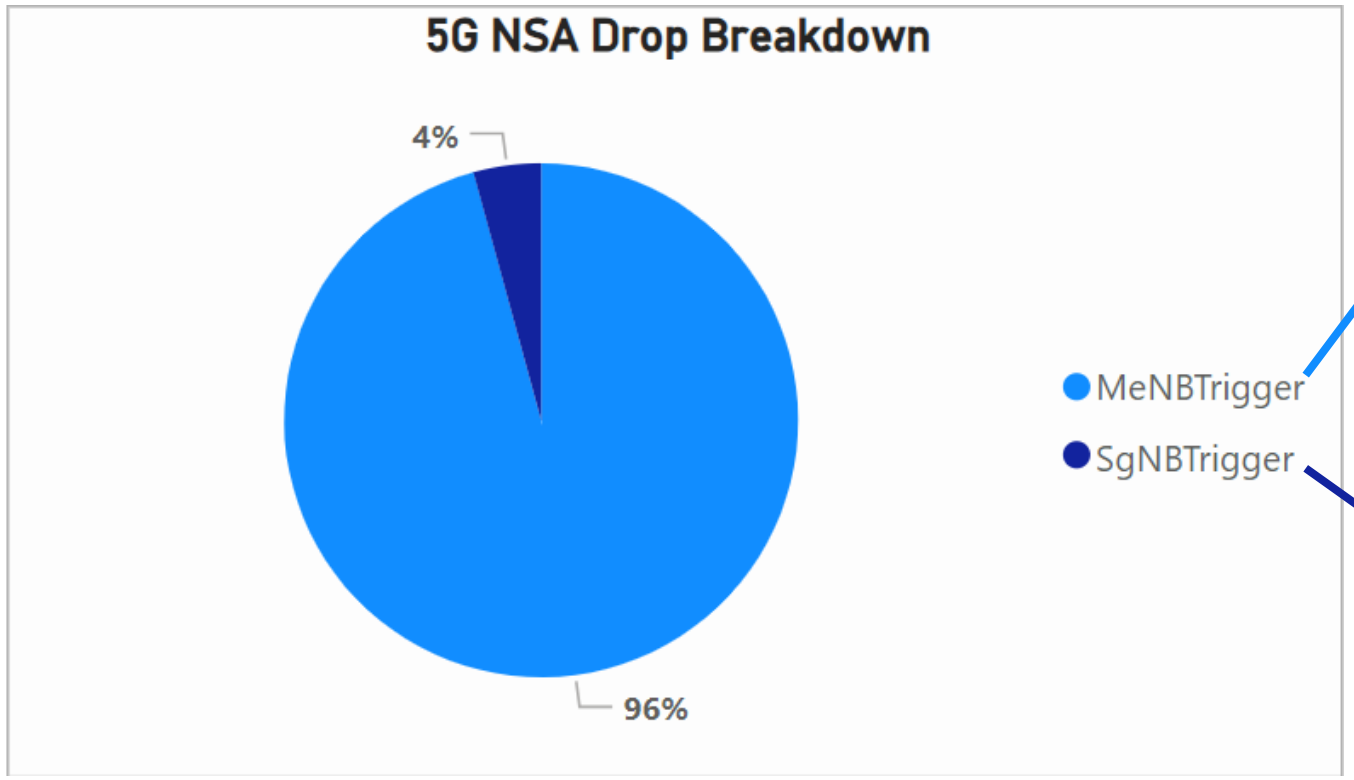
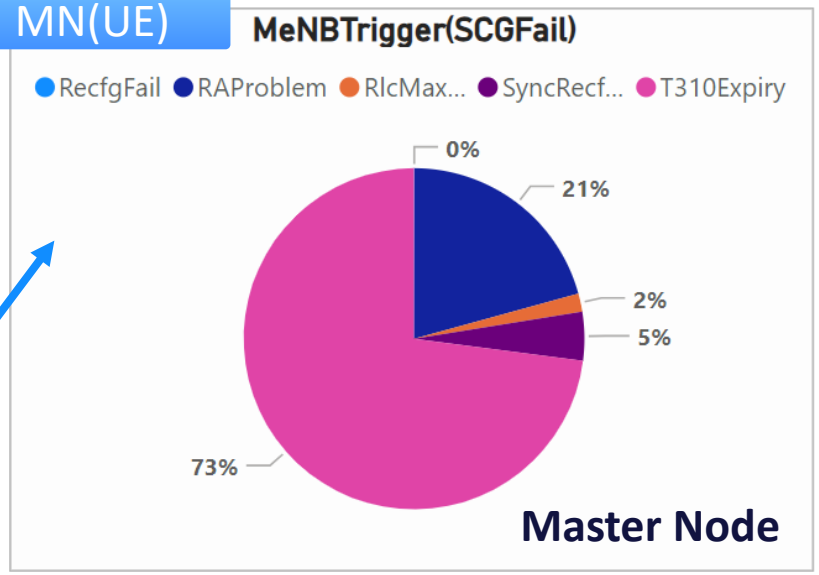
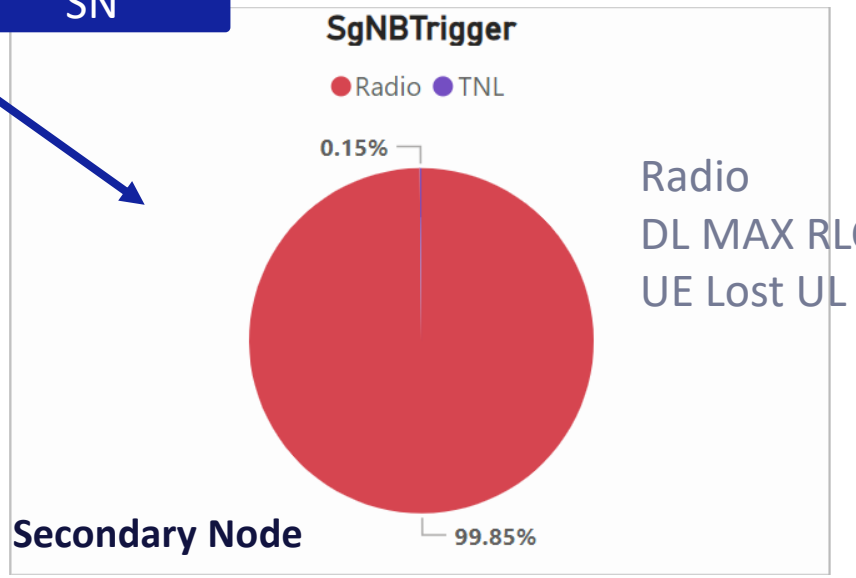
5G Non-Standalone Drops Breakdown per MN & SN



MN(UE)



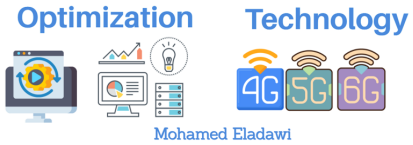
SN



Radio
DL MAX RLC
UE Lost UL SYN

Random values employed for visualization purposes only.

NSA Troubleshooting Guide: 5G Call Drop related Parameters & Features



RACH Problems

- RACH Format
- Cell Radius
- preambleReceivedTarget Power
- powerRampingStep
- preambleTransMax

Layering Tuning

- A2 RSRP for SgNB Release
- B1 Threshold for SgNB Addition
- A5 Threshold for PScell Change

Downlink & UL RF Issues

- RF Optimization (DL & UL)
- DL & UL Max Retx Thresholds
- PDCCH Beamforming Feature(DL)
- T310, n310 and n311 Tuning
- UlTimeAlignmentTimer

Abnormal Devices

- Penalty Timers
- Devices Blacklist from Core "Mask IMEI-SV"
- SPID
- Prohibit Access to 5G NSA from Radio