# S8HR and N9HR – a comparison

Nagaraja (Nag) Rao; Boca Raton, FL

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*Drawn by N. Rao*

# Background

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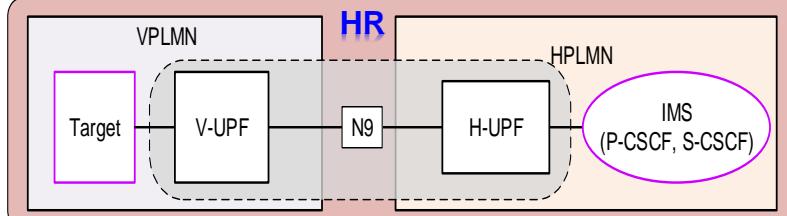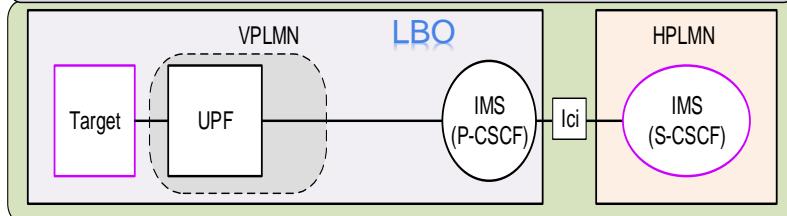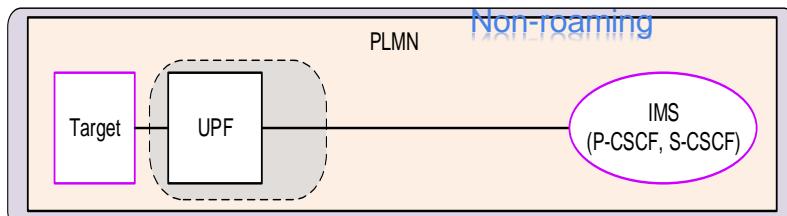
# Voice service network topologies

