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SERIES Y: GLOBAL INFORMATION INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS, NEXT-GENERATION NETWORKS, INTERNET OF THINGS AND SMART CITIES

Future networks

Mobility management for fixed mobile convergence in IMT-2020 networks

Recommendation ITU-T Y.3132

International Telecommunication Union

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Recommendation ITU-T Y.3132

Mobility management for fixed mobile convergence in IMT-2020 networks

Summary

Recommendation ITU-T Y.3132 presents the scenarios, requirements and design principles of mobility management (MM) for fixed mobile convergence (FMC) in IMT-2020 networks, which supports the network evolution and accommodates convergent services in fixed and mobile networks. This Recommendation presents the mobility management functional architecture for supporting FMC in IMT-2020 networks and information flows of location management, handover control and coordination management in IMT-2020 networks.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T Y.3132	2019-12-14	13	11.1002/1000/14130

Keywords

Coordination management, handover control, IMT-2020 network, location management, mobility management.

* To access the Recommendation, type the URL http://handle.itu.int/ in the address field of your web browser, followed by the Recommendation's unique ID. For example, http://handle.itu.int/11.1002/1000/11830-en.

FOREWORD

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As of the date of approval of this Recommendation, ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database at http://www.itu.int/ITU-T/ipr/.

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Mobility management for fixed mobile convergence in IMT-2020 networks

1 Scope

This Recommendation aims to describe the framework of mobility management for fixed mobile convergence (FMC) in IMT-2020 networks. The Recommendation covers the following issues, but is not limited to:

- Scenarios, requirements and design principles of mobility management for supporting FMC in IMT-2020 networks;
- Architecture of mobility management as a common function for FMC;
- Functions of location management, handover control, and coordination management of mobility management for FMC;
- Information flows of location management, handover control, and coordination management for FMC.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

[ITU-T Q.1762] Recommendation ITU-T Q.1762/Y.2802 (2007), *Fixed-mobile convergence general requirements*.

[ITU-T Y.3101] Recommendation ITU-T Y.3101 (2018), *Requirements of the IMT-2020 network.*

[ITU-T Y.3102] Recommendation ITU-T Y.3102 (2018), *Framework of the IMT-2020 network.*

[ITU-T Y.3130] Recommendation ITU-T Y.3130 (2018), *Requirements of IMT-2020 fixed mobile convergence*.

[ITU-T Y.3131] Recommendation ITU-T Y.3131 (2019), *Functional architecture for supporting fixed mobile convergence in IMT-2020 networks*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 fixed network [ITU-T Q.1762]: A network that provides wire-based (e.g., copper, fibre) or wireless access to its services. The fixed network may support nomadism, but does not support mobility.

3.1.2 mobile network [ITU-T Q.1762]: A network that provides wireless access to its services and supports mobility.

3.1.3 fixed mobile convergence [b-ITU-T Y.3100]: In the context of IMT-2020, the capabilities that provide services and applications to end users regardless of the fixed or mobile access technologies being used and independently of the users' location.

3.1.4 mobility management [b-ITU-T Q.1706]: The set of functions used to provide mobility. These functions include authentication, authorization, location updating, paging, download of user information and more.

3.1.5 handover [b-ITU-T Q.1706]: The ability to provide services with some impact on their service level agreements to a moving object during and after movement.

3.2 Terms defined in this Recommendation

None.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

AN Access Network
ASF Authentication Server Function
CN Core Network
CP Control Plane
CPE Customer Premises Equipment
DN Data Network
FMC Fixed Mobile Convergence
IWF Interworking Function
MM Mobility Management
NACF Network Access Control Function
NF Network Function
PCF Policy Control Function
PDU Protocol Data Unit
QoS Quality of Service
RAN Radio Access Network
RAT Radio Access Technology
RG Residential Gateway
SMF Session Management Function
UE User Equipment
UP User Plane
URRP UE Reachability Request Parameter
USM Unified Subscription Management
UPF User Plane Function
UL Uplink

5 Conventions

In this Recommendation:

The keywords "is required to" indicate a requirement which must be strictly followed and from which no deviation is permitted, if conformance to this Recommendation is to be claimed.

6 Design considerations of mobility management for FMC in IMT-2020 networks

6.1 Mobility management design principles

The IMT-2020 network should support the mobility scenario. In addition, mobility management for FMC is required to support a unified mobility state management capability for mobile and fixed access networks and support session continuity when the user equipment (UE) moves between fixed and mobile access networks.

The IMT-2020 network provides diverse services with different access networks using the access network (AN) agnostic common core network (CN), in order to enable service providers to provide different services without building a separate end-to-end network for each service. The mobility management for FMC is designed taking into consideration different access networks and the unified core network.

Figure 6-1 illustrates the scenario of mobile broadband service via fixed and (or) mobile access network. A terminal of mobile broadband service can be globally controlled by unified core network, and get access to data sources such as websites on the Internet via both fixed and mobile access simultaneously (which 'and' in the figure stands for) or via one of access technologies at one time (which 'or' in the figure stands for).

NOTE – In this scenario, the fixed access network for the mobile broadband service indicates that a mobile terminal (e.g., cell phone) can connect to a fixed access network via wireless hotspots (e.g., Wi-Fi) provided by traditional fixed gateways (e.g., customer premises equipment (CPE), residential gateway (RG)).

