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Jaringan Mobile
UMA Technology: Architecture, Applications, and Security Means

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UMA: Brief History and Evolution

UMAC (Unlicensed Mobile Access Consortium) was formed by leading companies within the wireless industry to promote UMA technology and to develop its specifications. Ā e UMAC worked with the 3GPP (Ā third Generation Partnership Project), which was established in 1998 through a collaboration agreement between different telecommunication standards bodies, to develop formal standards for UMA. Ā e initial set of UMA specifications was published in September 2004, which details the use of the same device over a licensed radio spectrum connection (GSM) when users are outside the UMA coverage and using an unlicensed radio spectrum (Bluetooth or Wi-Fi) when being inside the UMA coverage. 3GPP defined UMA as a part of 3GPP release 6 (3GPP TS 43.318) under the name of GAN (generic access network). UMA defines a parallel radio access network (RAN) known as the UMAN that interfaces with the mobile cellular core network using existing GSM-defined standard interfaces. Ā is solution uses the IP tunneling technique to transparently extend mobile voice, data, and IP multimedia subsystem (IMS) services to mobile users through enabling service delivery to mobile phones over any WLAN Access Point (including Wi-Fi and Bluetooth). For seamless integration between existing mobile networks and unlicensed spectrum networks, a UMA-enabled handset is defined with dual-mode operation capable of connecting within both networks.

UMA Architecture

UMA technology allows mobile subscribers to seamlessly roam between mobile and home wireless networks or WLAN hot spots. As subscribers move between networks, they continue to receive mobile voice and data services in a consistent manner. In fact, subscribers within buildings (indoors) can obtain good-quality voice due to improved signal strength. Mobile users can take advantage of potentially faster data services through avoiding the bandwidth constraints of the GSM. Figure 1.1 illustrates the general UMA concept. As illustrated in Figure 1.2 [1], connection to the fixed network occurs automatically when a mobile subscriber with a UMA-enabled dual-mode mobile handset moves within range of an unlicensed wireless network to which the handset is allowed to connect. Upon connecting, the handset contacts the UMA network controller (UNC) over the broadband IP access network to be authenticated and authorized to access GSM voice and GPRS data services via the unlicensed wireless network. If approved, the subscriber's current location information stored in the core network is updated, and from this point on, all mobile voice and data traffic is routed to the handset via the UMAN rather than the cellular RAN.

