White Paper

ANDREW®
**Geometrix®**
Location Information Server

Andrew WiMAX
Location Information Server (LIS) Overview

NENA Defined i2 Architecture

The US NENA-defined i2 architecture (see below) provides a globally applicable and interoperable template for implementing VoIP emergency call routing and location delivery to legacy emergency infra-structure. Because of this, the i2 architecture is gaining traction around the world. The LIS is a critical functional element of the i2 architecture, as well as future end-to-end IP systems. It is defined as being derived by the access network, and is the provider of the location information to be used for emergency services treatment.

North American Solution for VoIP 911
NENA Defined (i2) Migratory Architecture
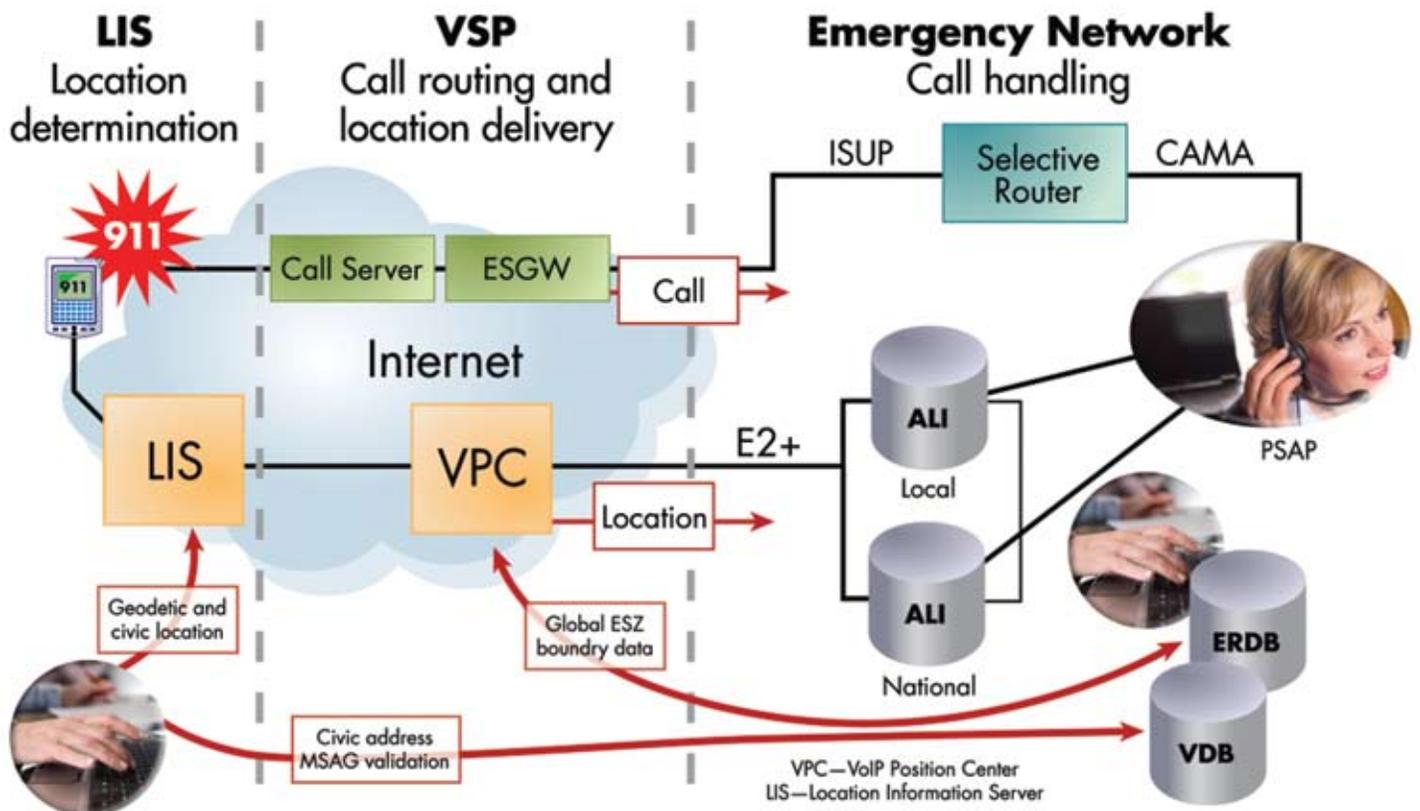
WiMAX Positioning Technologies

There are three primary locating/positioning technologies that have been identified for use on a WiMAX access network.

The three positioning technologies possible on WiMAX are:
- Cell id : A low accuracy solution providing a lat/long based on the WiMAX CID
- Multi-lateration : A medium accuracy solution providing a lat/long based on network measurements
- A-GPS : A high accuracy solution for devices with Assisted GPS functionality enabled.

These techniques are illustrated on the next page.

