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Technical Report

Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Impact of mobility for access-technology independent networks in the TISPAN NGN architecture

Reference

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Foreword

This Technical Report (TR) has been produced by ETSI Technical Committee Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN).

1 Scope

The present document identifies TISPAN NGN mobility scenarios and the impact of mobility between access-technology independent networks.

The main impact of these scenarios is expected to be on the NASS and RACS architectures, but does not preclude other impacts within the TISPAN NGN architecture. The present document may also recommend a way forward to support these scenarios; however, it may also conclude that no further work in TISPAN is required.

The present document is expected to be access-technology independent and as such will require coordination of the TISPAN work with external SDOs and Fora such as 3GPP, ITU-T, ECMA, and the WiMAX Forum.

2 References

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2.1 Normative references

The following referenced documents are indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

Not applicable.

2.2 Informative references

[i.1] ETSI ES 282 001: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Functional Architecture".

[i.2] ITU-T Recommendation Q.1706/Y.2801: "Mobility management requirements for NGN".

[i.3] ETSI ES 282 004: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Functional Architecture; Network Attachment Sub-System (NASS)".

[i.4] ETSI ES 282 003: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Resource and Admission Control Sub-System (RACS): Functional Architecture".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

access network: collection of network entities and interfaces that provide the underlying IP transport connectivity between end user devices and NGN entities

NOTE: See ES 282 001 [i.1].

core network: portion of the delivery system composed of networks, systems equipment and infrastructures, connecting the service providers to the access network

NOTE: See ES 282 001 [i.1].

handover: ability to provide service with some impact on their service level agreements to a moving object during and after movement

NOTE: This may include a session break and resume, or a certain degree of service interruption or loss of data while changing to the new access point. See ITU-T Recommendation Q.1706/Y.2801 [i.2].

MIP-based mobility: approach for service continuity in NGN which is implemented in network layer using MIP

nomadism: ability of the user to change his network access point on moving; when changing the network access point, the user's service session is completely stopped and then started again, i.e. there is no session continuity or handover possible

NOTE: It is assumed that normal usage pattern is that users shutdown their service session before moving to another access point. See ITU-T Recommendation Q.1706/Y.2801 [i.2].

service continuity: ability for a moving object to maintain ongoing service over including current states, such as user's network environment and session for a service

NOTE: This category includes Seamless Handover and Handover. See ITU-T Recommendation Q.1706/Y.2801 [i.2].

seamless handover: special case of mobility with service continuity since it preserves the ability to provide services without any impact on their service level agreement to a moving object during and after movement

NOTE: See ITU-T Recommendation Q.1706/Y.2801 [i.2].

SIP-based mobility: approach for service continuity in NGN which is implemented in the application layer using SIP signalling

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

AN Access Network
CN Core Network
CNG Customer Network Gateway
CPN Customer Premises Network

NASS Network Attachment Sub-System

NOTE: See ES 282 004 [i.3].

AMF Access Management Function

NOTE: See ES 282 004 [i.3].

UE User Equipment

NOTE: See ES 282 004 [i.3].

RACS Resource and Admission Control sub-System

NOTE: See ES 282 003 [i.4].

4 Overview of Mobility in NGN

Mobility is an essential requirement for NGN users to communicate at anytime and from anywhere. This could be facilitated through the use of various wire and wireless access technologies over heterogeneous network.

The solution of the mobility in NGN should take into account the long-term trend for future network, the need for a smooth evolution of the infrastructure, and the impact on existing network.

In current NGN, the mobility for nomadism has already been supported, while the mobility for service continuity (i.e. handover and seamless handover) is not yet supported.

4.1 SIP-based mobility and MIP-based mobility

There are two approaches for service continuity in NGN:

1) Implemented in network layer using MIP, which is called MIP-based mobility.

2) Implemented in the application layer using SIP signalling, which is called SIP-based mobility.

For SIP-based mobility, the solution requires network to support handover using SIP. It may support a make-before-break handover scheme. It is IP version and Access technologies agnostic and the service characteristics may be changed during the mobility procedure (e.g. add or remove media).