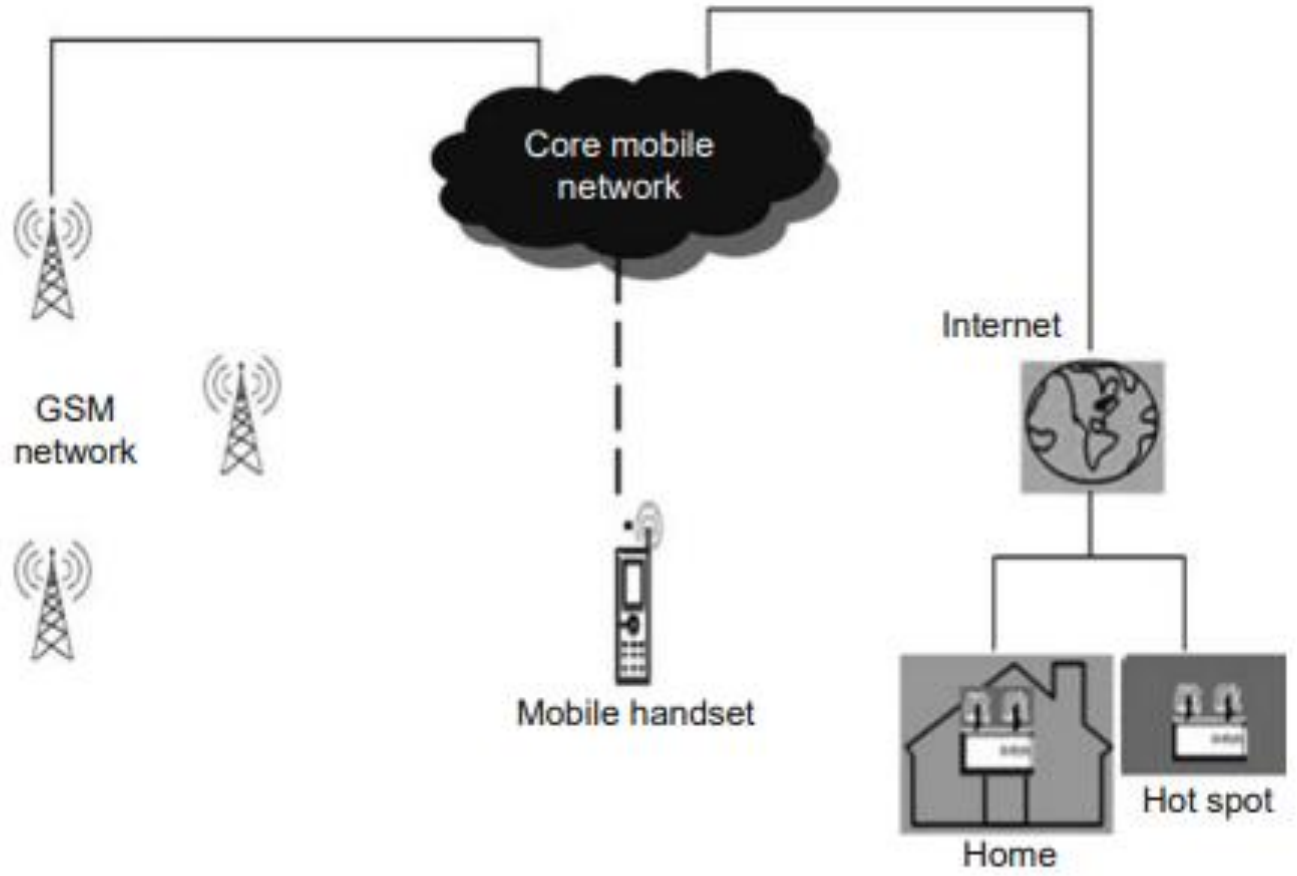

Figure 1.1 The UMA concept.

