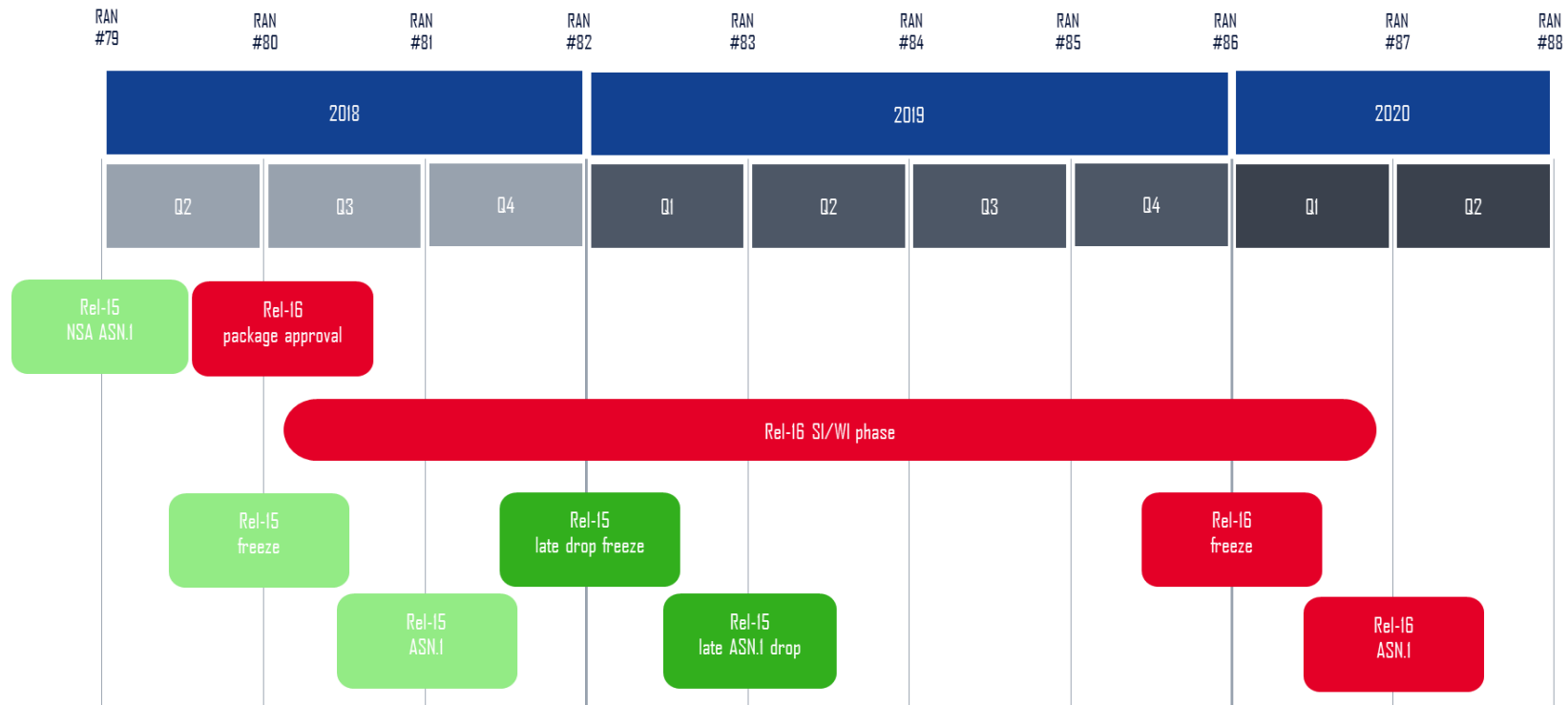


LG Uplus views on 5G NR evolution path with option 5/7x



• Timeline

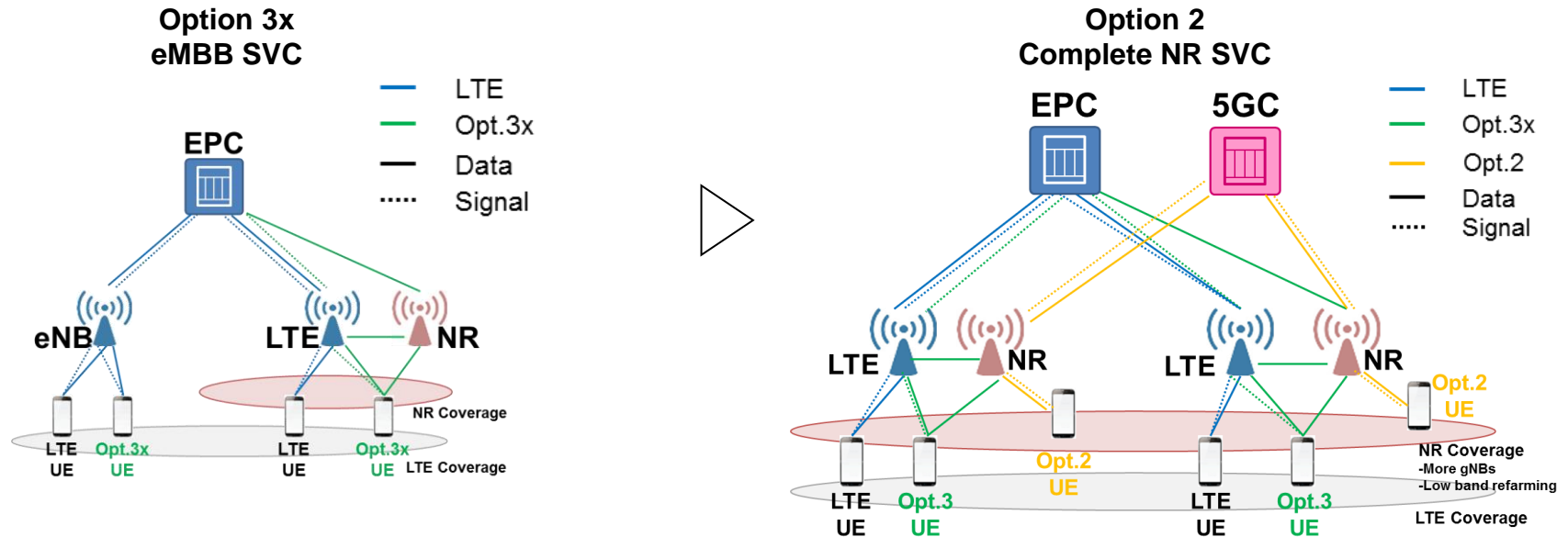
- Plan for finalizing all NR architecture options was endorsed [1]
- Option 3, 2 and 5 were finalized excepting maintenance parts and ASN.1 updates



• Key functionalities from Option 5, LTE-5GCN, were identified in [2]

- 5G NAS message transport, 5G security framework except that data integrity protection is not supported, Unified Access Control, Flow-based QoS, Network slicing, SDAP, NR PDCP, Support of UEs in RRC_INACTIVE state

Discussion – Evolution path comparison



Taking direct path from Option 3 family to Option 2

Observation 1

It requires **high cost** for having wide **NR coverage** from deploying more gNBs or reformatting low band