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# S8HR LI as in TS 33.107

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# S8HR LI as in TS 33.107

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# S8HR and N9HR

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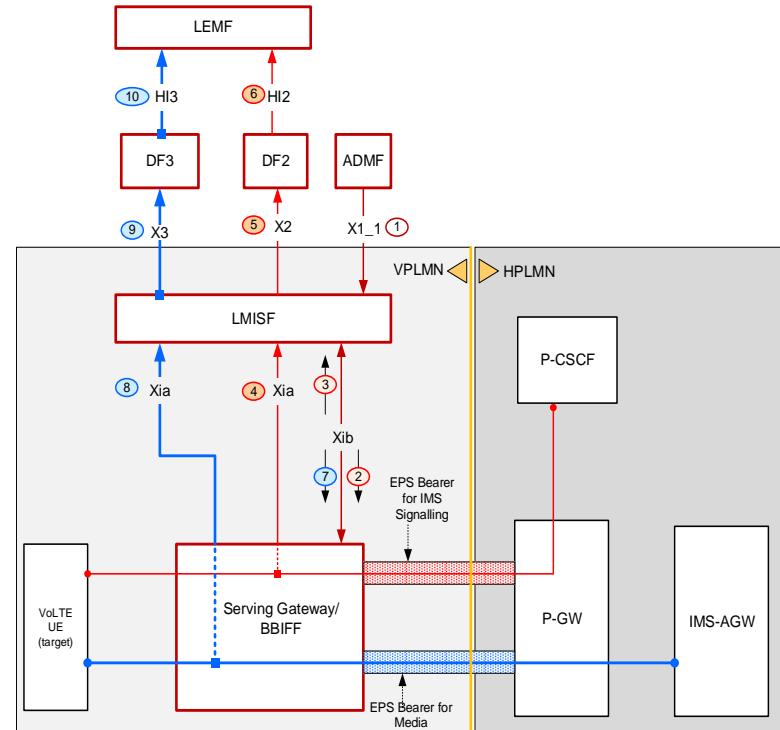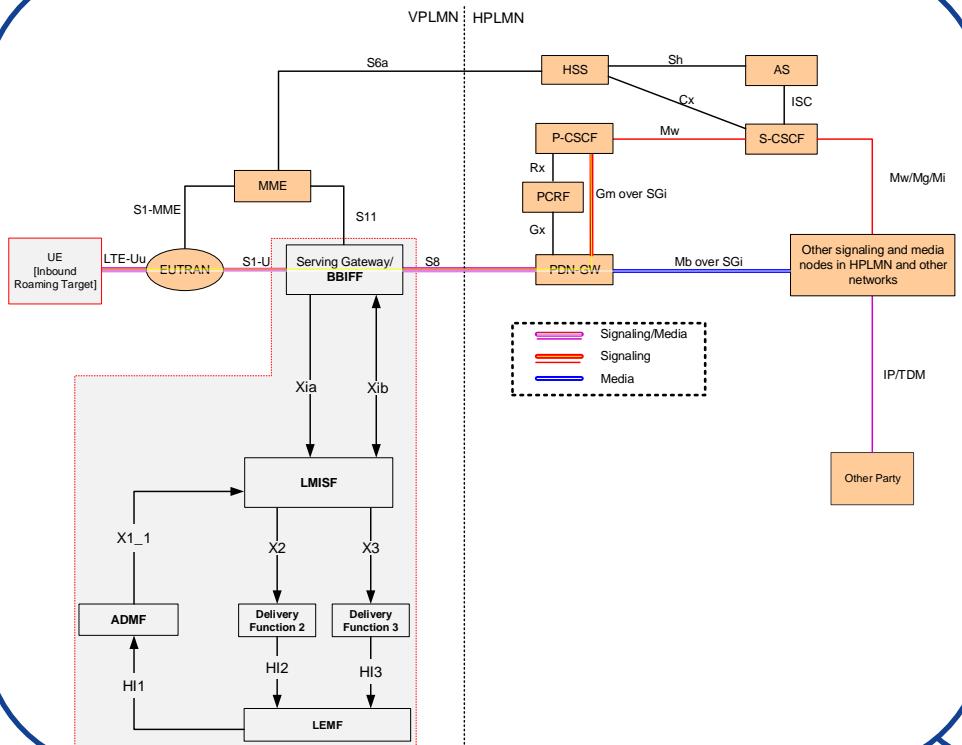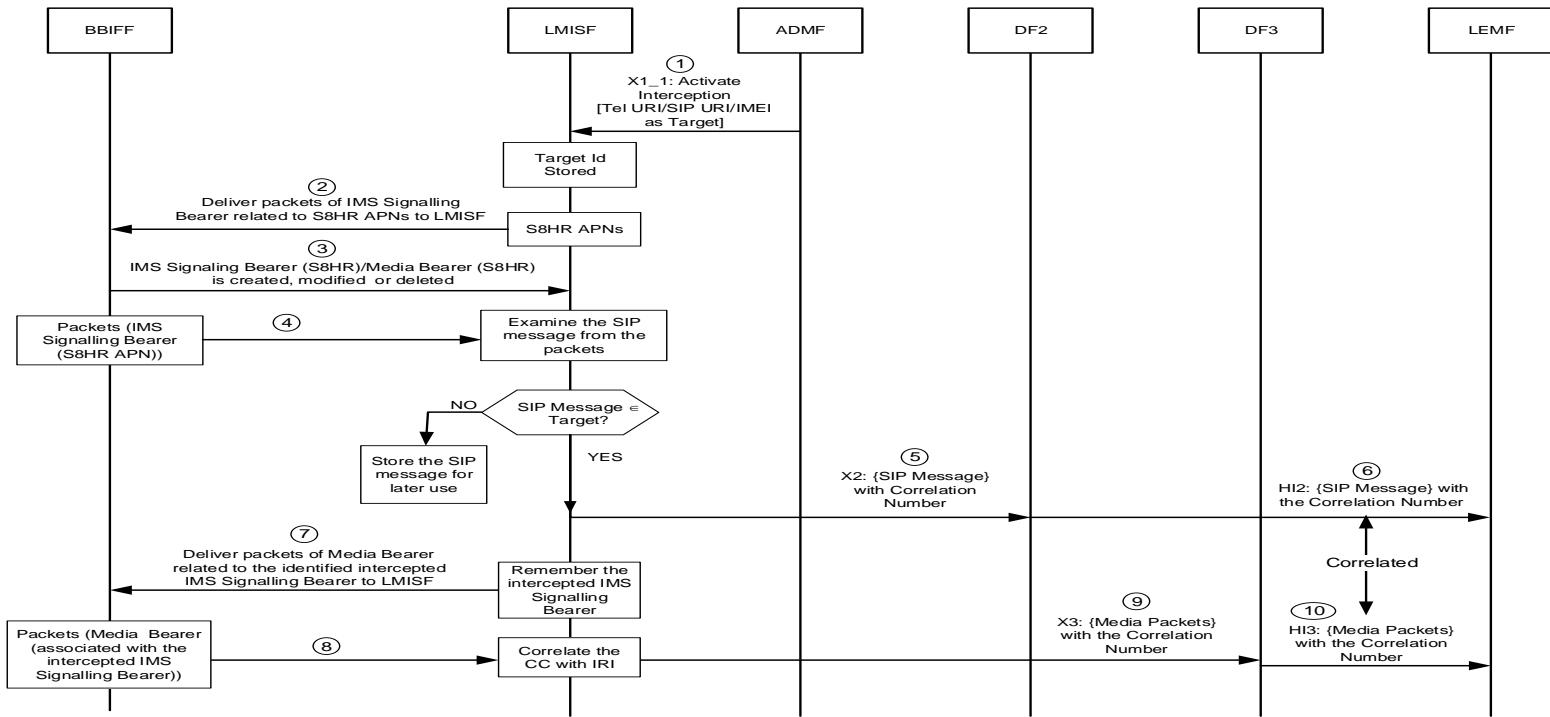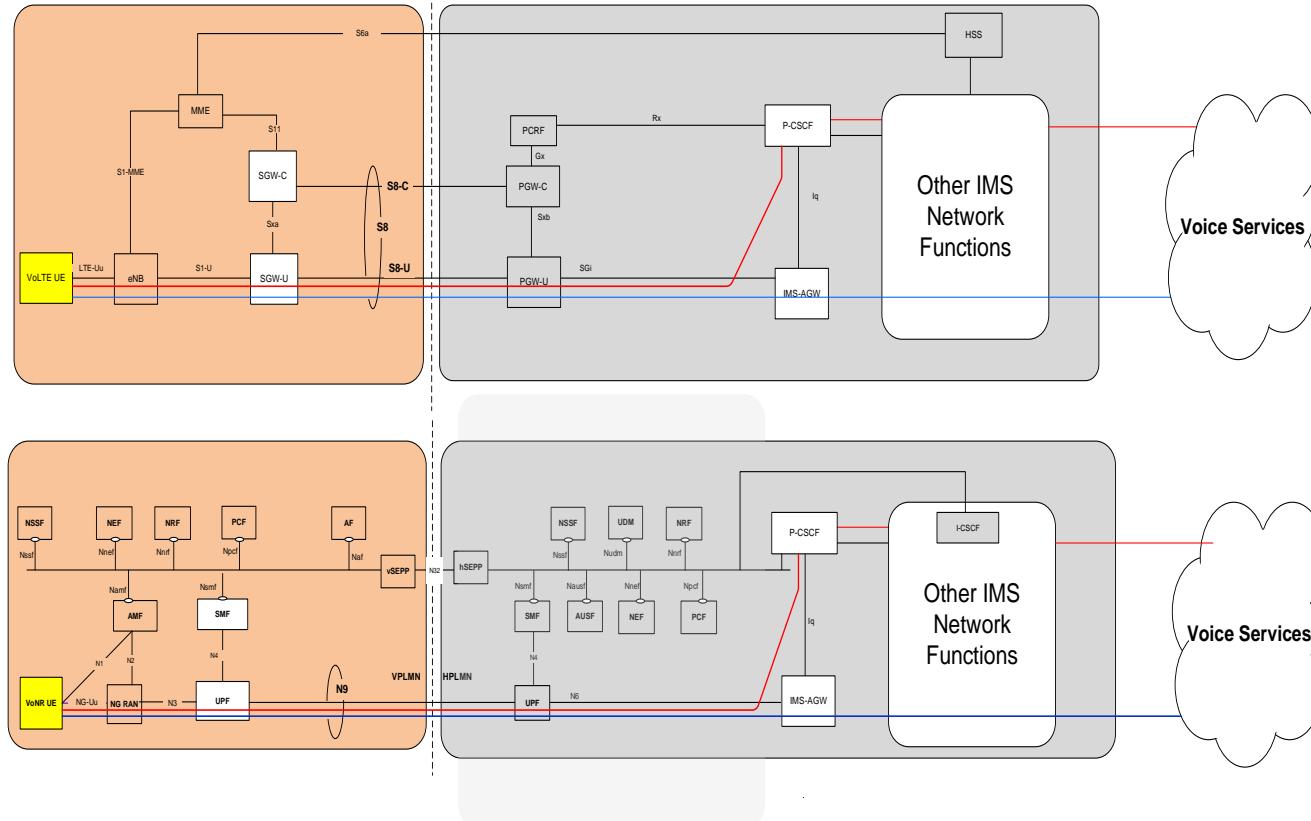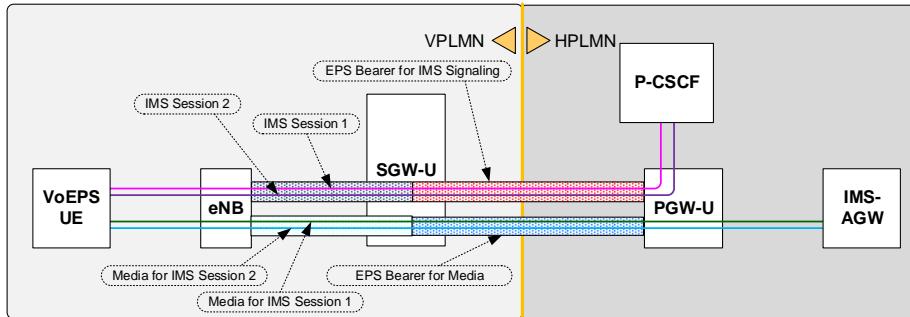
# Home-routed roaming architectures – EPS and 5GS
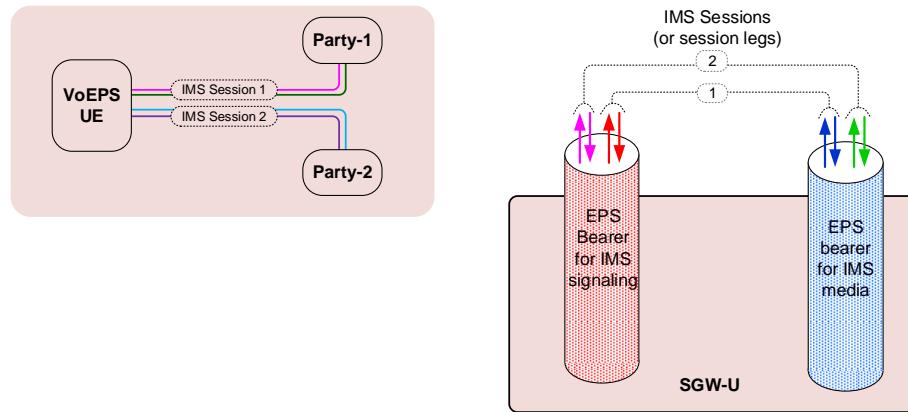