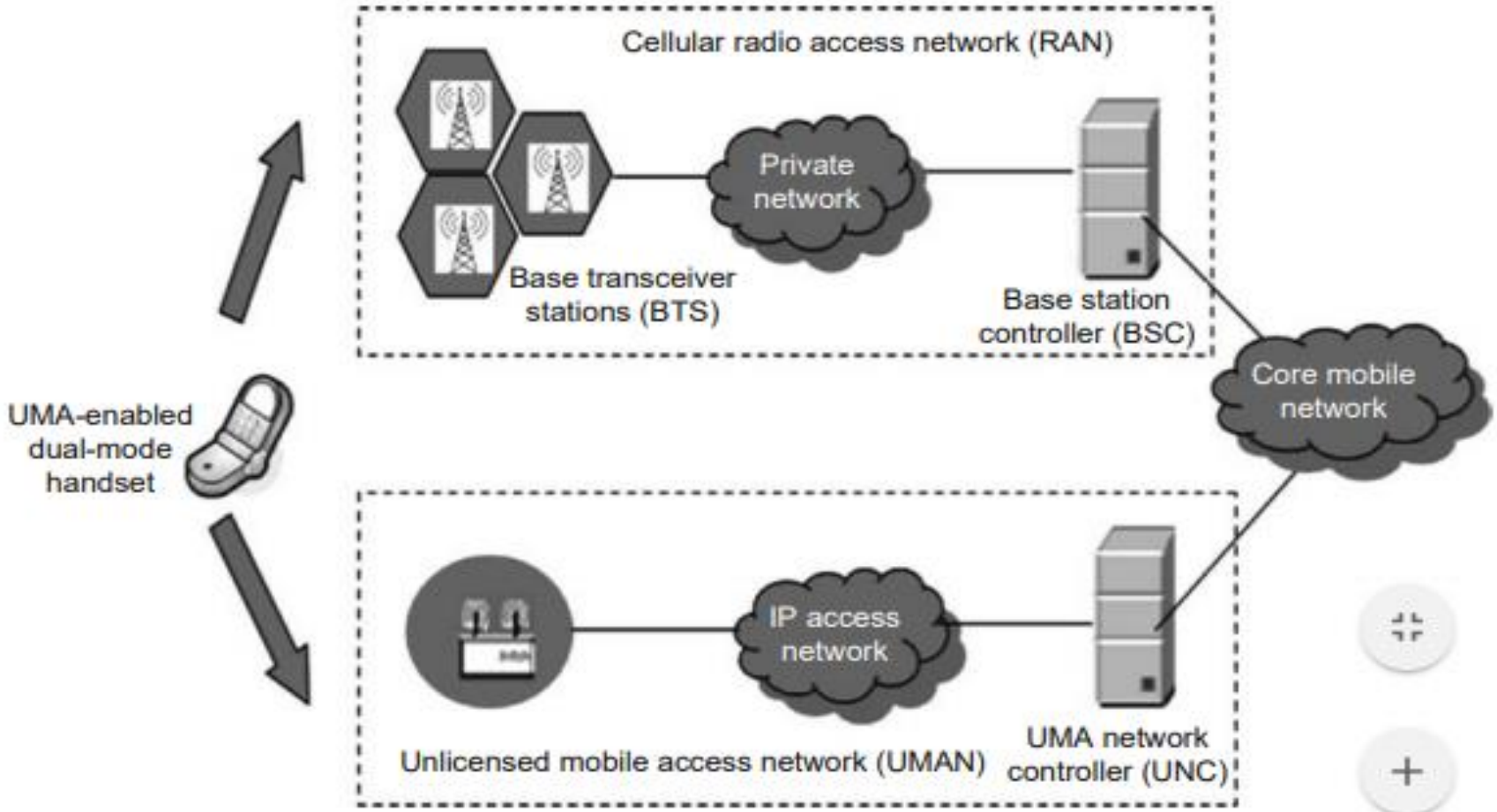

Figure 1.2 UMA architecture.

UMA Services

UMA technology delivers a number of key service advantages. With UMA, mobile operators can allow millions of subscribers to securely access the mobile core service network over an IP access network (including the Internet). Because UMA is an IP layer solution that does not impact the physical radio access layer, different wireless technologies such as Wi-Fi, Bluetooth, or even next generation wireless IP technologies such as worldwide interoperability for microwave access (WiMAX). Consequently, services can be provided at different environments such as home, office, hot spot, coffee shop, campus, and airport. Through UMA, all services available over GSM networks are available over IP access networks in a transparent manner.

Benefits of UMA for Mobile Operators and Service Providers Benefit

A following benefits for mobile operators, service providers, as well as clients could hence be achieved:

- Optimizing the use of GSM radio network resources by using an alternative lower-cost and higher-bandwidth access network.
- Reducing capital and operational expenditure on radio networks by using an alternative lowcost access network.
- Providing advanced and consistent services over both fixed and mobile networks.
- Offering bundled fixed and mobile services, making the mobile handset the customer's only phone, thereby increasing their share of the customer's total expenditure.
- Greatly increasing the use of mobile voice and data services in locations where usage was discouraged due to cost or network coverage.

Cont.

- Delivering enhanced reach as well as improved voice quality.
- Bringing increased usage and allowing new services to be offered, thanks to delivering broadband data rates to the handsets.
- Because operators have a lower cost to deliver the service, they will be able in the near future to achieve higher margins and offer more aggressive pricing to their subscribers.
- Clients (users) have the advantage of using the same terminal everywhere (inside home and outside).
- Clients (users) benefit from economical (special pricing) and technical advantages (radio coverage at their homes and offices).

Security Countermeasures in UMA

Security pitfalls are found to be mostly common among network operators and service providers, which can threaten UMA technology. In this context, the following countermeasures are useful and are simple to be deployed:

- Increasing service providers' comprehensive perimeter of security measures
- Enhancing security patching and update processes
- Changing password policies that are seldom followed or updated
- Preventing control of network management equipment by unauthorized users
- Assuring non visibility of cellular subscribers to other subscribers and the Internet

Cont.