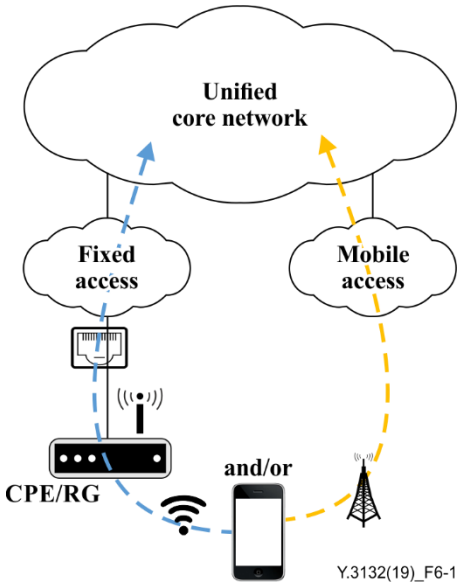

Figure 6-1 – Mobility scenarios for FMC in IMT-2020 network [ITU-T Y.3130]

The mobility management is required to be designed to support the mobility for UE across a wide variety of access networks. It is noted that mobility management performs the corresponding function, according to the type of mobility. The supported mobility types are as follows:

- Intra-access mobility – When UE moves within an access network (such as mobile access network) and changes its access point;
- Inter-access mobility – When UE moves between different access networks (such as mobile access network and fixed broadband access network) and changes its access point.

Mobility management is also required to be designed as a self-contained scheme, not depending on the specific data transport scheme. The feature of the separation of control plane (CP) and user plane (UP) make it easier to implement and deploy the mobility management to a variety of access networks in IMT-2020 network.

Mobility management is required to interact with other functionalities. For address allocation functionality, signalling interface is required to provide the UE's address information to support mobility management. For other functionalities of the CP such as authentication and authorization and charging, the interfaces are required to follow general standards.

6.2 General mobility management requirement

Mobility management is required to support mobility when UEs are spread across a wide variety of heterogeneous access networks. It is also required to provide a set of the signalling and control operations for a variety of mobility management related functional entities. To support FMC in IMT-2020 network, an operator may implement those mobility management related functions in the core network (CN) and different access networks. With the help of the appropriate signalling operations for mobility management, UEs could benefit from the continuation of the services in a seamless manner, while the UE moves access the various access networks for FMC in IMT-2020 network. With network functions in UP and CP which can be flexibly deployed as required, the mobility management framework is designed by the separation of CP and UP, which is required to be scalable and distributed. The separation of CP and UP allows scalability and independent evolution of both planes as well as flexible network function deployments.

Mobility management is designed to provide session continuity for FMC in IMT-2020 network, which is an important objective that mobility management needs to achieve. For session continuity between different access type networks for FMC in IMT-2020 network, mobility management is also required to support coordination management.

The general functions of mobility management are presented below.

The location management function is used to keep track of the movement of a UE in the network and to locate the UE for data delivery. The location management function includes the following procedures, UE reachability management and location reporting procedures.

The handover control function is used to provide the 'session continuity' for the 'on-going' session of the moving UE. The handover control function is required to minimize the data loss and handover latency during the handover of the UE.

The coordination management function is used to minimize the service interruption during the mobile access and the fixed access handover, with the consideration of network availability and status, the current application characteristics and requirements.

With intra-access mobility, the location management and the handover control function are employed. In addition, with inter-access mobility, the location management, the handover control and the coordination management functions are all employed.

6.3 Functional architecture of mobility management

The mobility management is a common functionality of the CP. The entities relevant to the mobility management are the network access control function (NACF) that include registration management, connection management and session management function (SMF) selection. The SMF provides functionalities to setup the Internet protocol (IP) or non-IP protocol data unit (PDU) connectivity for a UE as well as to control the UP for that connectivity. The policy control function (PCF) provides functionalities for the control and management of policy rules including rules for quality of service (QoS) enforcement, charging and traffic routing. The user plane function (UPF) provides functionalities for traffic routing and forwarding, PDU session tunnel management and QoS enforcement. The unified subscription management (USM) stores and manages, in a unified way, UE

context and subscription information. The authentication server function (ASF) performs authentication between UE and the network.

The mobility management functional architecture in IMT-2020 network architecture is shown in Figure 6-2. Entities relevant to location management include NACF, USM and other network functions (NFs). Entities relevant to handover control include NACF, SMF(s) and UPF(s). Entities relevant to coordination management include NACF, SMF/UPF, PCF and, ASF/USM.

