Generic Access Network(GAN)

Simran Bhatti, Vandana Tayal, Pooja Gulia

Student, Computer Science, Maharishi Dayanand University
Gurgaon, Haryana, India
sim.bhatti4@gmail.com

Student, Computer Science, Maharishi Dayanand University
Gurgaon, Haryana, India
vandana.tayal94@gmail.com

Student, Computer Science, Maharishi Dayanand University
Gurgaon, Haryana, India
pg.gulia2@gmail.com

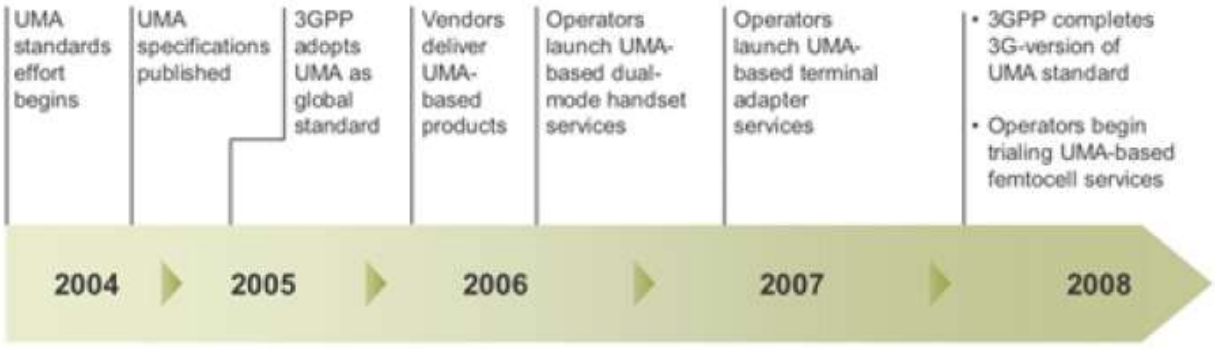
Abstract

Generic Access Network or **GAN** is generally an evolving telecommunication system that is used to extend mobile voice, data and multimedia (IMS/SIP) applications over IP networks. **Unlicensed Mobile Access** or **UMA** is the commercial name used by mobile carriers for the external IP access into their core networks. More recently, the system has been called the **Wi-Fi Calling** by a number of handset manufacturers, including Apple and Samsung.

Keywords*: IP, UMA, telecommunication system, femtocell services, Generic Access*

I. BRIEF HISTORY

UMA was developed by a group of operator and vendor companies. The initial specifications of UMA were published on 2 September 2004. The companies then contributed the specifications to the 3rd Generation Partnership Project (3GPP) as part of 3GPP work item "Generic Access to A/Gb interfaces". On 8 April 2005, 3GPP approved specifications for Generic Access to A/Gb interfaces for 3GPP Release 6 and renamed the system to GAN. But the term *GAN* is little known and the term *UMA* is more common in marketing.



