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SERIES Q: SWITCHING AND SIGNALLING

Signalling requirements and protocols for the NGN –
Signalling and control requirements and protocols to
support attachment in NGN environments

Signalling requirements and architecture of NACF for IP mobility

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Recommendation ITU-T Q.3203

Signalling requirements and architecture of NACF for IP mobility

Summary

Addition of IP mobility in access networks impacts the functionality of network attachment control functions (NACF), and it raises additional signalling requirements of NACF with respect to the mechanism of IP address management and the signalling flows for mobility interface. Generic signalling requirements and architecture are proposed in NACF functionality with considerations of interfacing mobility management functions described in [ITU-T Y.2018].

Keywords

NGN, NACF, Signalling, IP mobility

1 Scope

This Recommendation describes signalling architecture and relevant interfaces of network attachment control functions (NACF) to support IP mobility in access networks considering interaction with signalling and functionality of mobility management and control functions (MMCF). Additional signalling requirements of NACF are identified to support IP mobility in next generation access (NGA) networks, with respect to the mechanism of IP address management and the signalling flows for mobility interface. This Recommendation addresses the signalling requirements and architecture of NACF for mobility service based on [ITU-T Y.2014]. Mobility signalling of other functions (such as MMCF and resource and admission control functions (RACF)) is out of scope of this Recommendation.

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.1707] Recommendation ITU-T Q.1707/ Y.2804 (2008), *Generic Framework of Mobility Management for Next Generation Networks*.
- [ITU-T Y.2014] Recommendation ITU-T Y.2014 (2010), *Network attachment control functions in Next-Generation Networks*.
- [ITU-T Y.2018] Recommendation ITU-T Y.2018 (2009), *Mobility management and control framework and architecture within the NGN transport stratum*.
- [ITU-T Y.2701] Recommendation ITU-T Y.2701 (2007), *Security requirements for NGN release 1*.
- [IETF RFC 4862] IETF RFC 4862 (2007), *IPv6 Stateless Address Autoconfiguration*.

3 Definition

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 Handover: [b-ITU-T Q.1706].

3.1.2 Host-based mobility: [ITU-T Y.2018].

3.1.3 Network-based mobility: [ITU-T Y.2018].

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 Mobility signalling: signalling flows for delivering information related to location registration and handover management to support mobility service.

4 Abbreviations and Acronyms

This Recommendation uses the following abbreviations and acronyms:

AAA	Authentication, Authorization, and Accounting
AM-FE	Access Management Functional Entity
AR-FE	Access Relay Functional Entity
CoA	Care of Address
CPE	Customer Premises Equipment
DHCP	Dynamic Host Configuration Protocol
HA	Home Agent
HCF	Handover Control Function
HDC-FE	Handover Decision and Control Functional Entity
HDF	Handover Decision Function
HoA	Home Address
IETF	Internet Engineering Task Force
IP	Internet Protocol
LMA	Local Mobility Anchor
MAG	Mobile Access Gateway
MIPv4	Mobile IP for IPv4. See [b-IETF RFC 3344]
MIPv6	Mobile IP for IPv6. See [b-IETF RFC 3775]
MLM-FE	Mobile Location Management Functional Entity
MLM-FE(C)	An instance of the MLM-FE performing the central mobile location management role
MLM-FE(P)	An Instance of the MLM-FE performing the proxy mobile location management role
MMCF	Mobility Management and Control Function
MN	Mobile Node
NACF	Network Attachment Control Functions

NAC-FE	Network Access Configuration Functional Entity
NGN	Next Generation Network
NID-FE	Network Information Distribution Functional Entity
PIA	Persistent IP Address (PIA)
PMIP	Proxy Mobile IP
PMIPv6	Proxy MIPv6. See [b-IETF RFC 5213]
RA	Router Advertisement
RACF	Resource and Admission Control Functions
TAA-FE	Authentication and Authorization Functional Entity
TIA	Temporary IP Address
TLM-FE	Location Management Functional Entity
TUP-FE	User Profile Functional Entity
UE	User Equipment

5 Conventions

This Recommendation does not make use of specific conventions.

6 Overview of protocol supporting IP mobility on NGN access network

This Recommendation describes signalling requirements and architecture of network attachment control function (NACF) for both host and network based mobility management that relies on signalling and functionality of mobility management and control function (MMCF) added to support mobility management in the NGN transport stratum. NACF gives information about mobility management to MMCF which is responsible for mobile location management and handover control.

In the IETF based network architecture, two entities are generally considered to support IP mobility: home agent (HA) and access gateway. The home agent manages IP addresses in addition to mobile users' profile, and it delivers packets to mobile nodes (MN). In case of the network based mobility management, the access gateway detects a user's movement to a new network and registers the user's care of address (CoA) to HA. This approach does not require any additional protocol to MN for supporting IP mobility. However, a user has to configure its new CoA, in case of the host based mobility management. Whenever a user moves to a new network, the user configures its CoA and then registers it to the home agent. Appendix I describes the network architecture based on IETF mobile protocols.

The next generation network (NGN) mobility architecture including components of NACF and MMCF possibly applies to general mobility architecture. In NGN architecture model, NACF is responsible for allocating IP address and performing authentication. NACF allocates two kinds of IP addresses, persistent IP address (PIA) and temporary IP address (TIA), and updates UE's temporary IP address to MMCF for mobility service. NACF can optionally perform authentication process during UE's movement.

6.1 Network architecture

MMCF defined in [ITU-T Y.2018] is required for mobility service in the NGN transport stratum [ITU-T Q.1707]. Also, mobility-specific transport functions are needed in the forwarding plane of