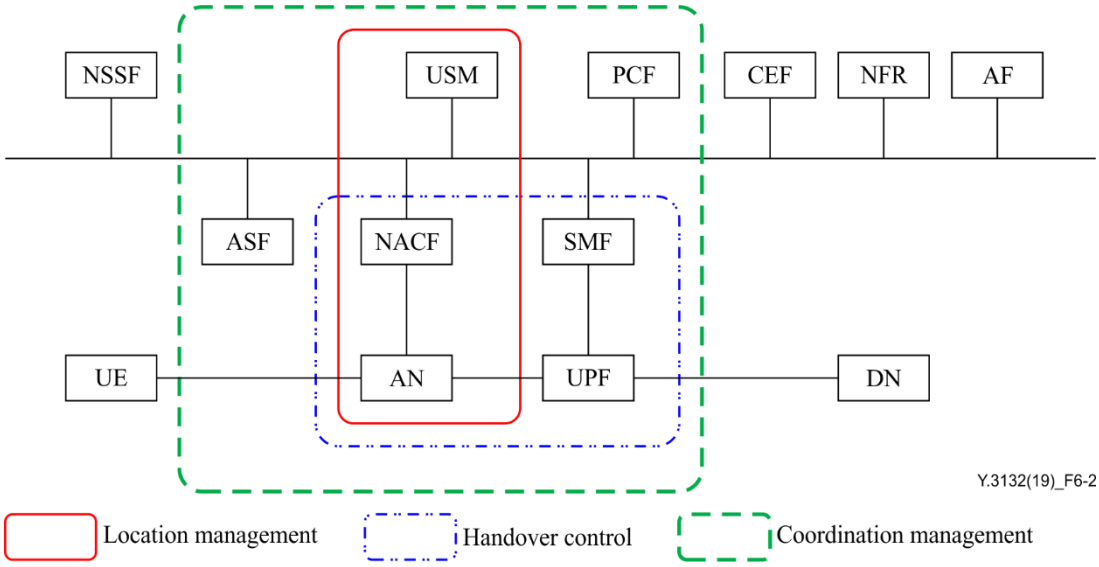

Figure 6-2 – Mobility management related functions in IMT-2020 network architecture [ITU-T Y.3131]

For the location management, the serving NACF notifies UE location to SMF. The NACF updates the status of the UE and AN immediately if the UE has a signalling connection with NACF. If the UE has no signalling connection established with the NACF, the NACF may page the UE immediately or store the updated areas in which the UE may initiate communication with the network, and update the status of the UE upon the next signalling interaction with UE. The NACF determines and updates the mobility pattern of the UE based on subscription of the UE, statistics of the UE mobility, network local policy, and the UE assisted information, or any combination of them. USM stores and manages UE context in a unified way.

For the handover control, NACF performs discovery and selection of the SMF that is the most appropriate to manage the PDU session. SMF setups the PDU session for a UE as well as controls the UPF for that connectivity. The SMF sends a Session Modification Request message to the UPF for PDU session modification. UPF provides the capacity for traffic routing and forwarding, PDU session tunnel modification, etc. If UPF re-allocation is required to support mobility, SMF selects a new UPF and performs inter-UPF mobility management.

For the coordination management, the NACF initiates the switching of the signalling connection and triggers session management to re-establish the PDU session tunnels. When a Session Establishment Request message is received, NACF performs the selection of the SMF. The serving SMF selects target UPF to provide the optimal path. The USM stores the UE's subscription data and manages UE context and subscription information in a unified way. The PCF in the serving network may further adjust the areas in which the UE may initiate communication with the network. The PCF also provides the control and management of policy rules. SMF gets policy information related to session establishment from the PCF. USM provides authentication information of the UE to the ASF.

7 Mobility management functions for FMC in IMT-2020 networks

This clause describes the functions to support mobility management for FMC in IMT-2020 network. Mobility management is used to handle all aspects related to UE mobility. The features of location management function, handover control function and coordination management function are described in clauses 7.1 to 7.3.

7.1 Location management function

The location management function is used to keep track of the movement of a UE in the network and to locate the UE for data delivery. The location management function is used to support the prospective 'incoming' session to the mobile UE.

According to the requirements of mobility management for FMC, the location management function supports session continuity of mobility management in mobility scenarios. When the same UE is moving or is used at different locations, the location management function is required to detect whether the UE is reachable, provide UE location for the network and request the AN to report where the UE is currently located via NACF. The function supports the capability of the network to identify and locate UE. The implementation of this function requires the cooperation of NACF, USM and other NFs.

The procedures of location management include UE reachability management and location reporting procedures.

Reachability management is responsible for detecting whether the UE is reachable and for providing the UE location (i.e., access node) for the network to reach the UE. This is done by paging the UE and UE location tracking. The UE location tracking includes both UE registration area tracking (i.e., UE registration area update) and UE reachability tracking. There are two states that are identified to reflect the status of the UE signalling connectivity with NACF: IDLE state (when a UE is registered and it has no signalling connection established with NACF) and CONNECTED state (when a UE has a signalling connection with NACF). Such functionalities can be either located at CN (in case of idle state) or AN (in case of connected state).

The location reporting procedure is used by an NACF to request the AN to report where the UE is currently located. The AN stops reporting when the UE transits to idle state or the NACF sends a cancel indication. This procedure may be used for services that require accurate cell identification (e.g., emergency services, lawful intercept, charging), or for subscription to the service by other NFs.

7.2 Handover control function

The handover control function is performed to minimize the data loss and handover latency during the handover of the UE. Each of the handover schemes is performed using the corresponding signalling between the entities associated with handover. The handover signalling is based on movement detection. Handover control procedure triggering includes whether a UE moving from the serving AN to the target AN and a serving AN cannot serve a UE anymore, e.g., due to changes in radio conditions or load balancing.

The handover control function is used to provide session continuity for mobility management in mobility scenarios, according to the requirements of mobility management in IMT-2020 network. The function supports intra-access and inter-access mobility of the mobility types. The function provides session continuity when UE moves within an access network or between different access networks. The implementation of this function requires the cooperation of NACF, SMF(s) and UPF(s).

The handover control function may handover a UE from a source radio access network (RAN) node to a target RAN node using the reference point between RAN and the NACF or reference point between RAN nodes. This can be triggered, for example, due to new radio conditions, load balancing or specific service e.g., in the presence of QoS for voice.

7.2.1 RAN-RAN reference point based inter RAN handover

This procedure is used to handover a UE from a source RAN to the target RAN using RAN-RAN reference point when the NACF is unchanged. The presence of IP connectivity between the source UPF and target UPF is assumed.

It is assumed that the PDU session for the UE comprises only one UPF that acts as a PDU session anchor at the time of this handover procedure. PDU session is defined as an association between a UE and a data network (DN) that provides PDU connectivity service in the context of IMT-2020. PDU session can be an IP type, non-IP type or Ethernet type.

