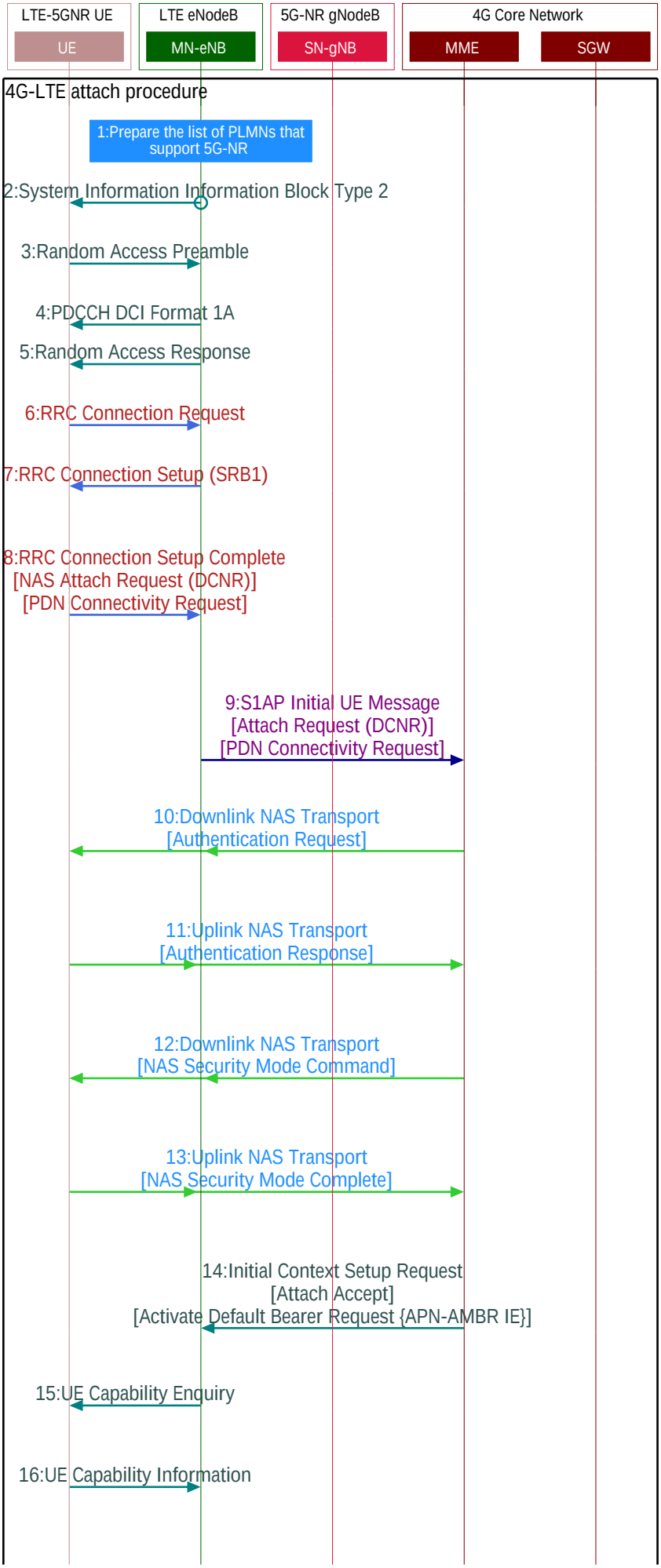


This list will be included in the SIB2 transmission.

The SIB2 broadcast from the MN-eNB signals the presence of 5G-NR PLMNs via the PLMN-InfoList-r15.

The terminal initiates a new session with the randomly selected preamble.

The eNodeB responds to the preamble with the "Random Access Response" message on the DL-SCH.

The UE uses a UL-SCH allocation to send the RRC Connection Request message.

eNodeB responds with an RRC Connection Setup message on the DL-SCH.

The UE signals the completion of the RRC connection. The message carries the NAS Attach Request. The DCNR bit in the "UE Network Capability" IE is set. This signals to the 4G Core Network that the UE supports dual connectivity with 4G-LTE and 5G-NR.

The NAS messages from the UE are signaled to the Core Network via the Initial UE message.

MME initiates the authentication procedure

Authentication is successfully completed.