- Packet core network is split between VPLMN and HPLMN.
  - In EPS, PGW is in HPLMN and SGW is in VPLMN.
  - In 5GS, SMF/UPF are present in both VPLMN and HPLMN.
- IMS network functions are in HPLMN.
- Voice-related signaling and media are seen as user plane in the VPLMN except perhaps the creation of PDN connection establishment.

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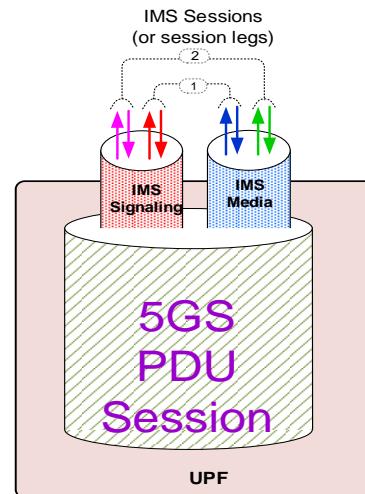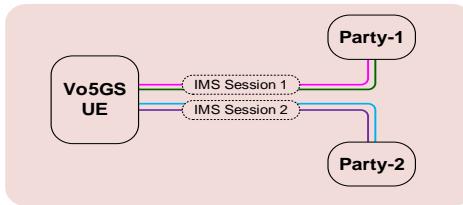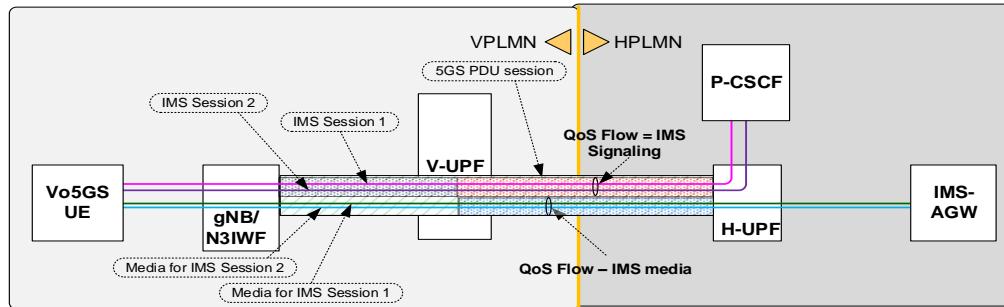
# S8HR – EPS bearer may have multiple IMS sessions



- Separate GTP tunnels are used for IMS signaling and media bearers.
- However, a given bearer may have multiple IMS sessions or IMS session legs.

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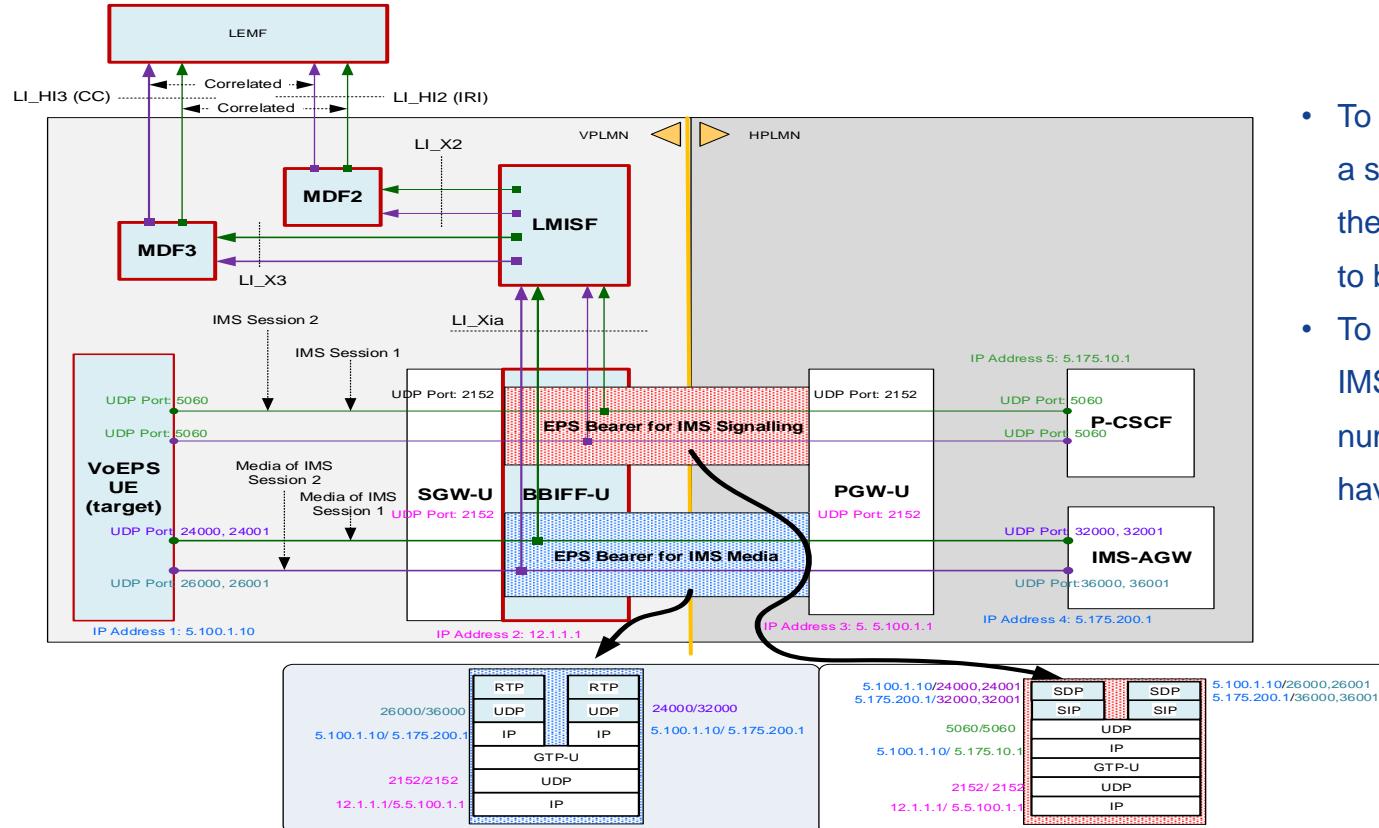
# N9HR – PDU session support QoS flows of IMS signaling and media



- GTP tunnel for each PDU session
- Each PDU session can have multiple QoF flows:
  - IMS signaling
  - IMS media.