Observation 2

5GC functions can be used within **NR gNB coverage only**

Observation 3

Interruption time will be **huge** for having inter-RAT handover while **voice & real-time services** which will be longer than 100ms with N26 (MME-AMF interface), and even longer without N26

Discussion – Evolution path comparison

Taking intermediate path with Option 5/7x

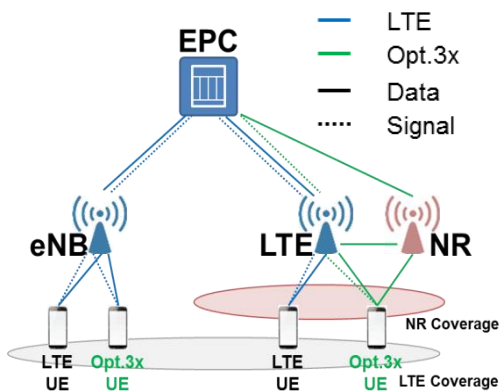
Observation 4

It provides **wide 5GC function coverage** with **cost-effective** way by upgrading eNB to eLTE(ng-eNB) over deployed LTE coverage rather than newly deploying more gNBs or refarming low band in near future

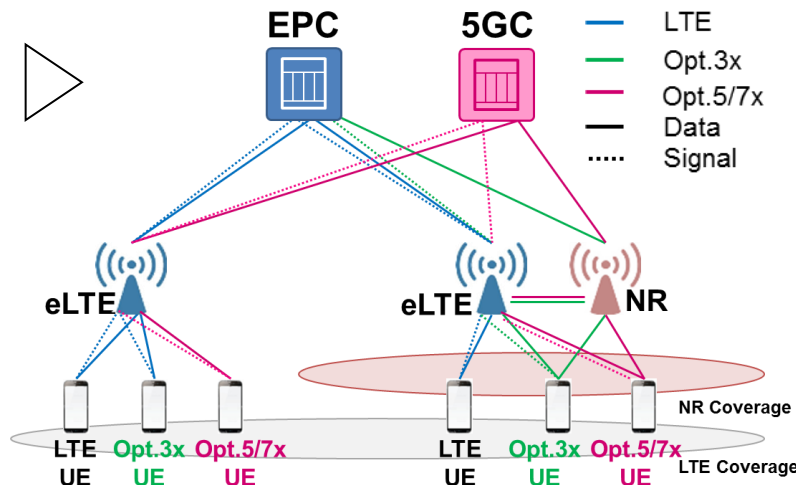
Observation 5

Interruption time can be **minimized** for having Xn handover while **voice or real-time service** which will be less than 50ms

