3GPP ‘5G’ mobility considerations

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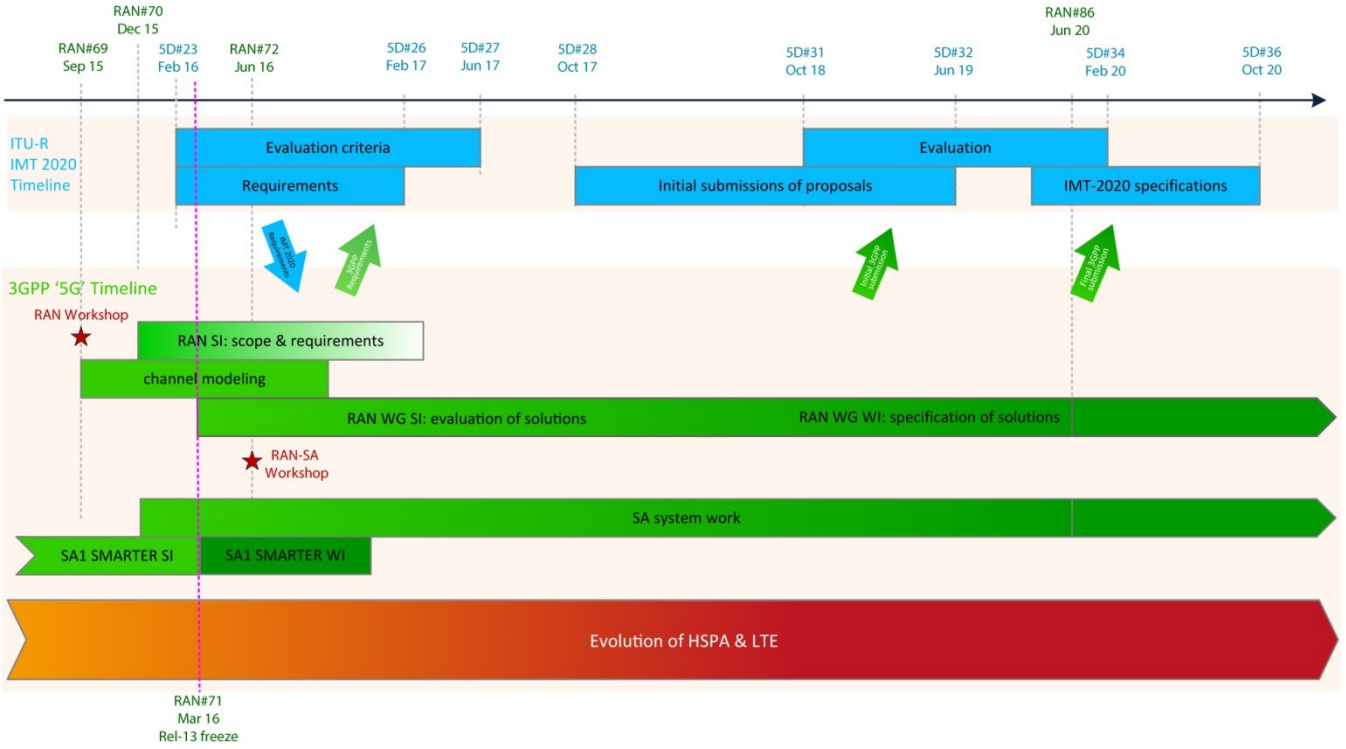
Background

- 3GPP is working furiously on the coming ‘5G’ requirements, and both new RAN & core architectures:
  - 3GPP SA1 Rel-14 work on SMARTER SI (TR22.891)
  - 3GPP SA1 Rel-14 work on NEO (TS22.864)
  - 3GPP SA2 Rel-14 work on NexTGen IS (TR23.799)
  - 3GPP RAN Rel-14 work on “Study on Scenarios and Requirements for Next Generation Access Technologies” (TR38.913)
  - and a lot more..

3GPP timeline for ‘5G’

- Rel-14 stage-3 freeze March 2017
- Rel-15 stage-3 freeze June 2018
- Rel-16 stage-3 freeze December 2019



What about mobility?

- 3GPP SA2 has 4-5 key issues under mobility:
  - Mobility Framework (key issue 3)
  - Session Management (key issue 4)
  - Enabling (re)selection of efficient user plane paths (key issue 5)
  - Support for session and service continuity (key issue 6)
  - Architecture impacts to support network capability exposure (Key Issue 9)
  - Connectivity via a relay UE (Key Issue 16)

- Actually additional related key issues on authentication, network discovery & selection, control plane & user plane separation, etc..

Some terminology

- **PDU Session:** Association between the UE and a data network.
  - Earlier more familiar term was PDN Connection.
  - Three types so far: IP, non-IP and Ethernet.

- **PDU Session of IP Type:** Association between the UE and an IP data network.
  - FFS: PDU session is comparable to a single-stack PDN connection in EPS. A dual-stack PDN connection in EPS corresponds to two PDU sessions.