  5QI determines the type.
- Each QoS flow may have multiple IMS sessions or IMS session legs.
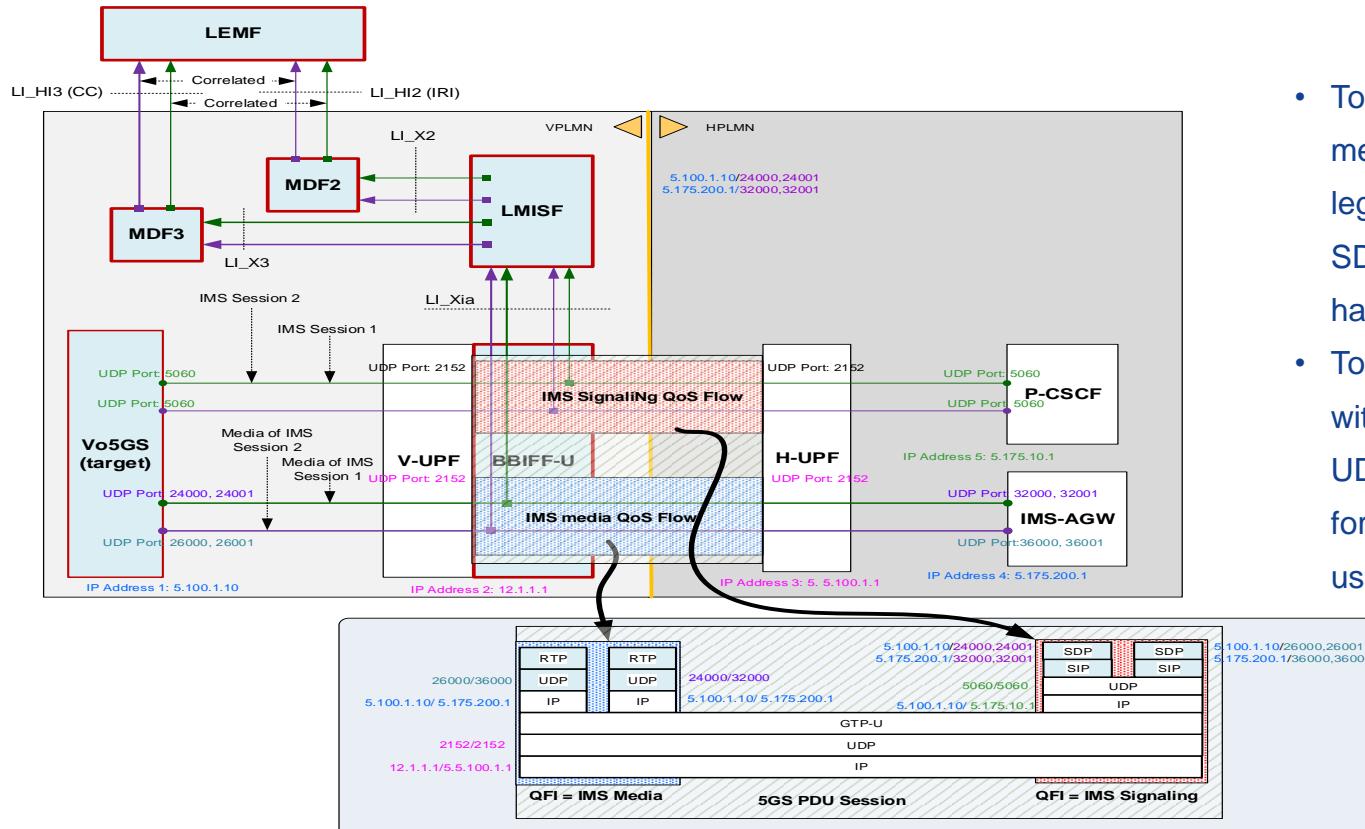
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# S8HR-LI and N9HR-I

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# S8HR: IMS session identification via deep packet inspection



- To associate a SIP message with a session leg, the SIP call Id and the SDP within the SIP will have to be used.
- To associate the media with a IMS session leg, the UDP port numbers used for the RTP will have to be used.