For MIP-based mobility, the solution bases on the well established MIP protocol family. The mobility is transparent to the applications and access technologies. It may support the different IP version. Consequently, some kind of network assistance during handover is needed to provide MIP-based seamless mobility. MIP-based mobility is also chosen for inter-access mobility management in heterogeneous networks involving both 3GPP and WiMAX.

5 Mobility Scenarios in NGN

Various types of mobility scenarios exist in NGN environments. The present document considers the classifications illustrated in figure 5.1. In figure 5.1, the mobility scenarios in NGN are classified into four categories: intra-AN mobility scenarios, inter-AN mobility scenarios between same type of access networks, inter-AN mobility scenarios between different types of access networks, and inter-CN mobility scenarios.

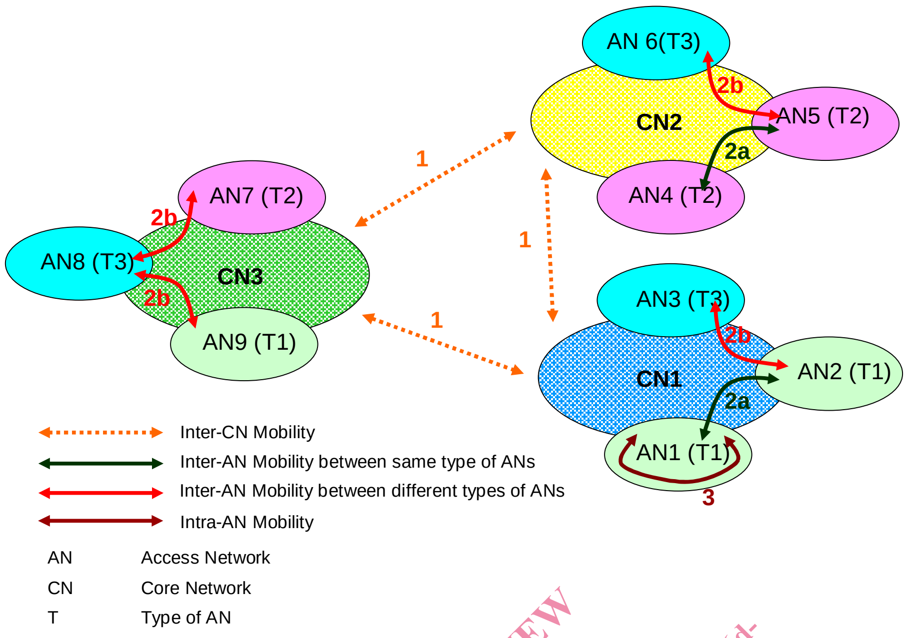

Figure 5.1: Classification of Mobility Scenarios

5.1 Intra-AN Mobility Scenarios

Intra-AN mobility scenarios address mobility within an AN. In figure 5.1, for example, mobility within AN1 of CN1 can be classified as Intra-AN mobility scenarios, marked as "3" in the figure.

Scenario A: Mobility between WiMax Access Networks owned by the same NGN Operator

User Bob is at the office (i.e. corporate network) and originates a voice call with User Alice via terminal supporting the WiMAX mode. When the call/session is established between Bob and Alice, Bob keeps the voice session ongoing and sets off from the office to the home. There are several WiMAX access nodes between Bob's office and Bob's home. In this way, Bob's WiMAX terminal needs to be moved from one access node (e.g. WiMAX BS) to another between the office and the home that are owned by the same NGN Operator. In this scenario, only one service control subsystem (e.g. IMS), one RACS and one NASS are considered in the access network.

