

AT&T Views on 5G Architecture Evolution: Early Phase 1 To Mature Phase 2 Deployment

Source: AT&T

R2-165031

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Background

In light of the agreements on the Accelerated Phase 1 and the delineation of the various architectures to be developed, it is important to consider the work approach and philosophy in 3GPP on several of the preferred architectures and to understand how these architectures might be deployed and transitioned over time and across the 5G Phase 1 and Phase 2.

AT&T has the view that Option 7 would be the preferred first step in the path of initial 5G followed by Options 2 and/or Option 4. (see *Options listed in RP-161266*)

However, recognizing the many factors that are in play the more practical approach may well be to pursue a migration from Option 3 to Option 7 to Option 2 and/or 4 evolution path. AT&T is of the view that a likely deployment and/or transition flow of the 3GPP 5G Architecture options, based on 3GPP development timing and releases, would be:

Step 1: Early 5G Deployment utilizing Phase 1 Option 3

Step 2: Phase 1 Evolution to Option 7 – Plus Simultaneous Support for Option 3 & Option 7

Step 3: Phase 2 Evolution to Option 2/4 – Plus Simultaneous Support Option 3 & Option 7

However, any alternative combinations or sequence of deployment and/or transition flows involving options 3, 7, 2/4 would similarly need to be supported; e.g. Option 3 to Option 2/4, Option 7 to Option 2/4 +Option 3; etc.



Proposal and TEXT Proposal

In order to support a variety of deployment needs by operators, AT&T proposes that the following principles 1 - 6 be included as a text proposal in the relevant TRs in both the RAN2/3 and SA2 WGs.



Principles on 5G Architecture Evolution

1. Option 7 should be progressed in parallel with Option 3 work
2. Option 3 development and specifications must be defined in a manner so as to facilitate transition to deploying and utilizing Option 7, taking due note of the RAN, CORE and device impacts. Some examples are:
 - a) The ability of the network to support both Option 3 or Option 7 UEs simultaneously on different frequency bands such as MM wave and below 6 GHz
 - b) The ability to support LTE <---> NR handover scenarios
 - c) A UE operating on Option 7 when on a MM wave band and another UE using Option 3 in the same serving NR node on the same MM wave band should be simultaneously supported for connectivity towards NG Core or EPC respectively (*supports 5G backward compatibility for initially deployed Option 3 UE*)
 - d) A UE operating on Option 7 when on an LTE band and another UE using Option 3 in the same serving eNB on the same LTE band should be simultaneously supported for connectivity towards NG Core or EPC respectively (*supports 5G backward compatibility for initially deployed Option 3 UE*)
3. Option 3 development and specifications should NOT preclude or hamper the transition to using Option 7 and should be a software only upgrade



Principles on 5G Architecture Evolution (cont'd)

4. Option 7 development and specifications should NOT preclude or hamper the transition to using Option 2/4, taking due note of the RAN, CORE and device impacts, and should be a software only upgrade
5. The industry movement to deployment of virtualized networks lends itself well to multiple architecture Options being implemented simultaneously in deployed systems; i.e. the COREs for Options 3, 7 and 2/4 plus legacy LTE are likely to coexist at the same time. The 3GPP specification work must support this.
 - a) Such a capability provides forward/backward compatibility and enhances transition with 5G deployments over time from early deployments in Phase 1 through to Phase 2.
 - b) It also facilitates the support of different variants of UEs in same or differing bands utilizing different control planes. Ultimately there would be transition to a single deployed architecture.
6. 3GPP needs to understand how much of Items 2 and 3 above are addressed in the standards specifications and how much would fall under product design and deployment regimes while keeping in mind factors such as roaming, migration aspects, as well as other pertinent aspects.