7.2.2 RAN-NACF reference point based inter RAN handover

The source RAN decides to initiate a RAN-NACF based handover to the target RAN.

The availability of a direct forwarding path is determined in the source RAN and indicated to the SMFs. If IP connectivity is available between the source and target RAN and security association(s) is in place between them, a direct forwarding path is available.

If a direct forwarding path is not available, indirect forwarding may be used. The SMFs use the indication from the source RAN to determine whether to apply indirect forwarding.

If during the handover procedure the NACF detects that the NACF needs to be changed, the NACF shall reject any SMF initiated RAN-NACF reference point request received since handover procedure started and shall include an indication that the request has been temporarily rejected due to handover procedure in progress.

7.3 Coordination management function

Coordination management is required to include mechanisms to minimize the service interruption during the handover between different access networks type. It considers network availability, status and performance, the current application characteristics and requirements together to manage inter-access mobility. Coordination management provides unified procedures according to the access agnostic common core network principle. In order to maintain session continuity during handover, NACF initiates the switching of the signalling connection between AN and NACF and triggers SMF to re-establish the PDU session tunnels. The UPF instances may be relocated depending on the specific handover situation. For UPF instance relocation, the serving SMF instance selects target UPF instance(s) to provide the optimal path. The function implements by the cooperation of NACF, SMF/UPF, PCF and ASF/USM.

If the UE is registered via a different access network, such as from mobile access to fixed access, the NACF is notified that the registration of the UE is completed. The UE sends the PDU session handover information to modify the PDU session via the NACF when the UE has secured the signalling connection with the NACF. NACF forwards the message to SMF. SMF controls UPF and, via NACF, AN to establish PDU session tunnels and UE-AN data transport tunnel.

After the PDU session has been handed over, SMF initiates the release of the UE-AN via the NACF. The SMF executes the release in order to release the resources over the source radio access technology (RAT) access. As the PDU session shall not be released, the SMF shall not send the PDU session release command to the UE.

8 Information flows of mobility management for FMC in IMT-2020 networks

This clause describes detailed information flows of location management function, handover control function and coordination management function.

8.1 Information flows of location management function

The procedures of location management function include UE reachability notification request procedure, UE activity notification procedure and location reporting procedure. Detailed information flows of these procedures are described in clauses 8.1.1 to 8.1.3.

8.1.1 UE reachability notification request procedure

The UE reachability notification request procedure is illustrated in Figure 8-1.

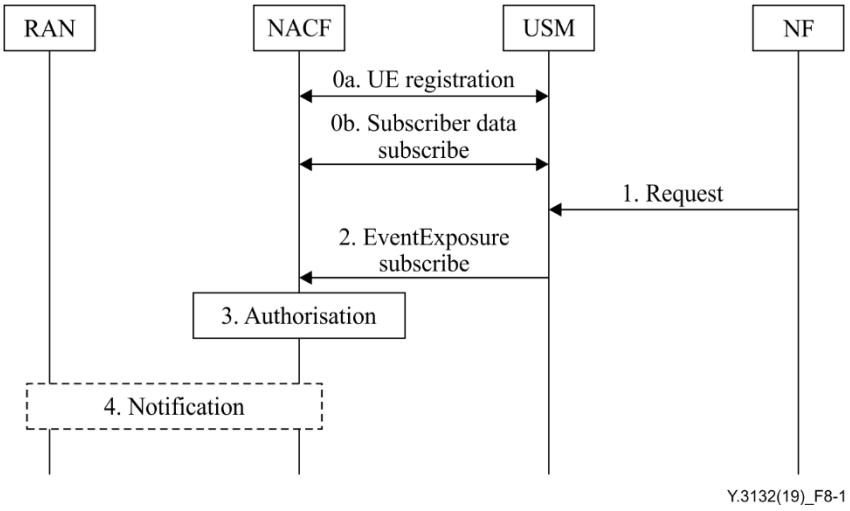

Figure 8-1 – UE reachability notification request procedure

During the registration or subscription update procedure, NF (e.g., SMF) requests the USM to provide an indication regarding UE reachability, the USM informs the NACF of the identities of the NFs that are authorized to request notifications on this UE's reachability via USM's registration or subscriber data update service operation. The NACF checks that the requesting entity is authorized to perform this request on this subscriber. If the entity is not authorized, the request may be rejected (e.g., if the requesting entity is recognized as being a valid entity, but not authorized for that subscriber) or silently discarded (e.g., if the requesting entity is not recognized). If the NACF has an MM context for that user, the NACF report to the USM or directly to the NF with a UE activity notification. If the UE state in NACF is in CONNECTED state, the NACF initiates notification to request the RAN to report the location of UE.

8.1.2 UE activity notification procedure

The UE activity notification procedure is illustrated in Figure 8-2. UE-CN signalling implies UE reachability. When the NACF receives a UE Notification or a Path Switch Request from RAN via AN-CN signalling, the NACF initiates the event exposure notify Service Operation message to the USM or directly to the NF and clears the corresponding UE reachability request parameter of the NACF for the UE.

