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Comparison of RAN Standard Impact between Standalone(SA) and Non-standalone(NSA) NR

CMCC

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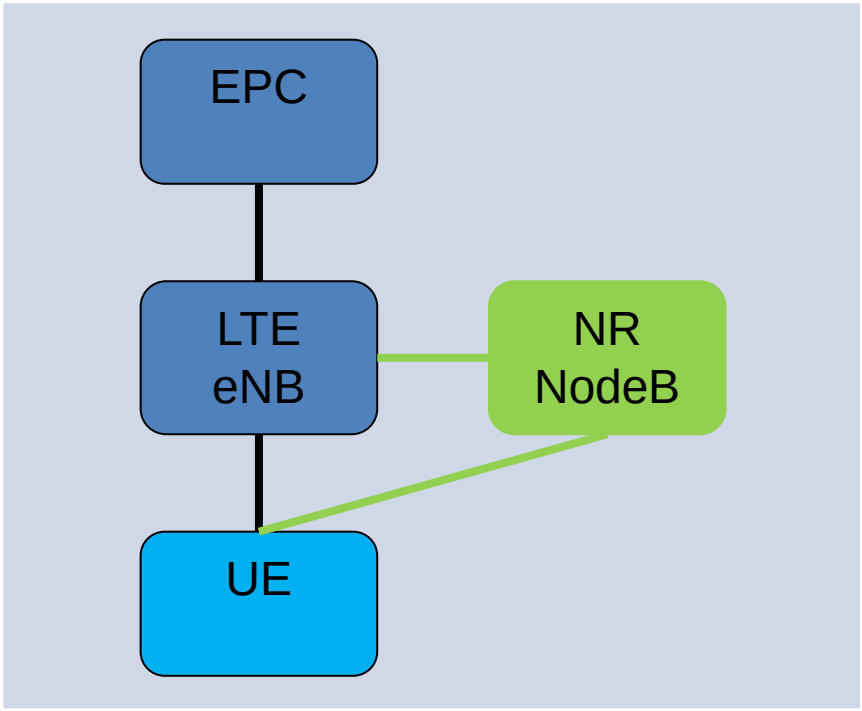
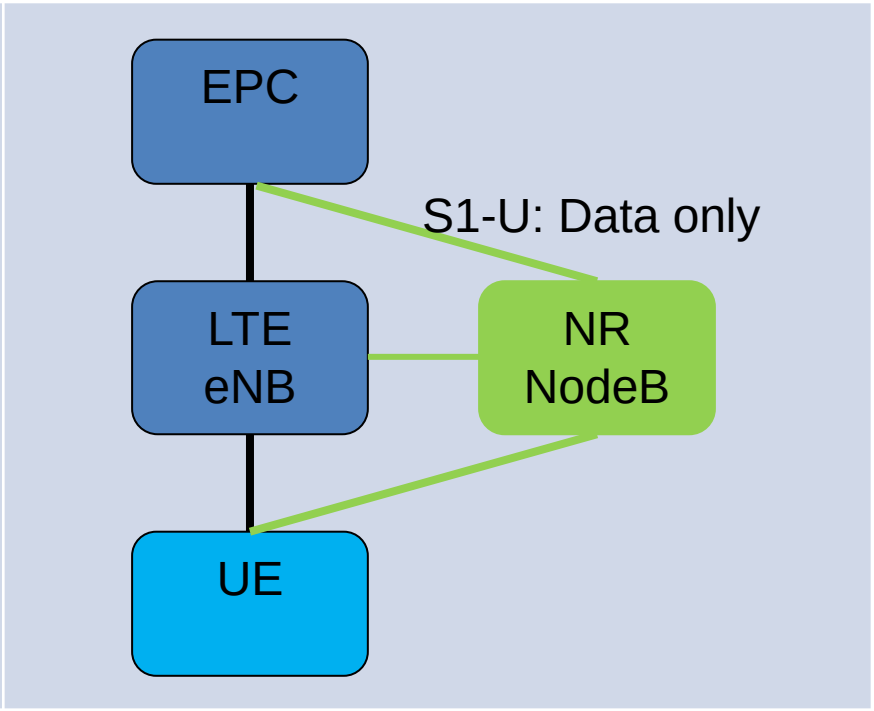
LTE-NR Dual Connectivity with EPC

(Note: For simplicity, LTE-anchored DC with EPC is analyzed as exemplary ones and do not present all NSA-NR operation options available)





3C-like DC framework:

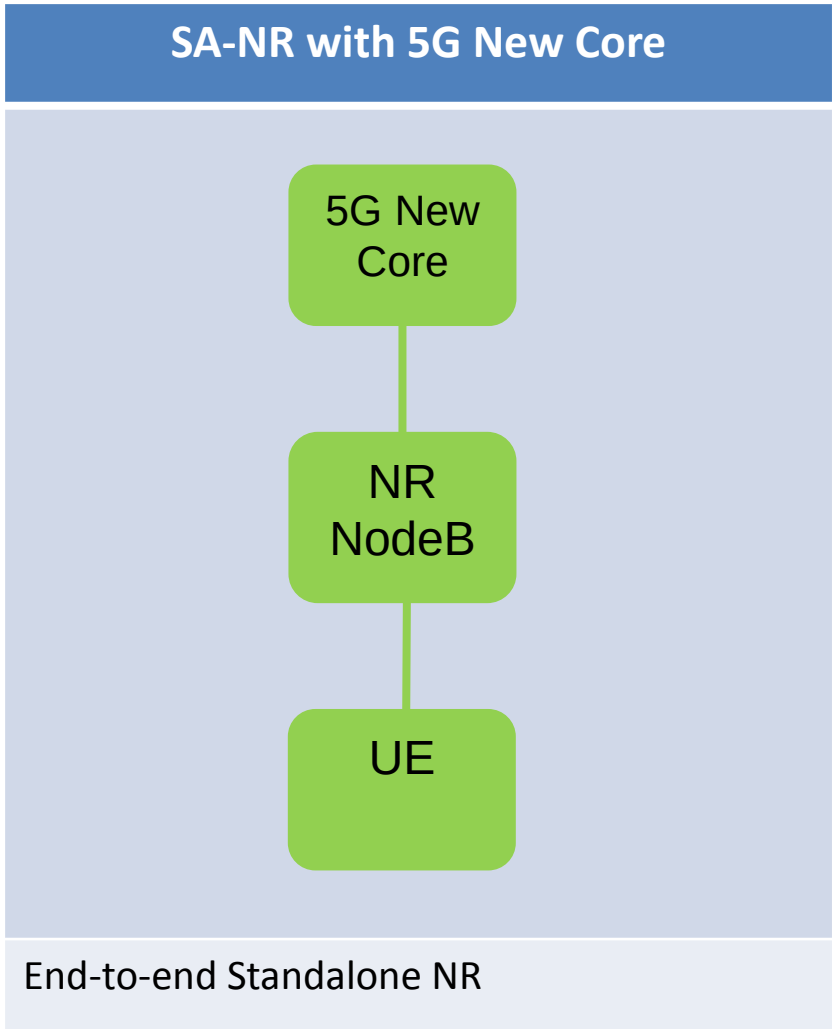
- LTE acts as control/data anchor and NR as data pipe, NR NodeB data from LTE eNB
- Dual-connectivity UE

1A-like DC framework:

- LTE acts as control anchor and NR as data pipe, NR NodeB data from EPC
- Dual-connectivity UE

- See 3GPP TR 36.842 for reference of the concepts of Dual-Connectivity, 3C and 1A.

Network architecture of SA NR



Standard impact comparison

Essential Tech Components			SA NR	NSA NR
UP protocol stack	PDCP		Required	Required for 1A-like DC
	RLC		Required	Required (minor difference with SA-NR foreseen)
	MAC		Required	Required (minor difference with SA-NR foreseen)
	PHY		Required	Required (minor difference with SA-NR foreseen)
CP functionalities	System information		Required	At least required for essential system information, e.g. SFN in MIB (depending on the CP architecture)
	Paging		Required	Not required
	RRC connection management		Required	Probably required (depending on the CP architecture)
	Radio bearer management		Required	Required (minor difference with SA-NR foreseen)
	measurement		Required	Required (minor difference with SA-NR foreseen)
	Mobility functions	Intra-NR handover	Required	FFS (depending on LTE-NR design target)
		Inter-RAT handover	Required	FFS (depending on LTE-NR design target)
		cell selection/reselection	Required	Not required
UE states			Required	Required (minor difference with SA-NR foreseen)
Initial access			Required	Required (minor difference with SA-NR foreseen)
Intra-NR RAN architecture			Required	Required (minor difference with SA-NR foreseen)
NR NodeB----CN interface			Required	Required for 1A-like DC (between NR NodeB and EPC)
LTE eNB----NR NodeB interface			Not necessarily required	Required
LTE----NR interworking			Required	Required
LTE----NR RF and co-existance			Required	Required (depending on RF analysis)

- Note: For simplicity, LTE UP protocol stack and CP functionalities are used as exemplary reference.

Observation and conclusion

- Different network architectures for SA and NSA NR standardization are observed
- Different RAN functionalities, protocol stacks, interfaces and procedures for SA and NSA NR standardization are observed
- From RAN point of view,
  - the difference of essential functionalities required for SA and NSA NR standardization is not that much, mainly as
    - System info, paging, idle mode mobility and LTE eNB---NR NodeB interface
  - the efforts required for SA and NSA NR standardization are comparable
    - Assuming the relatively small difference above mentioned.