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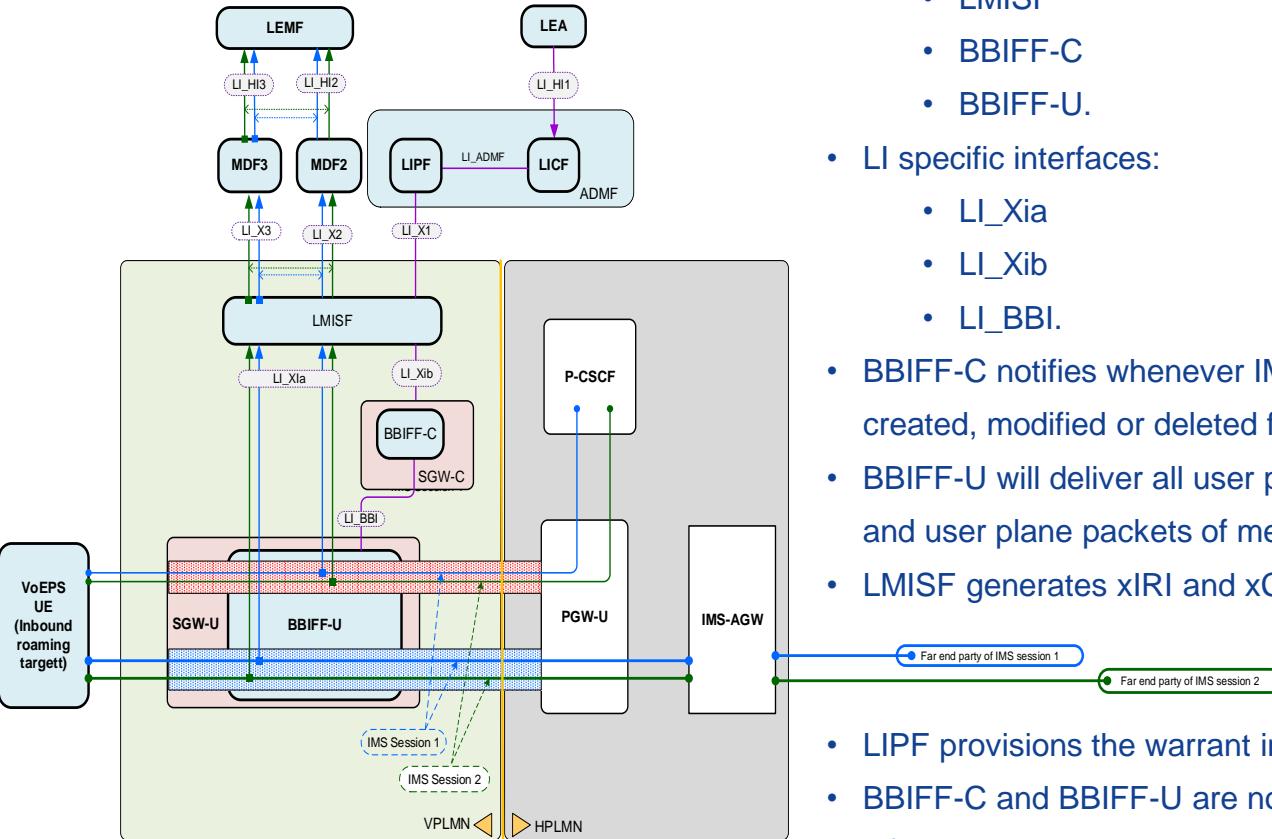
# N9HR: IMS session identification via deep packet inspection



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- To associate the media with a IMS session leg, the UDP port numbers used for the RTP will have to be used.

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# LI flavor to S8HR



- LI specific functions:
  - LMISF
  - BBIFF-C
  - BBIFF-U.
- LI specific interfaces:
  - LI_Xia
  - LI_Xib
  - LI_BBI.
- BBIFF-C notifies whenever IMS signaling and media bearers are created, modified or deleted for all inbound roamers with S8HR
- BBIFF-U will deliver all user plane packets of IMS signaling bearer and user plane packets of media bearer on demand.
- LMISF generates xIRI and xCC with session-leg level correlation.
- LIPF provisions the warrant information to LMISF.
- BBIFF-C and BBIFF-U are not aware of any target specific information.