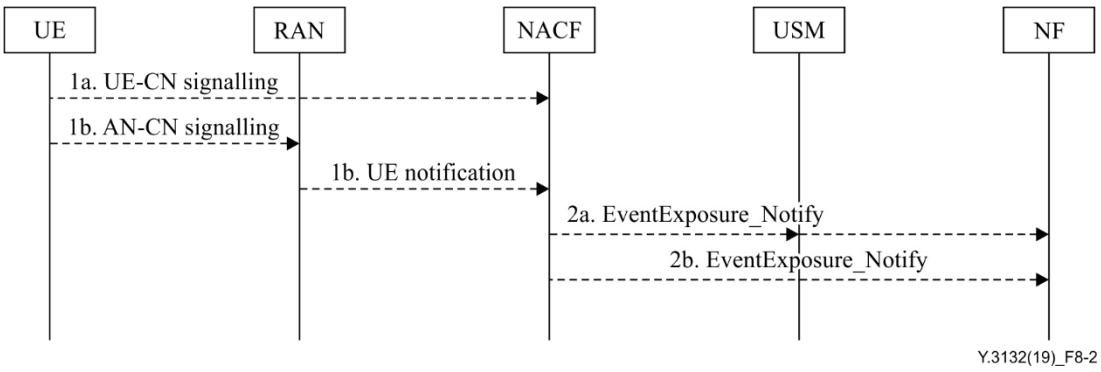

Figure 8-2 – UE activity notification procedure

1a. For a UE in idle state, the NACF receives UE-CN signalling implying UE reachability, e.g., a Registration Request or Service Request message from the UE, or

1b. For a UE in connected state, the NACF receives a UE Notification or a Path Switch Request from the RAN.

2a. If the NACF has an MM context for the UE and the UE Reachability Request Parameter for NACF (URRP-NACF) is set to report once the UE is reachable, the NACF initiates the event exposure notify Service Operation message to the USM or directly to the NF. The NACF clear the corresponding URRP-NACF for the UE.

2b. When the USM receives the NACF event exposure notify Service Operation message or USM UE Context Management registration service for a UE that has URRP-NACF set, it triggers the appropriate notifications to the NFs that have subscribed to the USM for this notification. USM clears the URRP-NACF for the UE.

8.1.3 Location reporting procedure

This procedure requests the RAN to report the location of UE via NACF. The RAN stops reporting when the UE transitions to idle state or the NACF sends cancel indication. This procedure may be used for services that require accurate cell identification (e.g., emergency services, lawful intercept, charging), or for subscription to the service by other NFs. The location reporting procedure is illustrated in Figure 8-3.

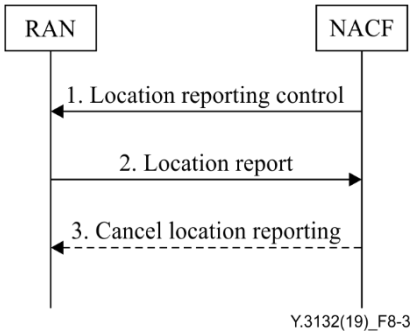

Figure 8-3 – Location reporting procedure

1. The NACF sends a Location Reporting Control message to the RAN. The Location Reporting Control message shall identify the UE for which reports are requested, the requested location information and reporting type. Reporting type indicates whether the message is intended to trigger a single standalone report about the current cell identity serving the UE or start the RAN to report whenever the UE changes cell, or ask the RAN to report whenever the UE moves out or into the area of interest. If the reporting type indicates to start the RAN to report

when the UE moves out of or into the area of interest, the NACF also provides the requested area of interest information in the Location Reporting Control message.

2. The RAN sends a Location Report message informing the NACF about the location of the UE which shall include the requested location information. When the UE is connected, if RAN has received a Location Reporting Control message from NACF with the reporting type indicating single stand-alone report, the RAN shall perform RAN paging before reporting the location to NACF. If RAN has received a Location Reporting Control message from NACF with the reporting type indicating continuously reporting whenever the UE changes cell, the RAN shall send a Location Report message to the NACF including the UE's last known location with time stamp. If the reporting type indicates to start the RAN to report when the UE moves out of or into an area of interest, the RAN shall send the Location Report message to NACF with the location of the UE when the RAN perceives that the UE has moved out of or into the area of interest.

3. The NACF sends a Cancel Location Reporting message to inform the RAN that it should terminate location reporting for a given UE. This message is needed only when the reporting was requested for a reporting period.

8.2 Information flows of handover control function

8.2.1 RAN-RAN reference point based inter RAN handover

This procedure is used to handover a UE from a source RAN to the target RAN using RAN-RAN reference point when the NACF is unchanged and the SMF decides to keep the existing UPF.

The information flow is shown in Figure 8-4.