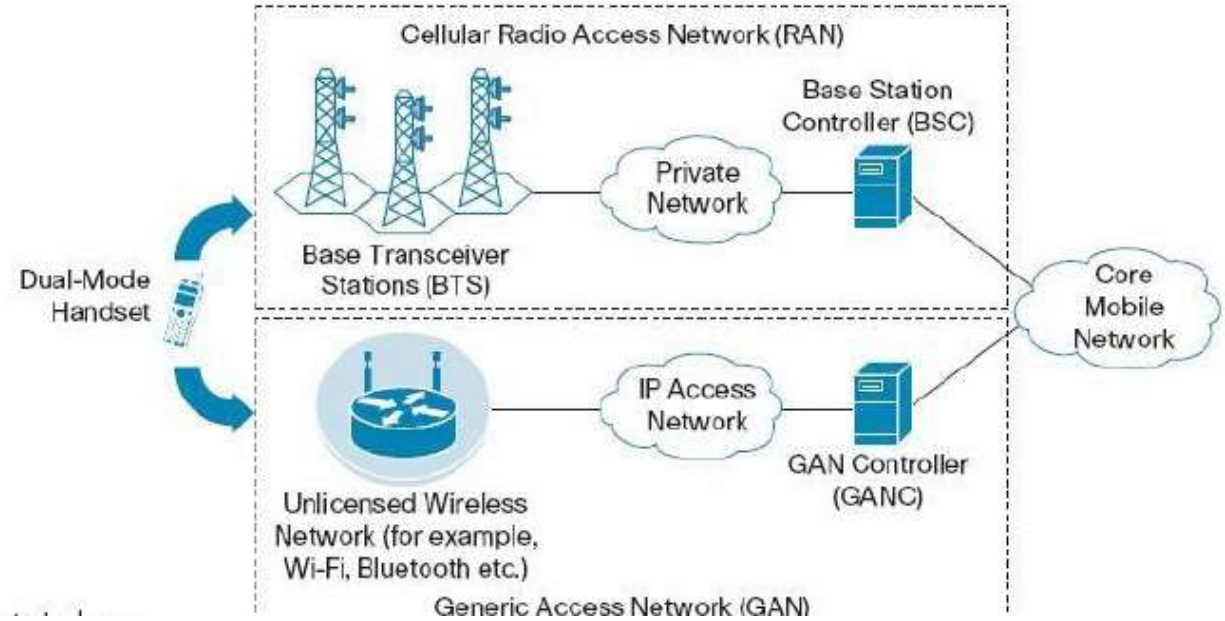
II. UMA-Operation Modes

A typical UMA/GAN handset has four modes of operation:

- GERAN-only: uses only cellular networks
- GERAN-preferred: uses cellular networks if available, otherwise the 802.11 radio
- GAN-preferred: uses an 802.11 connection if an access point is in range, otherwise the cellular network
- GAN-only: uses only the 802.11 connection

In all cases, the handset is used to scan for GSM cells when it first turns on, to determine its location area. This allows the carrier to route the call to the nearest GANC, set the correct rate plan, and comply with existing roaming agreements.

At the end of 2007, the GAN specification was enhanced to support 3G (Iu) interfaces from the GANC to the mobile core network (MSC/GSN). This native 3G interface can be used for dual-mode handset as well as 3G femtocell service delivery. The GAN release 8 documentation describes these new capabilities.



III. Advantages

For carriers:

- Instead of erecting expensive base stations to cover dead zones, GAN allows carriers to add coverage using low cost 802.11 access points. Subscribers at home have very good coverage.

- In addition, GAN relieves congestion (meaning that networks can, through GAN, essentially piggyback on other infrastructure) on the GSM or UMTS spectrum by removing common types of calls and routing them to the operator via the relatively low cost Internet
- GAN makes sense for network operators that also offer Internet services. Operators can leverage sales of one to promote the other, and can bill both to each customer.
- Some other operators also run networks of 802.11 hotspots, such as T-Mobile. They can leverage these hotspots to create more capacity and provide better coverage in populous areas.

For subscribers:

- Subscribers do not rely on their operator's ability to roll out towers and coverage, allowing them to fix some types of coverage dead zones (such as in the home or workplace) themselves.
- The cheaper rates for 802.11 use, coupled with better coverage at home, make more affordable and practical the use of cell phones instead of land lines.
- Using IP over 802.11 eliminates expensive charges when roaming outside of a carrier's network.
- GAN can migrate between IP and cellular coverage and is thus seamless; in contrast, calls via third-party VOIP plus a data phone are dropped when leaving high-volume data coverage.

IV. Disadvantages

- Subscribers must upgrade to Wi-Fi/UMA enabled handsets to take advantage of the service.
- Calls may be more prone to disconnect when the handset transitions from Wi-Fi to the standard wireless service and vice versa (because the handset moved out or within the Wi-Fi's range). How much this is a problem may vary based on which handset is used.
- The UMA may use different frequency that is more prone to some types of interference
- Some setup may be required to provide connection settings (such as authentication details) before advantages may be experienced. This may take time for subscribers and require additional support to be provided. The costs of support may be for more than the wireless phone company: network administrators may be asked to help a user enter appropriate settings into a phone (that the network administrator may know little about).
- The phones that support multiple signals (both the UMA/Wi-Fi and the type of signal used by the provider's towers) may be more expensive, particularly to manufacture, due to additional circuitry/components required
- This uses the resources of the network providing the Wi-Fi signal (and any indirect network that is then utilized when that network is used). Bandwidth is used up. Some types of network traffic (like DNS and IPsec-encrypted) need to be permitted by the network, so a decision to support this may impose some requirement(s) regarding the network's security (firewall) rules.

- Using GAN/UMA on a mobile requires the WiFi module to be enabled. This in turn drains the battery faster, and reduces both the talk time and standby time when compared to disabling GAN/UMA (and in turn WiFi).

V. References

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