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# LI flavor to N9HR
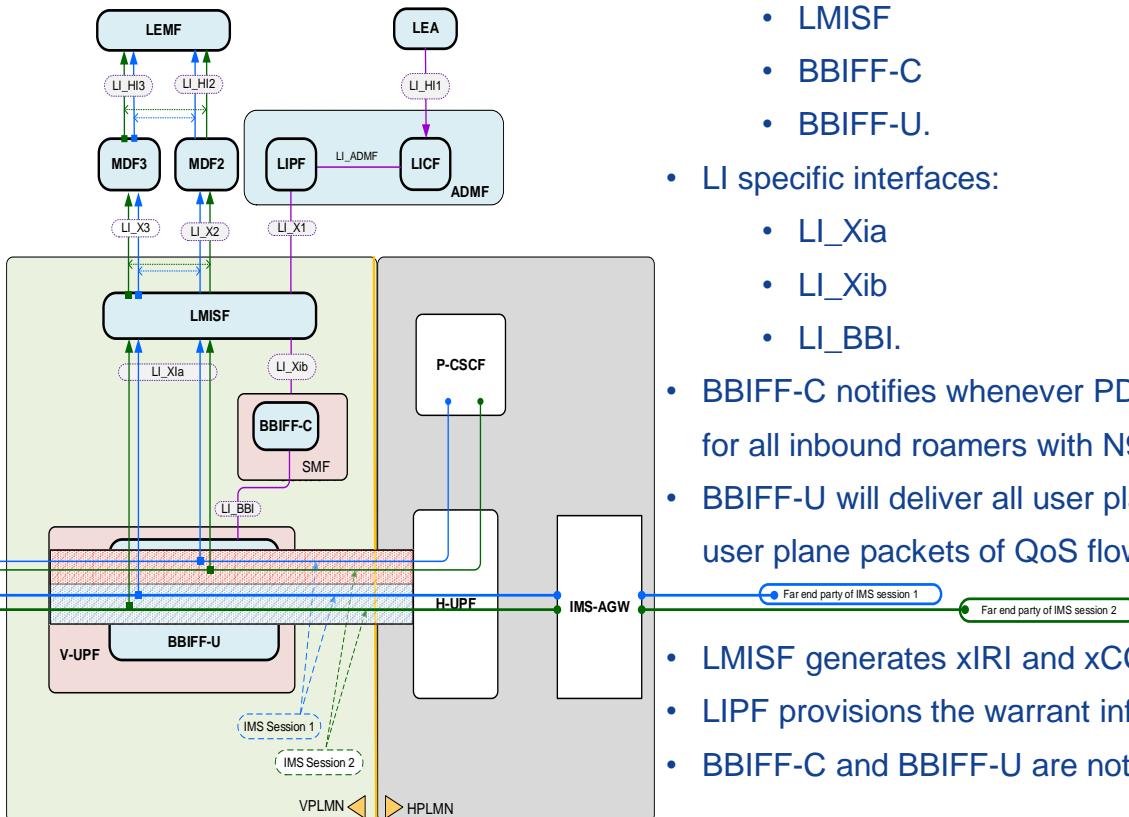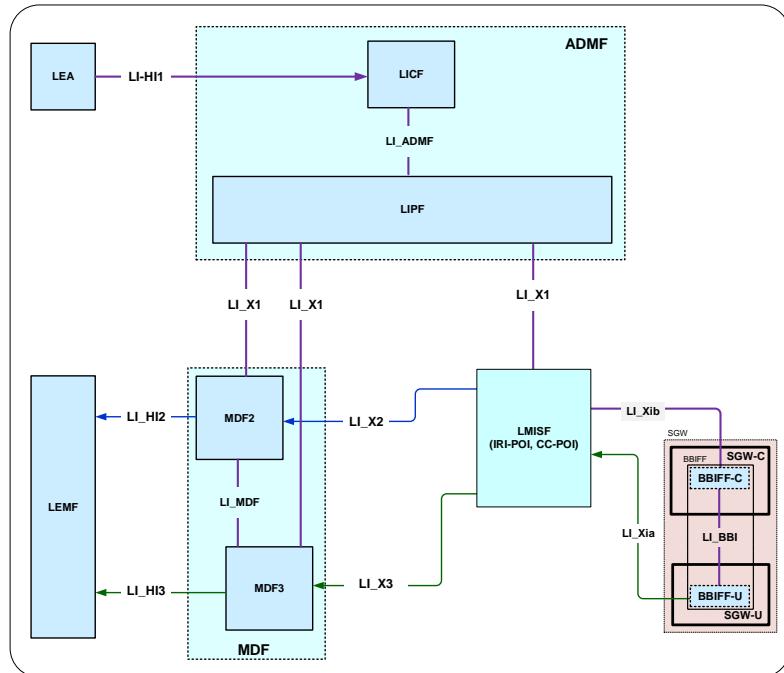


- LI specific functions:
  - LMISF
  - BBIFF-C
  - BBIFF-U.
- LI specific interfaces:
  - LI_Xia
  - LI_Xib
  - LI_BBI.
- BBIFF-C notifies whenever PDU sessions are created, modified or deleted for all inbound roamers with N9HR
- BBIFF-U will deliver all user plane packets of QoS flow with MS signaling user plane packets of QoS flow with media on demand.
- LMISF generates xIRI and xCC with session-leg level correlation.
- LIPF provisions the warrant information to LMISF.
- BBIFF-C and BBIFF-U are not aware of any target specific information.

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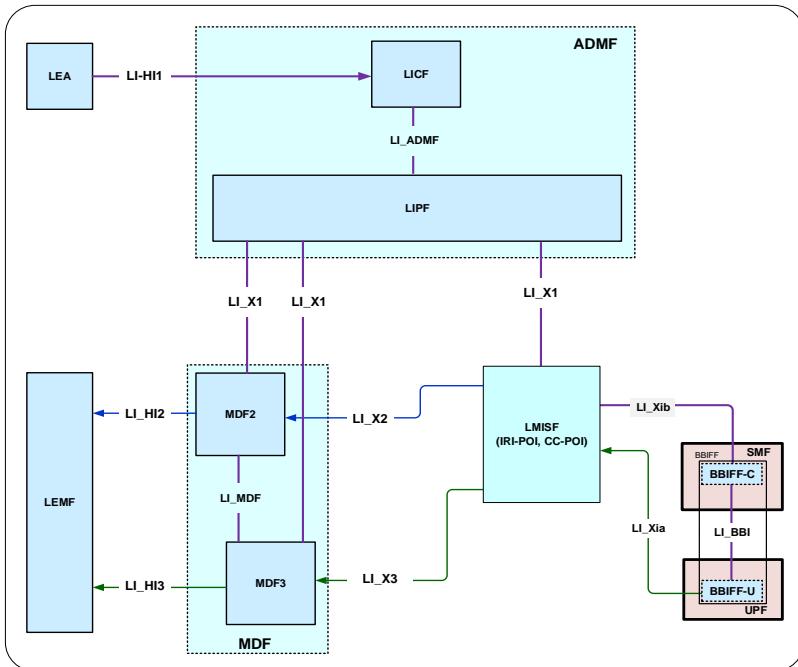
# Proposed architecture diagram for S8HR LI and N9HR LI