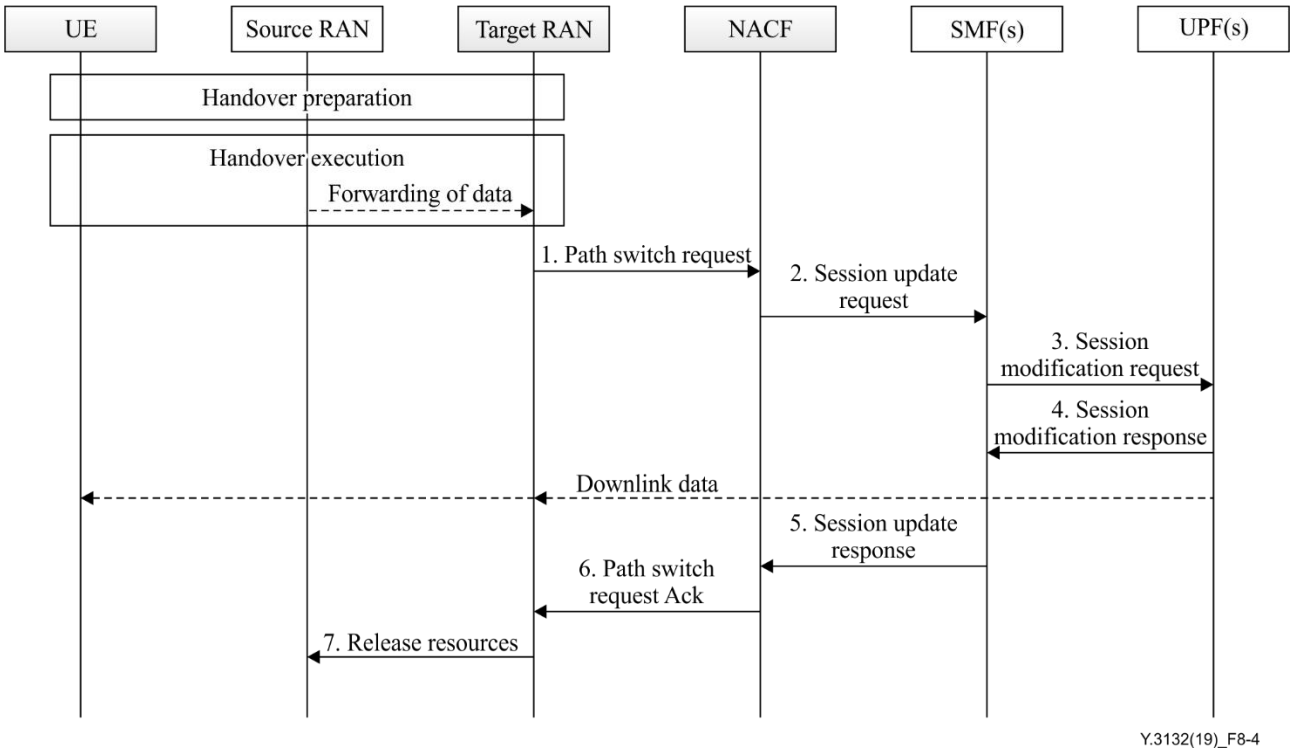

Figure 8-4 – RAN-RAN reference point based inter RAN handover

1. The target RAN sends a Path Switch Request message to an NACF to inform that the UE has moved to a new target cell and provides a list of PDU sessions to be switched. If none of the QoS flows of a PDU session is accepted by the target RAN, the target RAN shall include the

PDU session in the list of rejected PDU sessions. Depending on the type of target cell, the target RAN includes the appropriate information in this message.

For the PDU sessions to be switched to the target RAN, the Path Switch Request message shall include the list of accepted QoS flows.

2. The NACF sends a Session Update Request message to each SMF associated with the lists of PDU sessions received in the Path Switch Request message. The UE location information parameter sent by the NACF is set to the target RAN identifier.

   For the PDU sessions to be switched to the target RAN, upon receipt of the Session Update Request message, each of these SMFs determines whether the existing UPF can continue to serve the UE.

   If a PDU session is included in the list of rejected PDU session(s) by the target RAN, the SMF deactivates the UP connections of those PDU session(s).

   If only partial QoS flows of the PDU session(s) are accepted by the target RAN, the SMF may initiate the PDU session modification procedure to remove the non-accepted QoS flows from the PDU session(s) after the handover procedure.

3. For PDU sessions that are modified by the target RAN, the SMF sends a Session Modification Request message to the UPF. For PDU session(s) corresponding to local area data network(s) when the UE is outside the area of availability of the local area data network, the SMF updates the session of the UPF(s) corresponding to the PDU session to deactivate the corresponding UP connection.

4. For the PDU sessions that are switched, the UPF returns a Session Modification Response message to the SMF after requested PDU sessions are switched. Tunnel identifiers for uplink (UL) traffic are included only for PDU sessions whose user plane resources are not being released and only if the UPF allocates CN Tunnel Info. For the PDU sessions that are deactivated, the UPF returns a Session Modification Response message to the SMF after the RAN tunnel information is released.

5. The SMF sends a Session Update Response message (CN Tunnel Info) to the NACF for PDU sessions which have been switched successfully. The SMF sends a Session Update Response message without including the CN Tunnel Info to the NACF for the PDU sessions for which UP resources are deactivated or released, and then the SMF releases the PDU session(s) which is to be released using a separate procedure.

6. Once the Session Update Response message is received from all the SMFs, the NACF aggregates received CN Tunnel Info and sends this aggregated information as a part of Path Switch Request Ack to the Target RAN. If none of the requested PDU sessions have been switched successfully, the NACF shall send a Path Switch Request Failure message to the target RAN.

7. By sending a Release Resources message to the source RAN, the target RAN confirms success of the handover. It then triggers the release of resources to the source RAN.

8.2.2 Inter RAN node RAN-NACF reference point based handover

The handover control function may handover a UE from a source RAN node to a target RAN node using the reference point between RAN and the NACF. The source RAN decides to initiate a RAN-NACF reference point based handover to the target RAN. The SMFs use the indication from the source RAN to determine whether to apply indirect forwarding or direct forwarding. The inter RAN node RAN-NACF reference point based handover procedure is illustrated in Figure 8-5. Registration of a serving NACF with the USM is not shown in the figure for brevity.