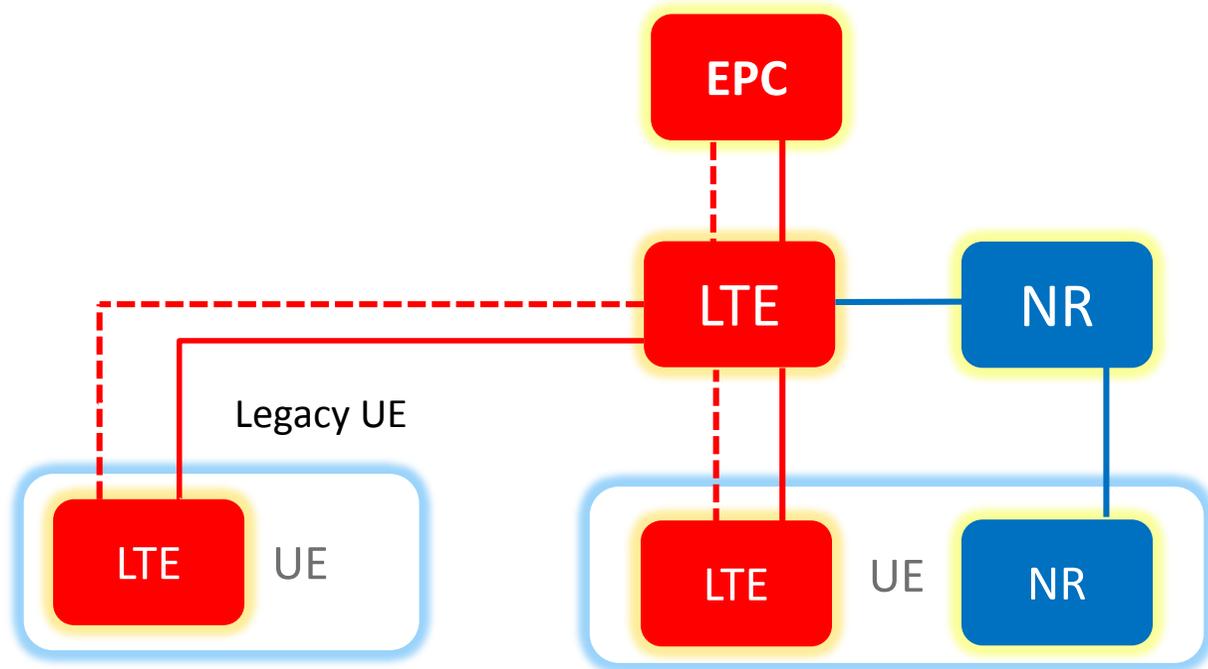
Figures relating to the proposals in the contribution are enclosed in the subsequent slides to aid in appreciating the viewpoints.