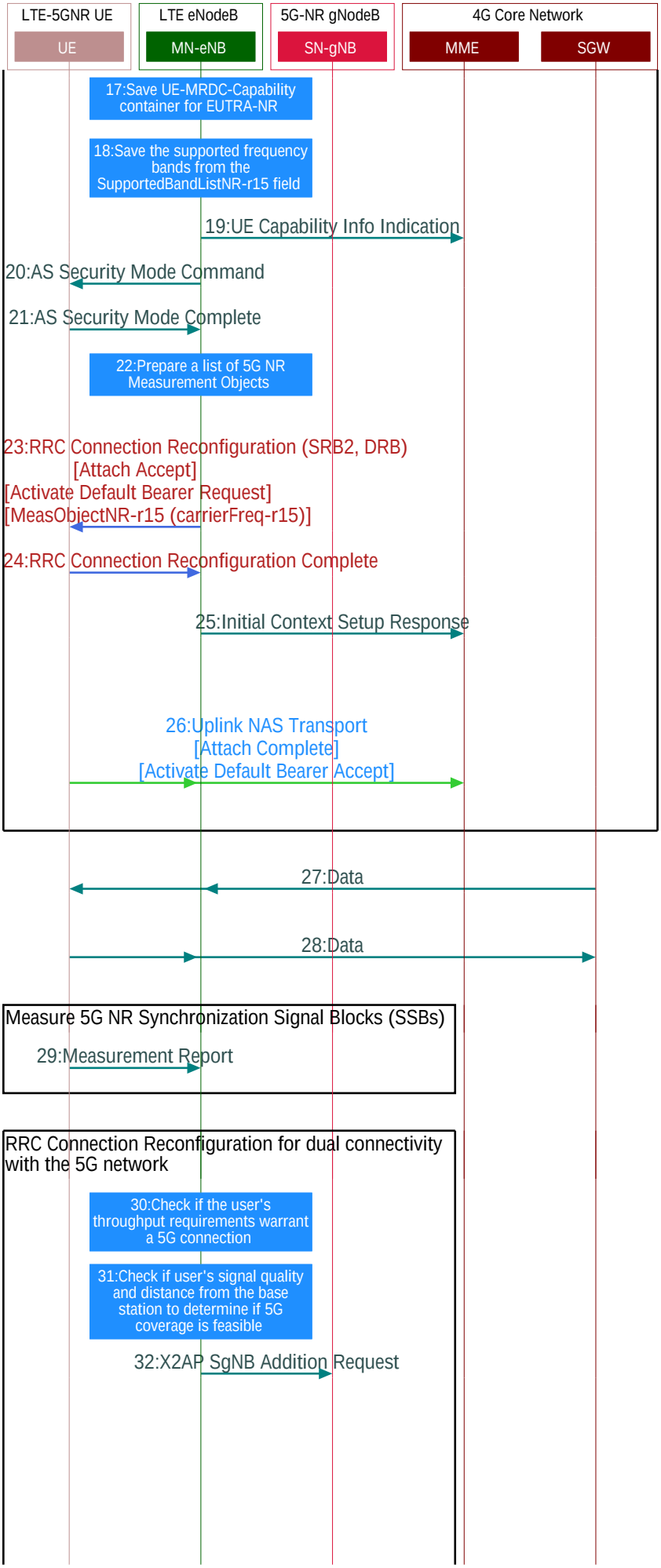
MME initiates NAS level security procedure.

NAS level security procedure is completed. From this point, all communication between MME and UE will be encrypted.

MME responds back to the eNodeB with a message containing three messages: S1AP Initial Context Setup Request, NAS Attach Accept and Activate Default Bearer Request. 5G downlink and uplink data rates are signaled via Extended UE-AMBR Downlink and Uplink Information Elements.

MME has not sent UE capabilities so the eNodeB asks the UE for "UE Capabilities". UE capabilities are requested for 4G-LTE (utra), EN-DC (eutra-nr) and 5G (nr).

UE reports that it supports the EUTRA-NR radio access technology. EUTRA-NR specific capabilities are specified in the UE-MRDC-Capability container. The message also contains information about the supported 5G frequency bands.



Extract the dual connectivity capabilities from the UE Capability Info message.

Extract information about the UE supported frequency bands.

UE capabilities are also passed to the MME.

Setup security between the eNodeB and the UE

Ciphering is enabled in both directions.

Prepare a list of 5G NR frequencies for measurement

The RRC Connection Reconfiguration message is sent to activate the default radio bearer. The message also carries the Attach Accept message as NAS Payload. The message includes measurement objects for 5G NR frequencies.

UE signals the completion of the RRC Connection Reconfiguration.

eNodeB responds back to the Initial Context Setup message. The message also contains the GTP TEID that should be used for sending downlink data to the eNodeB.

UE signals the completion of Attach and default bearer activation.