- **Session Continuity:** The continuity of a PDU session. For PDU session of IP type “session continuity” implies that the IP address is preserved for the lifetime of the PDU session.
  - In DMM terms Sustained IP address.

- **Service Continuity:** The uninterrupted user experience of a service, including the cases where the IP address and/or anchoring point changes.
  - In DMM terms the IP address in nomadic.

Different levels of UE mobility

- Support session continuity:
  - i.e., ‘classic IP mobility’)
- Not support session continuity:
  - I.e., addresses come and go while the MN changes the point of attachment to the network or connections flap/get reestablished.
- Support service continuity when session continuity is not provided:
  - I.e., ‘application level mobility’.

Potential Requirements for mobility

- Mobility support consists of providing none, any one or some combination of the following :
  - minimizing packet loss during inter- and/or intra-RAT cell changes for some or all packet data connections (e.g. APNs) of a UE,
  - maintaining the same IP address assigned to a UE across different cells and RATs for some or all packet data connections (e.g. APNs) of a UE,
  - minimizing impact to the user experience (e.g. minimization of interruption time) when changing the IP address and IP anchoring point for some or all packet data connections (e.g. APNs) of a UE

- Party spoiler: the APN seems still to be there..

Other general selected requirements

- Support a separation of Control plane and User plane functions. √
- Support multiple simultaneous connections of an UE via multiple access technologies. √
- Support the new RAT(s), the evolved LTE, and non-3GPP access types.
- Support unified authentication framework for different access systems.
- Allow independent evolutions of core network and RAN, and minimize access dependencies. √
- Minimize the signalling (and delay) required to start the traffic exchange between the UE and the PDN. √