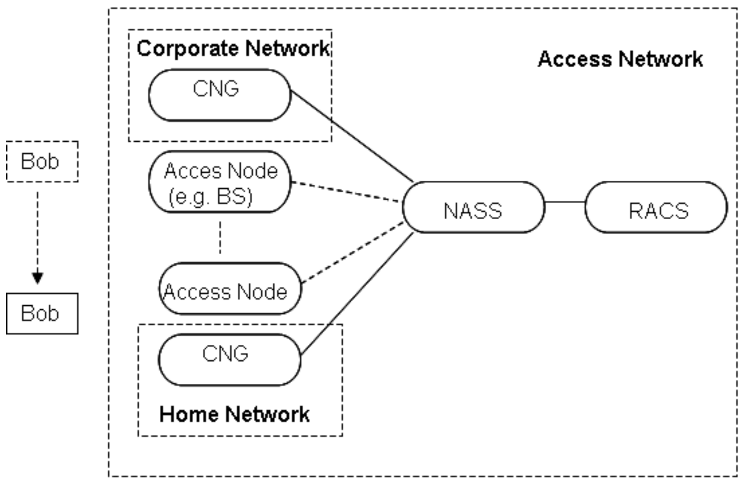

Figure 5.2: Mobility between WiMax Access Network owned by the same NGN Operator

Scenario B: Mobility between WiFi Hotspots owned by the same NGN Operator

User Bob has a WiFi enabled terminal and originates a voice call with User Alice at anywhere. During the call, User Bob roams between WiFi Hotspots that are owned by the same NGN Operator whilst keeping the call/session established.

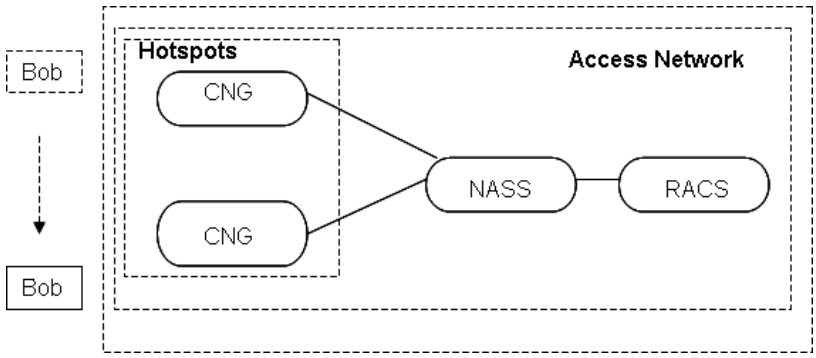

Figure 5.3: Roaming between WiFi Hotspots owned by the same NGN Operator

For this specific scenario, the CNG operates in bridge mode and directly attaches to the NASS.

Scenario C: Roaming between WiFi Hotspots owned by different NGN Operator's

This scenario is not described in the present document.

Scenario D: Mobility between a WiFi Hotspot and WiMAX owned by the same NGN Operator

User Bob has a dual mode phone which supports WiFi/WiMAX. Because WiMAX mode has poor indoor coverage and potentially has a higher cost than using WiFi mode, Bob chooses the WiFi mode, whilst at home, to originate a voice call with User Alice (Alice could be anywhere). When the call/session is established between Bob and Alice, Bob leaves his home and in doing so roams from the WiFi access to the WiMax access that is owned by the same NGN Operator. The call/session remains established during the handover.

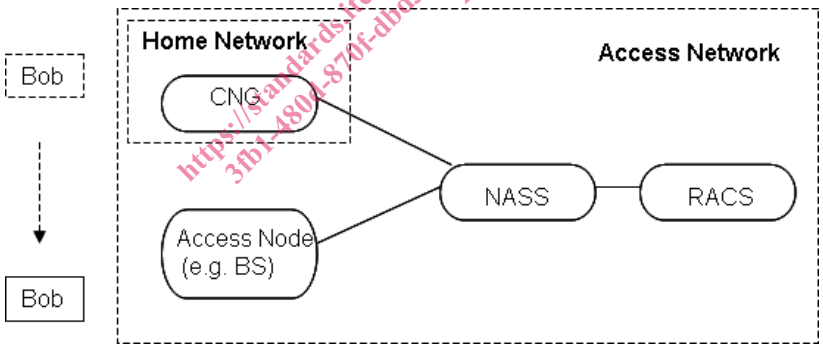

Figure 5.4: Mobility between WiFi Hotspot and WiMAX Access owned by the same NGN Operator

5.2 Inter-AN Mobility Scenarios

Inter-AN mobility scenarios address mobility between different ANs within the CN.

Inter-AN mobility scenarios can be further classified into the following two sub-types:

1) mobility scenarios between the same type of ANs (e.g. mobility between AN1 and AN2 within the CN1, marked as "2a" in figure 5.1); and

2) mobility scenarios between different types of ANs (e.g. mobility between AN2 and AN3 within CN1, marked as "2b" in figure 5.1).