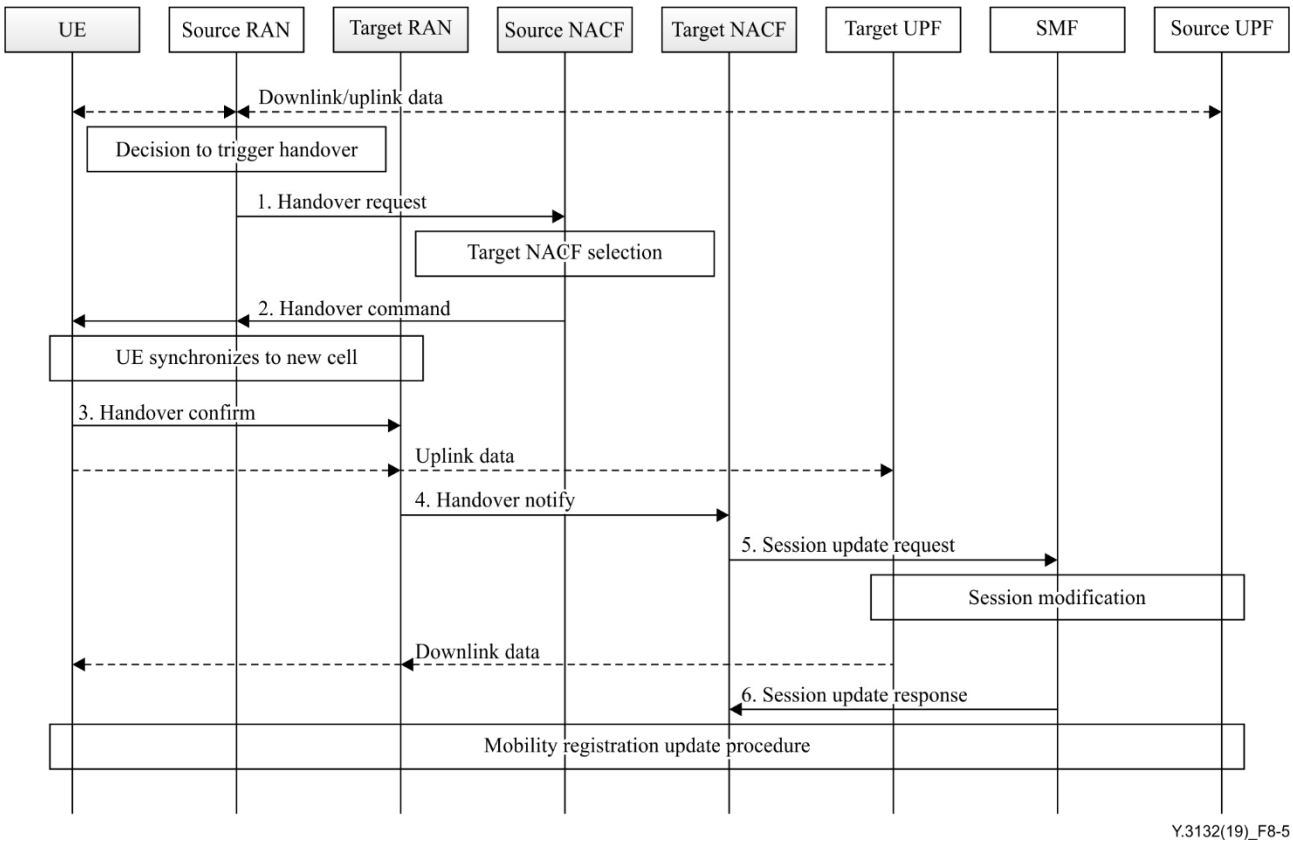

Figure 8-5 – Inter RAN node RAN-NACF reference point based handover

1. The source RAN sends a Handover Request message to the source NACF and provides RAN information created by the source RAN. All the PDU sessions handled by the source RAN shall be included in the Handover Required message, indicating which of those PDU session(s) are requested by source RAN to handover. When the source NACF can no longer serve the UE, the source NACF selects the target NACF.
2. Source NACF sends handover command to source RAN including target RAN info list. Target RAN info is provided to the UE by the source RAN using Handover Command.
3. After the UE is successfully synchronized to the target cell, it sends a Handover Confirm message to the target RAN. Handover is by this message considered as successful by the UE.
4. Target RAN sends Handover Notify message to target NACF. Handover is by this message considered as successful in target RAN.
5. Target NACF sends a Session Update Request to SMF indicating handover complete for PDU session. Handover Complete is sent for each PDU session to the corresponding SMF to indicate the success of the handover. Target NACF also registers itself as the serving NACF with the USM by using UE registration.
6. SMF sends Session Update Response with PDU session ID to target NACF to confirm reception of Handover Complete. The UE initiates Mobility Registration Update procedure. The target NACF knows that it is a Handover procedure and therefore the target NACF performs only a subset of the Registration procedure.

8.3 Information flows of coordination management

For different access network types, mobility management for FMC in IMT-2020 network is required to support coordination management function. The IMT-2020 network architecture is required to provide a core network which can be commonly used by different access networks. This requires

AN-CN functional separation and a common signalling interface [ITU-T Y.3102]. For ANs which do not normally support a common signalling interface [ITU-T Y.3102], an interworking function (IWF) needs to be provided at the AN-CN interface so that NFs deployed in the CN can still use a common signalling interface. The coordination management procedure is illustrated in Figure 8-6.