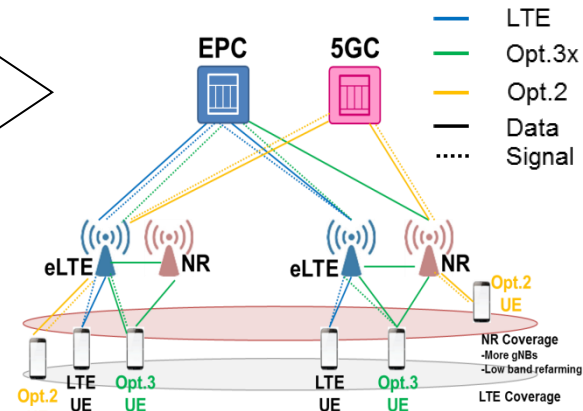
Option 3x
eMBB SVC



Option 5/7x
eMBB/Limited URLLC SVC



Option 2
Complete NR SVC



- **Proposal 1**

Completion of option 7x should be highly prioritized in Rel-15 late drop scope considering industries to reflect standardized option into their development roadmap as early as possible

- **Proposal 2**

Companies are encouraged to identity missing links between option 5/7x and option 2(not excluding option 4) which will be required for evolution path in regard of voice/real-time service continuity and handover from 3GPP standard point of view

Taking direct path from Option 3 family to Option 2,

Observation 1 : It requires **high cost** for having wide **NR coverage** from deploying more gNBs or refarming low band

Observation 2 : **5GC functions** can be used within **NR gNB coverage only**

Observation 3 : **Interruption time** will be **huge** for having inter-RAT handover while **voice & real-time services** which will be longer than 100ms with N26 (MME-AMF interface), and even longer without N26

Taking intermediate path with Option 5/7x,

Observation 4 : It provides **wide 5GC function coverage** with **cost-effective** way by upgrading eNB to eLTE(ng-eNB) over deployed LTE coverage rather than newly deploying more gNBs or refarming low band in near future

Observation 5 : **Interruption time** can be **minimized** for having Xn handover while **voice or real-time service** which will be less than 50ms

Proposal 1 : Completion of option 7x should be highly prioritized in Rel-15 late drop scope considering industries to reflect standardized option into their development roadmap as early as possible

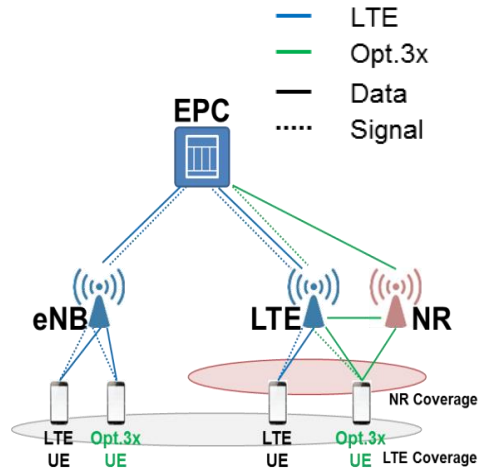
Proposal 2 : Companies are encouraged to identify missing links between option 5/7x and option 2(not excluding option 4) which will be required for evolution path in regard of voice/real-time service continuity and handover from 3GPP standard point of view