- Maintaining confidentiality and integrity of sensitive information (for instance, information related to subscribers' profiles)
- Protecting identities and information communicated by subscribers
- Preventing attacks that deny the availability of services
- Preventing fraudulent use of services

Protecting UMA

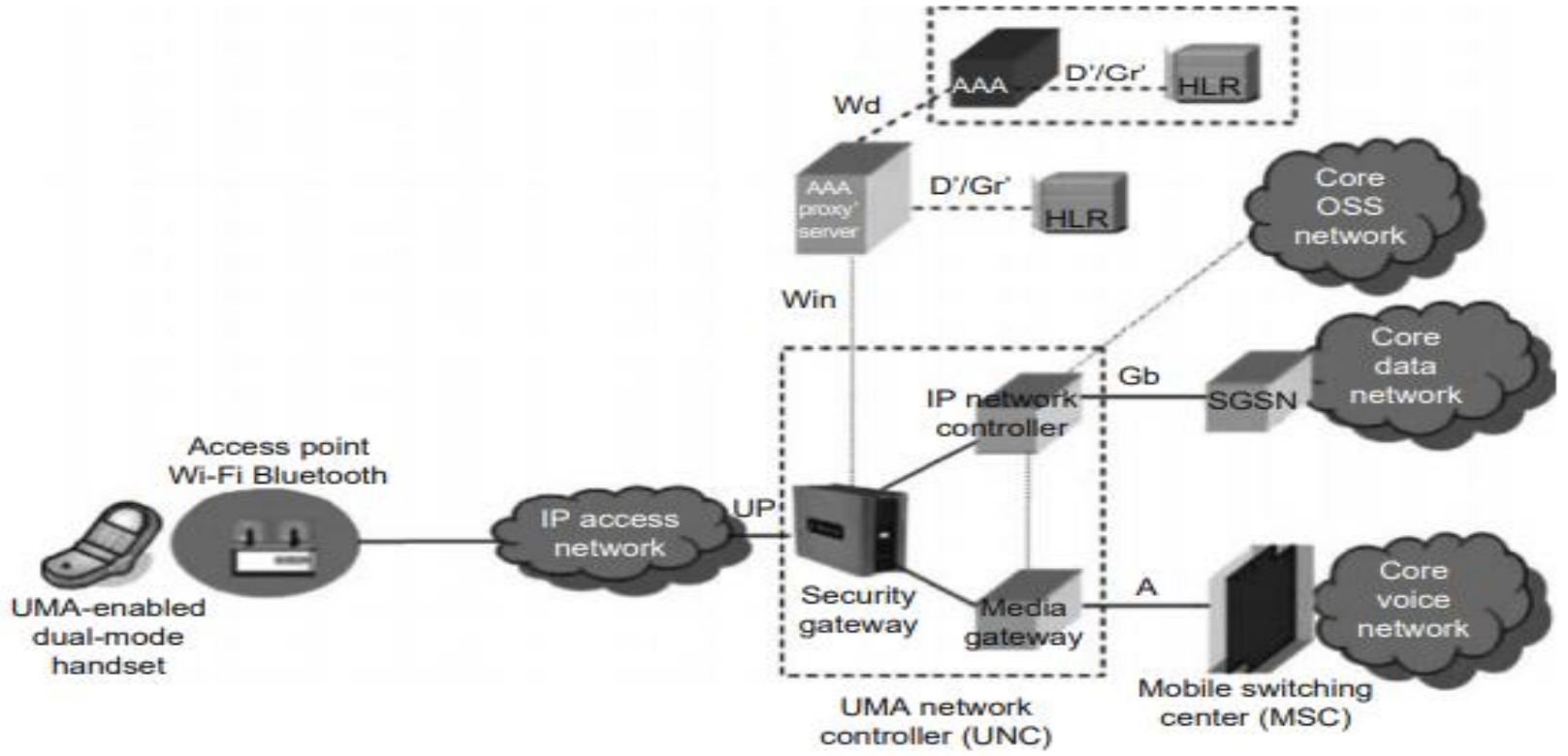

Figure 1.3 Handset establishment of an IPSec tunnel to the SGW.

Summary

With UMA, operators can extend high-quality mobile services to provide increased revenue opportunities. Many service providers view UMA as a critical first step toward merging voice and multimedia services over an IMS architecture. Indeed, security is critical for successful UMA deployments and is one of the highest priorities as service providers interconnect 3G wireless networks to UMANs. Ā is priority is reflected in the UMA technology industry group's inclusion of a UMA SGW in its specification. SGW is designed to extend into UMANs, the authentication, integrity, and security functions that already are integral to wireless networks today. With UMA being a relatively new technology, many of the specific threats are not yet well understood. Ā is poses new challenges to GSM service providers as they increasingly need to enhance their service portfolio. As a consequence, it is imperative that service providers look beyond the base UMA security requirements defined by the standards but address security within the scope of their entire network.