5G Non Standalone Solution Overview

This chapter contains general overview information about the 5G NR Non Standalone (NSA) solution, including sections for:

Overview

5G is the next generation of 3GPP technology, after 4G/LTE, defined for wireless mobile data communication. 5G will bridge wireless and wireline networks by introducing a major network architectural change from radio access to core.

The 5G standards are introduced in 3GPP Release 15 to cater to the needs of 5G networks. The 5G framework will take advantage of the massive throughput and low latency that new radio provides.

The two solutions defined by 3GPP for 5G networks are:

- 5G Non Standalone (NSA): The existing LTE radio access and core network (EPC) is used as an anchor for mobility management and coverage to add the 5G carrier. This solution enables operators to provide 5G services with shorter time and lesser cost.

Note The 5G NSA solution is supported in this release.

- 5G Standalone (SA): An all new 5G Packet Core will be introduced with several new capabilities built inherently into it. The SA architecture comprises of 5G New Radio (5G NR) and 5G Core Network (5GC).

  Network Slicing, CUPS, Virtualization, Multi-Gbps support, Ultra low latency, and other such aspects will be natively built into the 5G SA Packet Core architecture.

Product Description

The 5G Non Standalone (NSA) solution enables operators using Cisco EPC Packet Core to launch 5G services in shorter time and leverage existing infrastructure. NSA leverages the existing LTE radio access and core

network (EPC) to anchor 5G NR using the Dual Connectivity feature. This solution provides a seamless option to deploy 5G services with very less disruption in the network.

The 5G NSA solution is 3GPP compliant and can inter-operate with any RAN and network functions. Cisco MME, SGSN, S-GW, P-GW, and PCRF services support 5G NSA. See the product-specific feature chapters in this guide for 5G NSA.

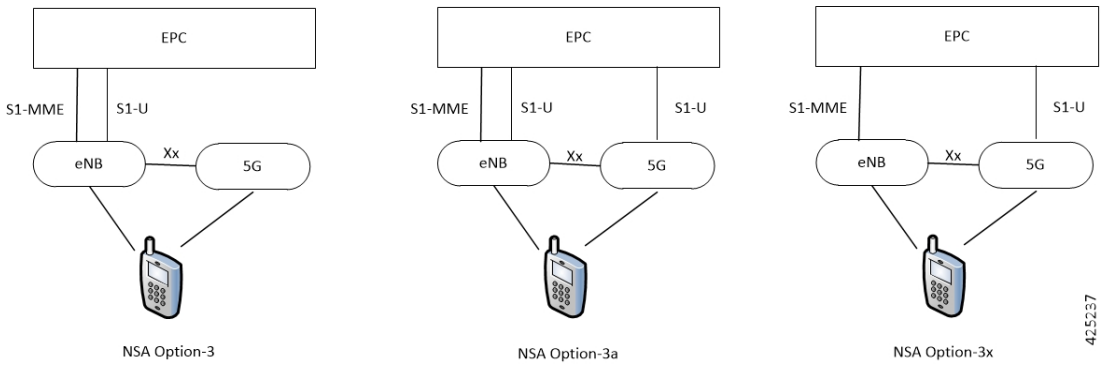
The initial deployments of 5G services are based on 5G NSA, also called option-3. The variants of option-3 are option-3, option-3a and option-3x.

Option-3/3a/3x are transparent to MME and P-GW, and translates to an E-RAB modification procedure at MME.

- Option-3 — Traffic is split across 4G and 5G at eNodeB.
- Option-3a — Traffic is split across 4G and 5G at EPC (S-GW).
- Option-3x — Traffic is split across 4G and 5G at 5G cell.

The following figure illustrates the interfaces and nodes for option-3 and the variants.

Figure 1: NSA Option-3 Variants



Qualified Platforms

The 5G NSA solution runs on Cisco ASR 5000, ASR 5500, and virtualized platforms. For additional platform information, see the appropriate System Administration Guide and/or contact your Cisco account representative.