[1] RP-180554 Plan for finalizing all NR architecture options

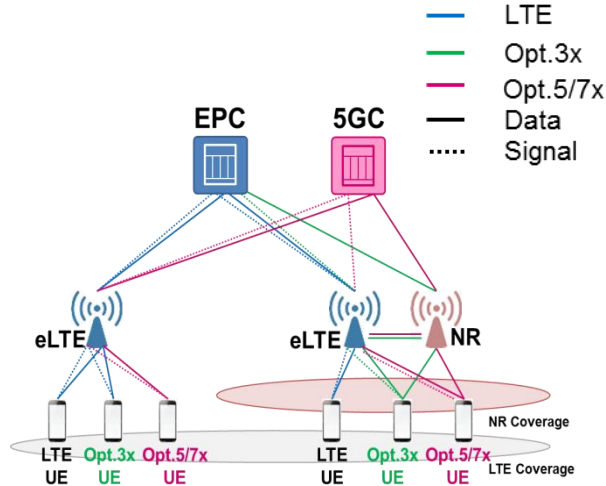
[2] RP-180862 WI summary of LTE-5GCN

Appendix. Summary for each option

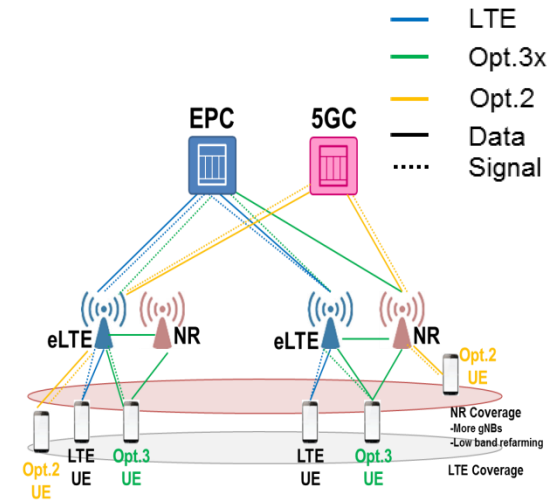
**Option 3x
eMBB SVC**



**Option 5/7x
eMBB/Limited URLLC SVC**



**Option 2
Complete NR SVC**



Option 3x UE

Option 5/7x UE

Option 2 UE

Data Rate

NR+LTE

NR+LTE

NR

**Delay
(RTT bet. UE
and GW)**

LTE air delay for LTE coverage
 NR air delay for NR coverage
 + Wired path delay
 [Not Guaranteed]

LTE air delay for LTE coverage
 NR air delay for NR coverage
 + Wired path delay
 [Guaranteed]

LTE air delay for LTE coverage
 NR air delay for NR coverage
 + Wired path delay
 [Guaranteed]

NW Slicing

Not Support

Support

Support

Voice

VoLTE

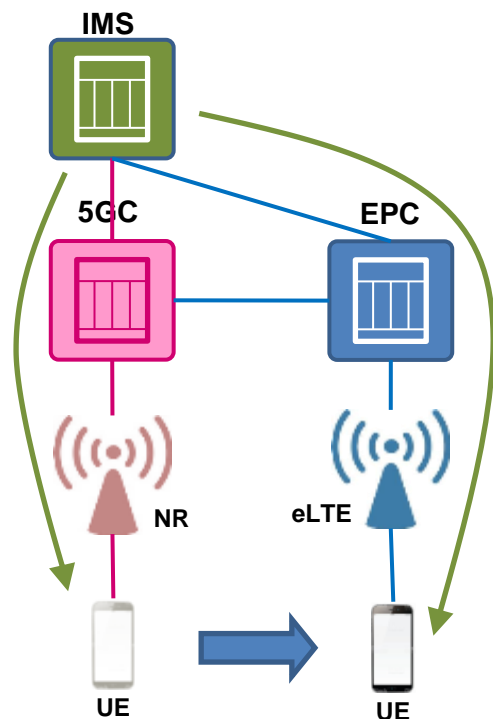
VoLTE

VoNR

• Voice and real-time service benefits (inter-RAT)

- Inter-RAT handover is inevitable for initial 5G deploying
- Interruption time is essential for voice and real-time service.
- From option 2 to option 5 handover case can reduce interruption time than from option 2 to option 1 or 3 case.

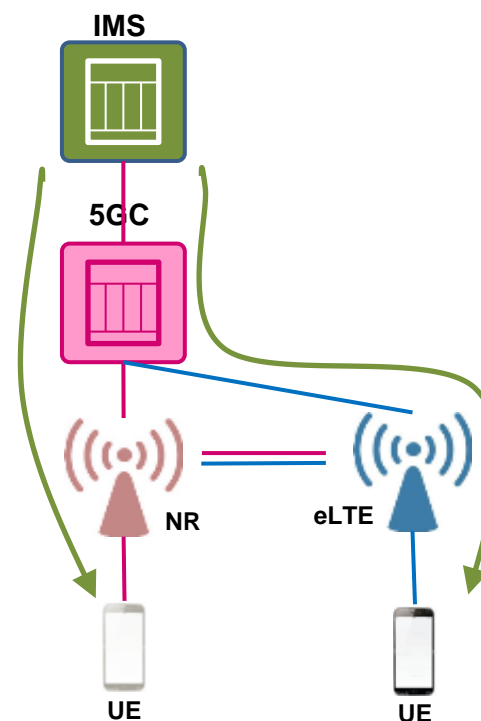
* From opt.2 → opt.1 or 3 Handover



* Interruption time

- Longer than 100ms (w/ N26 interface)
- Even longer than above (w/o N26 interface)

* From opt.2 → opt.5 Handover



* Interruption time

- Around 50ms