## S8HR LI
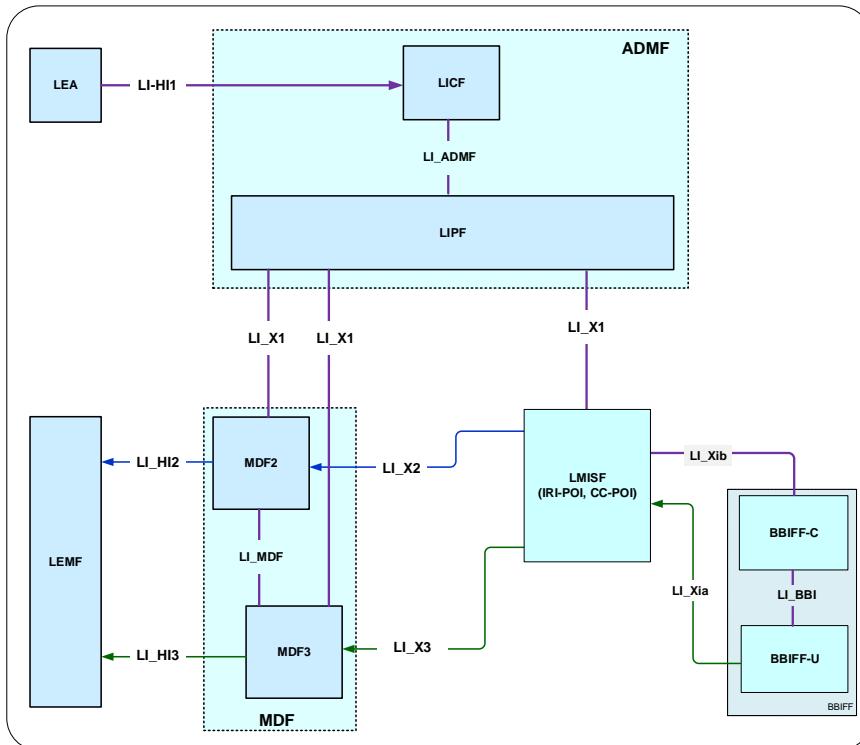


- IMS signaling bearer and IMS media bearer with S8HR APN.

## N9HR LI



- PDU session with QoS flow for IMS signaling and QoS flow for IMS media with N9HR DNN.

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# Summary

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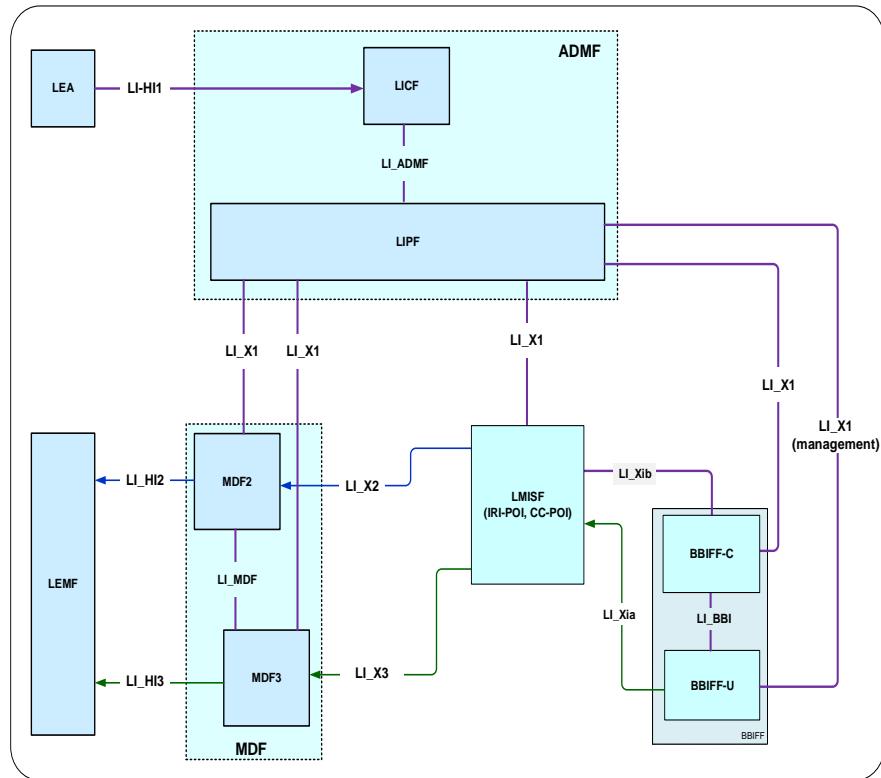
# Generic LI architecture diagram for VPLMN with home-routed roaming



- LI specific functions:
  - LMISF
  - BBIFF-C
  - BBIFF-U.
- LI specific interfaces:
  - LI_Xia
  - LI_Xib
  - LI_BBI.
- Limitations:
  - One LMISF per S8HR APN or N9HR DNN.
  - UE location at the beginning of the call is based on the XiB notification (of IMS media bearer setup or PDU session modification) ← this may happen after the SIP INVITE is handled.
  - SIP headers used for target identification can be different from the SIP headers used in IMS.
- SGW, UPF relocation considered.

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# Alternate generic LI architecture diagram for VPLMN with home-routed roaming



- LI_X1 to BBIFF-C is to provide the LMISF address.
- No warrant based provisioning at BBIFF-C.
- The scope of LI_X1 (management) is yet to be defined in TS 33.127.

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