Deployment & Evolution of 5G Architectures Over Time



Step 1: Early 5G Deployment utilizing Phase 1 - Option 3

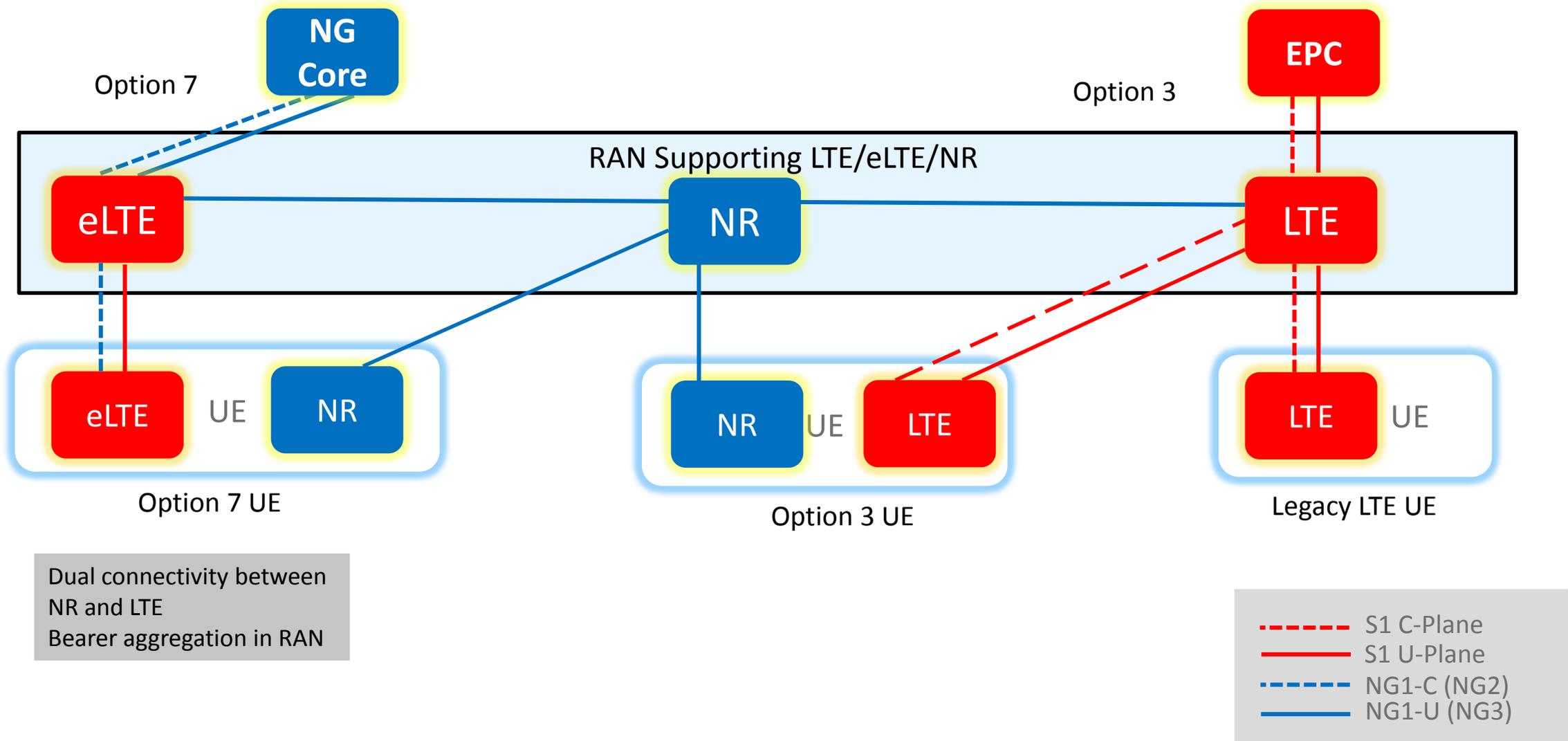


Dual connectivity between
NR and LTE
Bearer aggregation in RAN

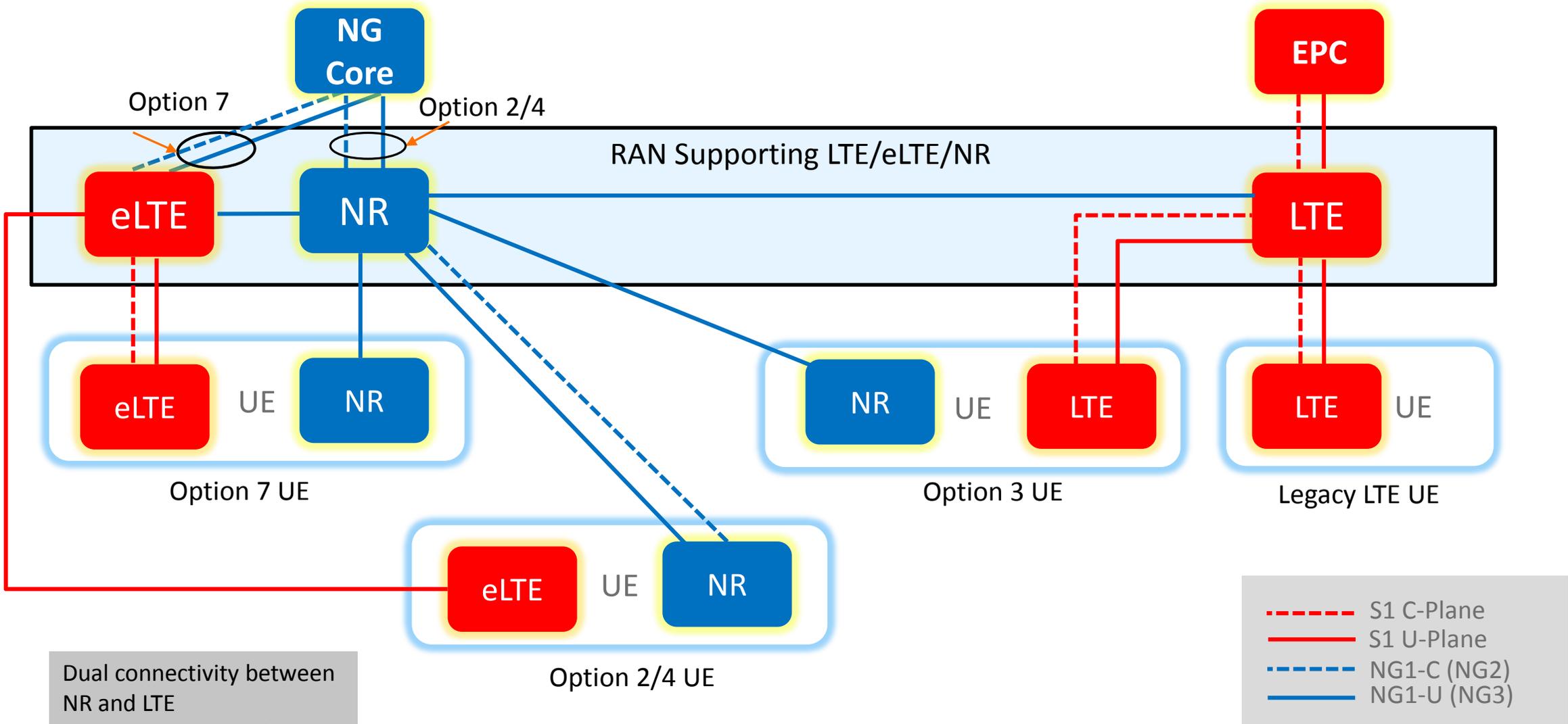
- S1 C-Plane
- S1 U-Plane
- NG1-C (NG2)
- NG1-U (NG3)



Step 2: Phase 1 Evolution to Option 7 – Plus Simultaneous Support for Option 3 & Option 7



Step 3: Phase 2 Evolution to Option 2/4 – Plus Simultaneous Support Option 3 & Option 7



Dual connectivity between NR and LTE
Bearer aggregation in RAN

CORE Configurations for Options 3, 7 and 2/4 and legacy LTE will likely co-exist. The 3GPP specification work must support this.

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Backup Slide - 3GPP Reference Documents

RP-161253



RAN Schedule &
Scope

RP-161266



Deployment
Scenarios

RP-161269



RAN Tasks

SP-160465



RAN_SA 5G Rel-15
Timeline