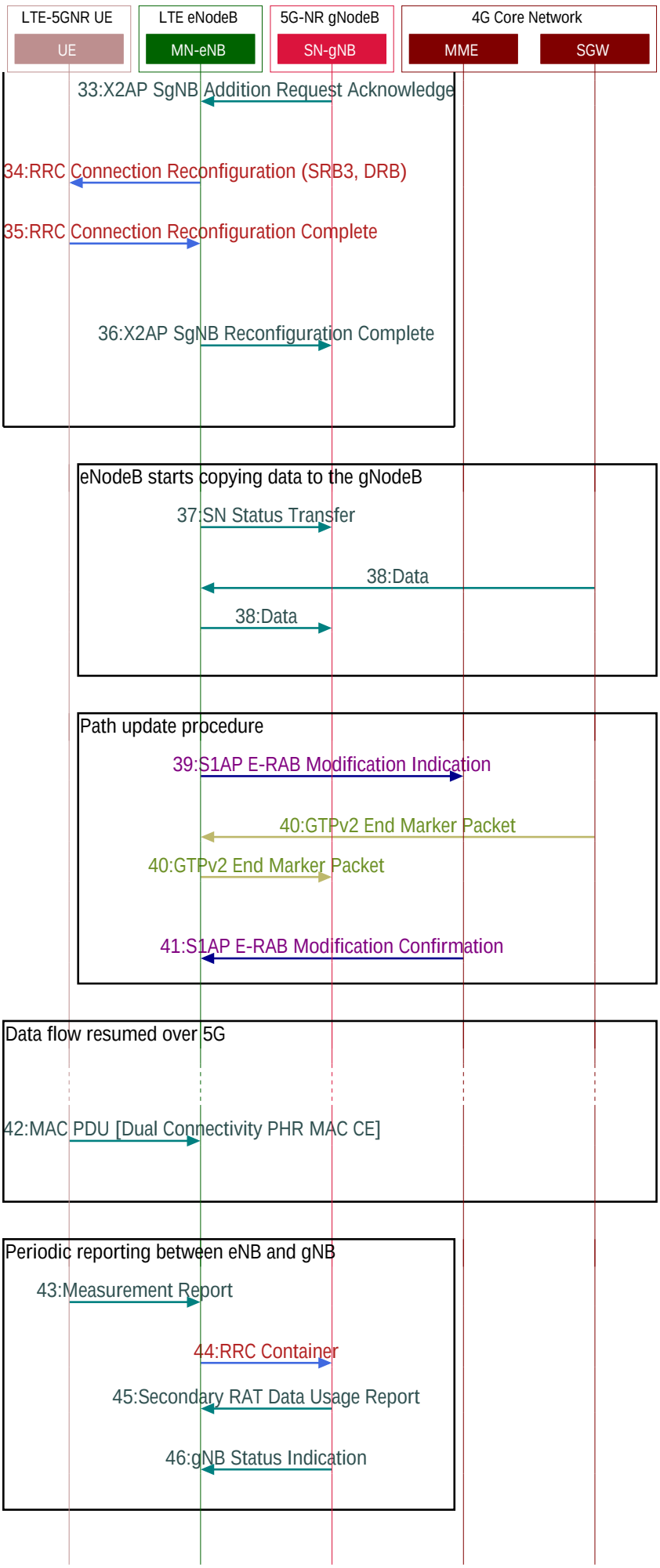
Downlink data is flowing on the default bearer.

Uplink data is flowing on the default bearer.

5G signal quality is reported back to 4G eNB.

The 4G LTE eNodeB decides to add the 5G-NR base station as a secondary node. The eNodeB sends a Secondary Node Addition Request to the gNodeB. The message carries the RRC and Radio Bearer configuration. UE capabilities and security information are also included in the message.

The network indicates whether the UE shall use either KeNB (master node key) or S-KgNB (secondary node key) for the 5G DRB.



The gNodeB responds with information about the radio resources and bearers admitted with the 5G network. The NR RRC configuration message is included in the message.

The 4G eNodeB sends an RRC Connection Reconfiguration to the UE. The message assigns 5G radio resources to the UE.

The UE signals the receipt of the RRC Connection Reconfiguration to the LTE eNodeB. The message carries the "NR RRC Reconfiguration Complete" message meant for the SN-gNB.

The 4G eNodeB informs the secondary node (gNodeB) about the reconfiguration complete. The "NR RRC Reconfiguration Complete" message is delivered to the SN-gNB via the "MeNB to SgNB" container.

eNodeB informs the gNodeB about the PDCP SN and HFN for all the bearers that are being transferred to 5G.

SGW is sending data to the MN-eNB. The MN-eNB keeps forwarding that data to the SN-gNB.

Notify the MME that the data bearer is being switched from 4G-LTE to 5G-NR.

Send the End Marker to the eNodeB. This marks the end of data transmission to the 4G-eNodeB. Subsequent data transmissions will be towards the 5G-gNodeB.

MME responds back the eNodeB.

Periodically, the UE reports the Power Headroom to the the MN-eNB. The PHR MAC CE contains the power headroom for the cells on the MN-eNB and SN-gNB cells.

The UE reports measurements to the MN-eNB. The measurements include results from 5G NR cells.

The MN-eNB reports these measurements to the SN-gNB.

Periodically, the SN-gNB reports the usage statistics for 5G NR bearers to the MN-eNB.

The SN-gNB also reports any overload information to the MN-eNB.