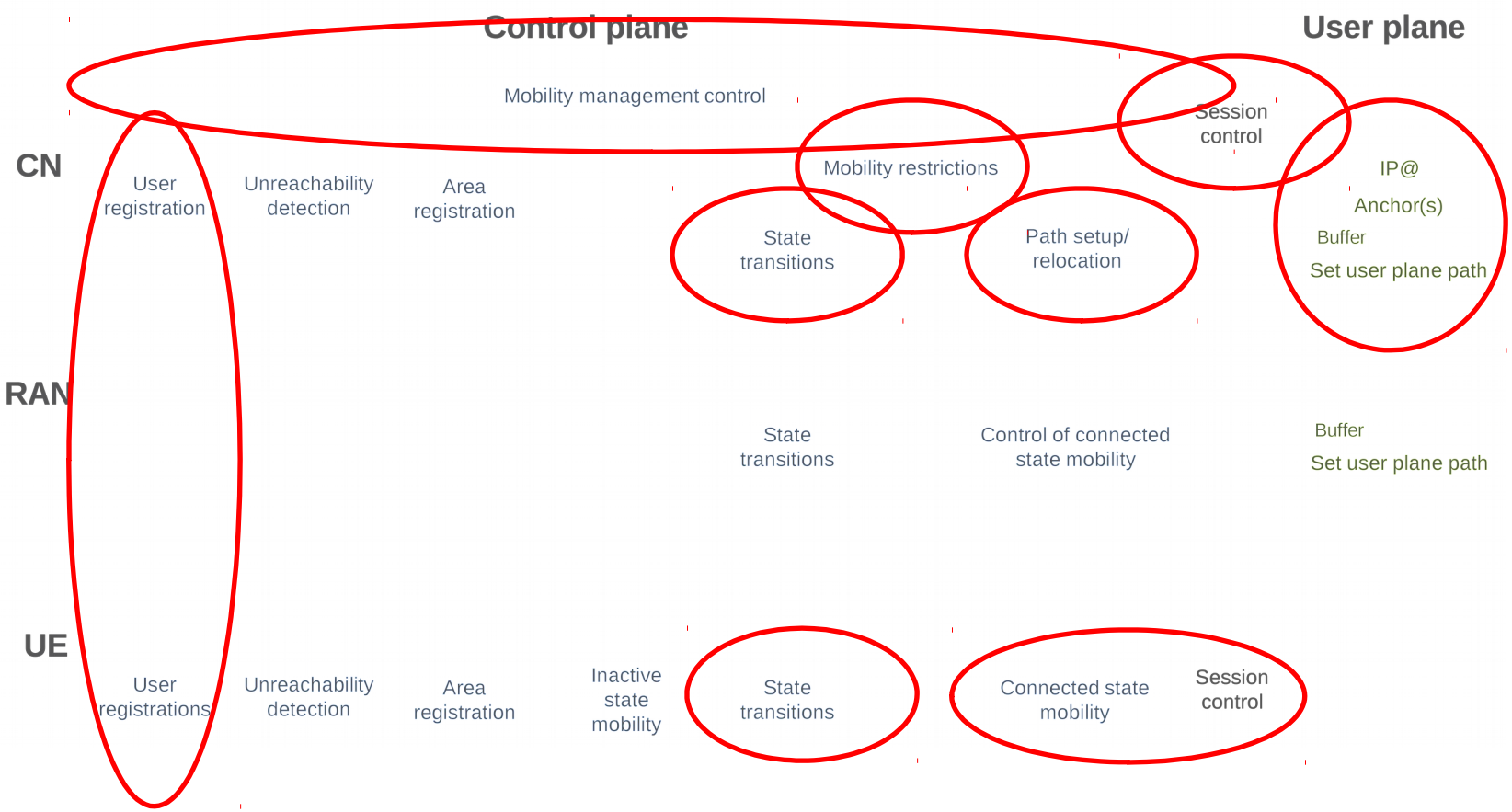
Rundown of key issues

- Mobility framework:
  - In DMM for example the FPC (UP and CP separation, etc).
- Enabling (re)selection of efficient user plane paths:
  - In DMM Multiple (distributed) anchoring and Dynamic anchor assignment/re-location.
- Support for session and service continuity & Session management:
  - In DMM on-demand mobility is what comes close, for example, because the different levels of mobility.

Rundown of key issues, cont'd

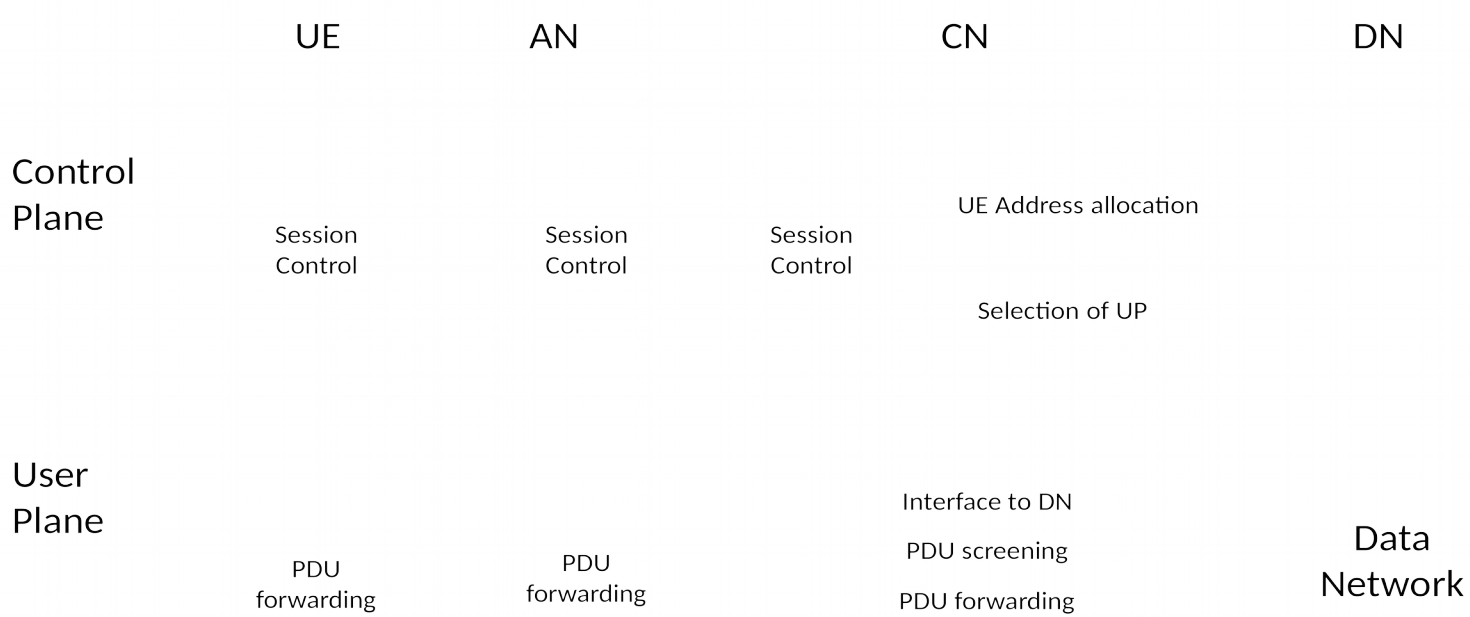
- Connectivity via a relay UE:
  - No DMM equivalent immediately but close to NEMO and prefix delegation..
- Support network capability exposure:
  - In DMM (and MIF PVDs) informing services provided by the network (connectivity information, QoS, mobility, etc.)
- Broadcast/Multicast Capabilities & network discovery and selection??

The mobility framework and its high level functions



Areas that could concern IETF, DMM and other WGs as well..

Session management functions



Work in progress in 3GPP on AN/CN side but will likely to be interesting mobility wise :)

Summary

- The ‘5G’ mobility related work has multiple topics that we e.g., in DMM, have (tried) to work on..

- The big question again is whether 3GPP is interested.. and if were how to push/contribute to the architecture & protocol selection.
  - There has not been request from IETF to work on anything..