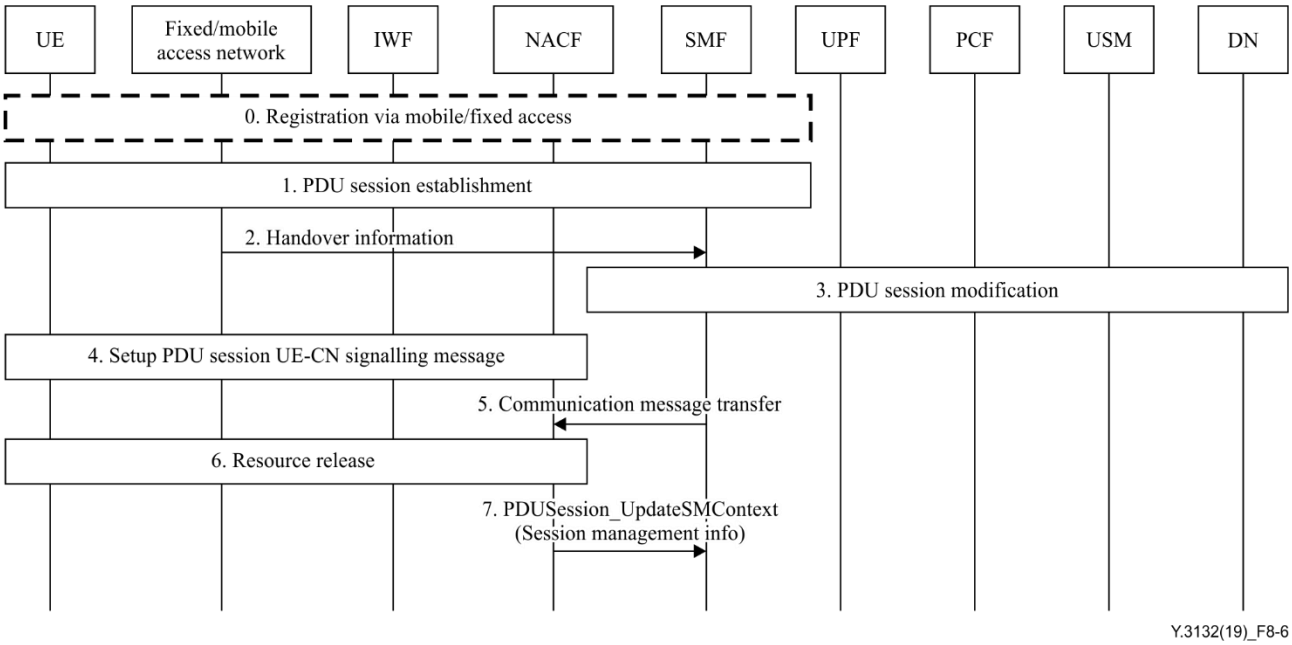

Figure 8-6 – Coordination management procedure

0. When the UE moves between a mobile access network and a fixed access network and changes its access point, if the UE moves from the mobile access network to the fixed access network, the UE register via the fixed access network, and if the UE moves from the fixed access network to the mobile access network, the UE registered via the mobile access network. Registration of the serving NACF with the ASF is not shown in the figure for brevity.
1. The UE sends the PDU Session Establishment Request to the SMF via NACF. The SMF retrieves PDU session information from USM, sends the response to the NACF, and performs authentication and authorization with the DN. The SMF performs PCF selection and establish a PDU session with the PCF.
2. The AN sends the PDU Session Handover Information message to SMF via NACF to modify the PDU session.
3. SMF requests the UPF to modify the PDU session. According to the response message received from the UPF, SMF sends a PDU Session Modification Request message to AN via NACF.
4. The NACF sends the PDU session Modification Request message to the AN. The AN forwards the UE-CN message received from the SMF to the UE. The AN sends the PDU Session Modification Response message to the NACF.
5. The PDU Session Release is initiated by the SMF via source radio access technology (RAT) access network, the SMF sends the Communication Message Transfer (SM Resource Release request, skip indicator).

   If the UP connection of the PDU session is active, the SMF shall also include the UE-AN Resource Release request (PDU Session ID) in the Communication Message Transfer, to release the AN resource associated with the PDU session.

The "skip indicator" in the Communication Message Transfer tells the NACF whether it may skip sending the SM Resource Release request to the UE (e.g., when the UE is in IDLE mode).

6. NACF sends the Resource Release Request message. If the UE is in IDLE state and "UE-CN SM delivery can be skipped" is not indicated, the NACF initiates the network triggered Service Request to transmit the UE-CN message (PDU Session ID, SM Resource Release request) to the UE. If the UE is in CONNECTED state, then the NACF transfers the SM Resource Release request received from the SMF to the AN via IWF. Because the PDU Session shall not be released, the SMF shall not send the PDU Session Release Command to the UE, this message does not include the UE-CN SM information but only the UE-AN Resource Release Request. The AN acknowledges the UE-AN SM Resource Release Request by sending a UE-AN SM Resource Release Ack (User Location Information) message to the NACF, when the AN has received a UE-AN SM Resource Release request to release the AN resource associated with the PDU session. The SMF executes the release in order to release the resources over the source RAT access.
7. The NACF sends the PDUSession_UpdateSMContext (UE-AN SM Resource Release Ack, user location information) to the SMF. Since the PDU session is not to be released, the SMF shall not respond to this step and the SM context between the NACF and the SMF is maintained.

9 Security considerations

The FMC in IMT-2020 network is required to be aligned with the security requirements contained in [ITU-T Q.1762] and the requirements of security and personal data protection contained in [ITU-T Y.3101], with the following additional ones:

- The FMC in IMT-2020 network is required to provide mechanisms to support data confidentiality and integrity for fixed and mobile access networks.
- The FMC in IMT-2020 network is required to provide secure storage, handling and enforcement of policies.
- The FMC in IMT-2020 network is required to provide a security coordination function [ITU-T Y.3130] for coordinating the security policies of each and every involved access network.

Bibliography

[b-ITU-T Q.1706] Recommendation ITU-T Q.1706/Y.2801 (2006), *Mobility management requirements for NGN*.

[b-ITU-T Y.3100] Recommendation ITU-T Y.3100 (2017), *Terms and definitions for IMT-2020 network*.

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