Licenses

5G NSA is a licensed Cisco solution. Contact your Cisco account representative for detailed information on specific licensing requirements. For information on installing and verifying licenses, refer to the *Managing License Keys* section of the *Software Management Operations* chapter in the *System Administration Guide*.

How the 5G NSA Works

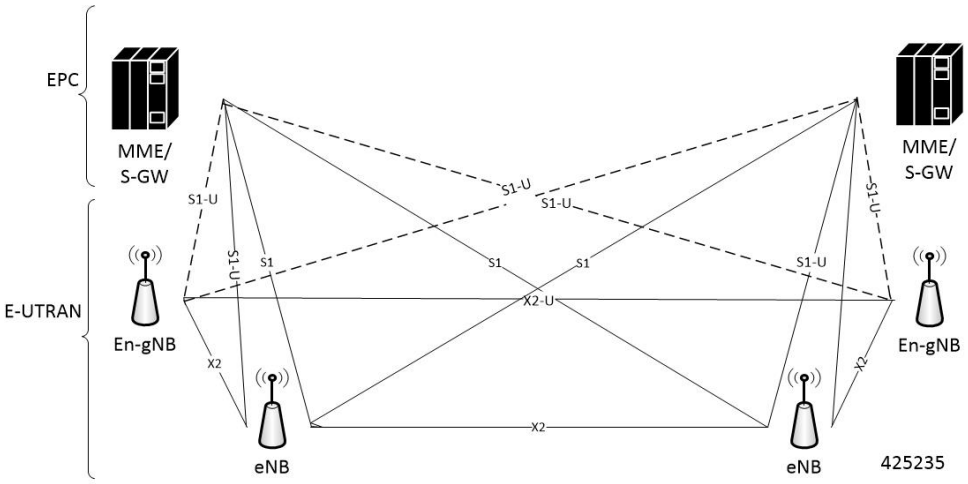
This section provides information on the function of the 5G NSA in an EPC network.

Dual Connectivity

The E-UTRA-NR Dual Connectivity (EN-DC) feature supports 5G New Radio (NR) with EPC. A UE connected to an eNodeB acts as a Master Node (MN) and an en-gNB acts as a Secondary Node (SN). The eNodeB is connected to the EPC through the S1 interface and to the en-gNB through the X2 interface. The en-gNB can be connected to the EPC through the S1-U interface and other en-gNBs through the X2-U interface.

The following figure illustrates the E-UTRA-NR Dual Connectivity architecture.

Figure 2: EN-DC Architecture



If the UE supports dual connectivity with NR, then the UE must set the DCNR bit to "dual connectivity with NR supported" in the UE network capability IE of the Attach Request/Tracking Area Update Request message.

If the UE indicates support for dual connectivity with NR in the Attach Request/Tracking Area Update Request message, and the MME decides to restrict the use of dual connectivity with NR for the UE, then the MME sets the RestrictDCNR bit to "Use of dual connectivity with NR is restricted" in the EPS network feature support IE of the Attach Accept/Tracking Area Update Accept message.

If the RestrictDCNR bit is set to "Use of dual connectivity with NR is restricted" in the EPS network feature support IE of the Attach Accept/Tracking Area Update Accept message, the UE provides the indication that dual connectivity with NR is restricted to the upper layers.

If the UE supports DCNR and DCNR is configured on MME, and if HSS sends ULA/IDR with "Access-Restriction" carrying "NR as Secondary RAT Not Allowed", MME sends the "NR Restriction" bit set in "Handover Restriction List" IE during Attach/TAU/Handover procedures. Similarly, MME sets the RestrictDCNR bit to "Use of dual connectivity with NR is restricted" in the EPS network feature support IE of the Attach Accept/Tracking Area Update Accept message. Accordingly, UE provides the indication that dual connectivity with NR is restricted to the upper layers.

The "Handover Restriction List" IE is present in the "Initial Context Setup Request" message for Attach and TAU procedure with data forwarding procedure, in the "Handover Required" message for S1 handover procedure, in the "Downlink NAS Transport" message for TAU without active flag procedure.