Provisioning of Multimedia Applications across Heterogeneous All-IP Networks

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INTRODUCTION

With the opening of the telecommunication market and the emergence of low-cost and heterogeneous wireless access technologies, it is envisaged that next-generation network and service providers will not only vary in the deployed access technology but also in their business models and structures. Such providers will differ from large providers such as the current telecom providers offering multiple services and covering large geographical areas, down to small providers offering certain services such as conferencing or messaging only or covering small geographical areas such as a coffee shop or a shopping mall. Further, while in the current networking environment, a home provider of a user is usually represented by a large telecom provider; in such a heterogeneous environment, any trustworthy entity such as an application provider, a banking entity, or a credit card provider that is capable of authenticating the user and marinating his usage profile can act as a home provider. Towards this vision this article discusses the issues that concern the establishment of multimedia applications across heterogeneous networks.

NEXT-GENERATION NETWORKS AND THE ALL-IP CONVERGENCE

Convergence of heterogeneous wireless technologies over a broadband IP core network will allow mobile subscribers to access a new variety of services, over a variety of access networks and by using a variety of devices. This integration will be realized on the network access with devices able to hand off across heterogeneous wireless access technologies, service delivery, and availability (Dagiuklas & Velentzas, 2003). There is no industry consensus on what next-generation networks will look like but, as far as the next-generation networks are concerned, ideas and concepts include:

- transition to an "All-IP" network infrastructure;
- support of heterogeneous access technologies (e.g., UTRAN, WLANs, WiMAX, xDSL, etc.);
- VoIP substitution of the pure voice circuit switching;
- seamless handovers across both homogeneous and heterogeneous wireless technologies;
- mobility, nomadicity, and QoS support on or above the IP layer;
- provisioning of triple-play services creating a service bundle of unifying video, voice, and Internet;
- home networks opening new doors to the telecommunication sector and network providers;
- unified control architecture to manage application and services; and
- convergence among network and services.

HETEROGENEOUS MULTIMEDIA NETWORKS AND SERVICES

Vision

In order to allow seamless communication and roaming in a heterogeneous wireless environment, one needs to provide an efficient way for coupling multimedia service provisioning, access with fast-handover schemes, and establishing trust relations among service providers and users. This necessitates the provisioning of a framework for establishing security and trust relations among network operators, service providers, and mobile users, allowing thereby smooth roaming among different administrative domains/networks

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Figure 1. Inter-domain framework

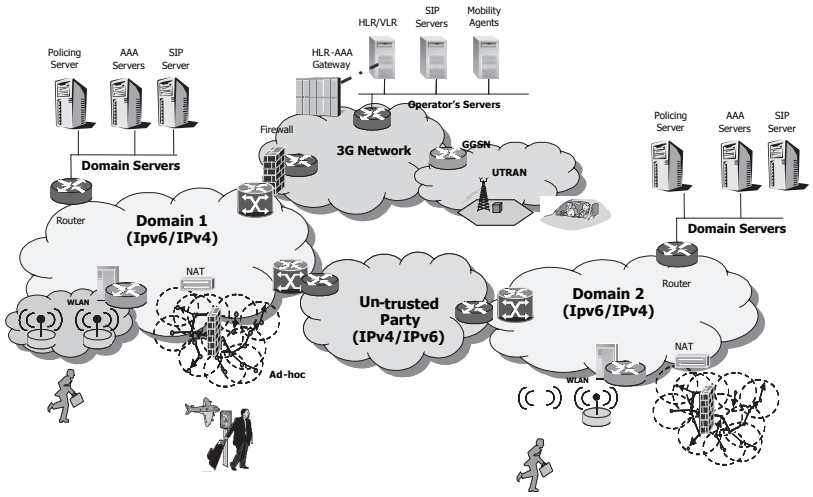
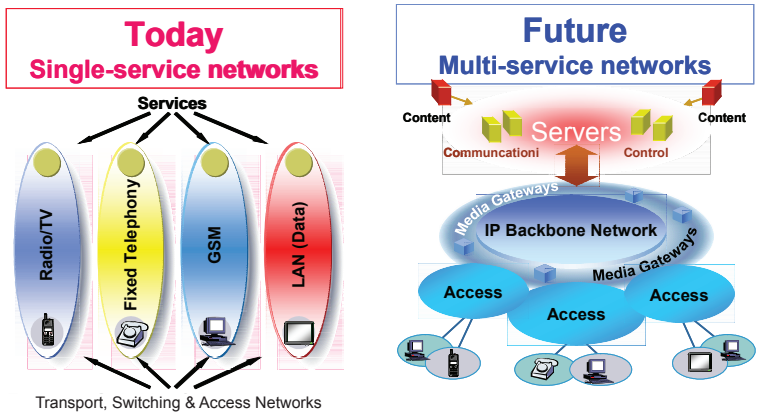


Figure 2. NGN architecture migration (Nokia, 2001)



and seamless provisioning of multimedia services. Such a vision infrastructure is illustrated in Figure 1.

This infrastructure will support the dynamic establishment of trust relations between independent providers (e.g., foreign and home providers) in a distributed manner over hybrid IPv4 and IPv6 networks (Salkintzis, 2004). Moreover, it will provide the required enhancements for providing secure interconnection among different heterogeneous networks, establishing user-provider trust relations, and the necessary means for authenticating users in foreign domains and exchanging their profiles in a secure manner. This would thereby enable users to roam to foreign networks and use the provided services in these networks without affecting their privacy. Finally, to support the smooth and fast handover, efficient and secure context exchange mechanisms will be provided, allowing users to roam among different providers without having to explicitly re-authenticate themselves and establish new trust relations.

It is envisioned that the NGN architecture will be based on packet-based technologies. The most important part of NGN is the division of network functionality into many distributed functions, which fall into the following categories (Dagiuklas et al., 2005):

1. Control, management, and signaling, which provides the intelligence needed for user control of the connection. This intelligence is distributed.
2. Access, routing, switching, and transport, which provides the functions needed for transporting information between end users and other network elements.
3. Convergence with existing legacy networks (PSTN, SS7, mobile networks).

Figure 2 illustrates the transitions from the current scene towards NGN.

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