WiMAX LIS Positioning Technologies

## WiMAX Positioning Techniques:
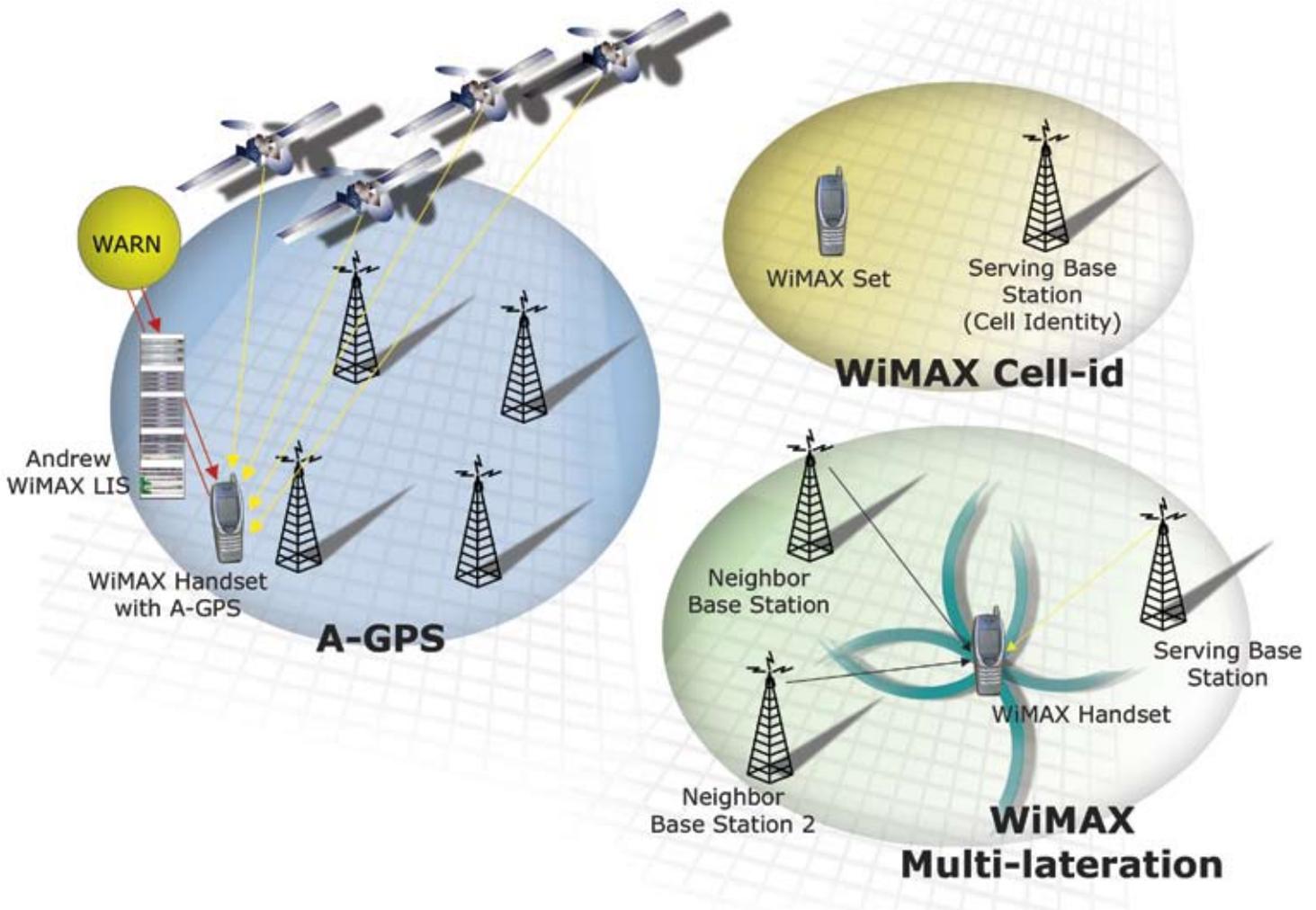
Location Applications

In WiMAX network environments, the LIS function can be deployed in reliable carrier grade form for many purposes, including emergency services, security applications and for Location Based Services.

The lead application for using a WiMAX LIS is for emergency services, or VoIP 911 as it is termed in North America. In the case of an emergency services call, the LIS can be queried initially for a low-delay position, and the LIS will typically respond with a location result using Cell-id. While this result typically lacks the accuracy required for emergency caller location (Cell-id often is accurate only to within km's), it is sufficient for the purposes of VoIP call routing to a PSAP. If, following the Cell-id location, a high accuracy position is requested by the PSAP, the LIS can provide a more accurate location result determined by either multi-lateration or A-GPS, depending on the capabilities of the WiMAX terminal.

The emergency services / VoIP 911 implementation is summarized in the illustration below.

Emergency Services / VoIP 911

Cell DB contains 802.xx cell information
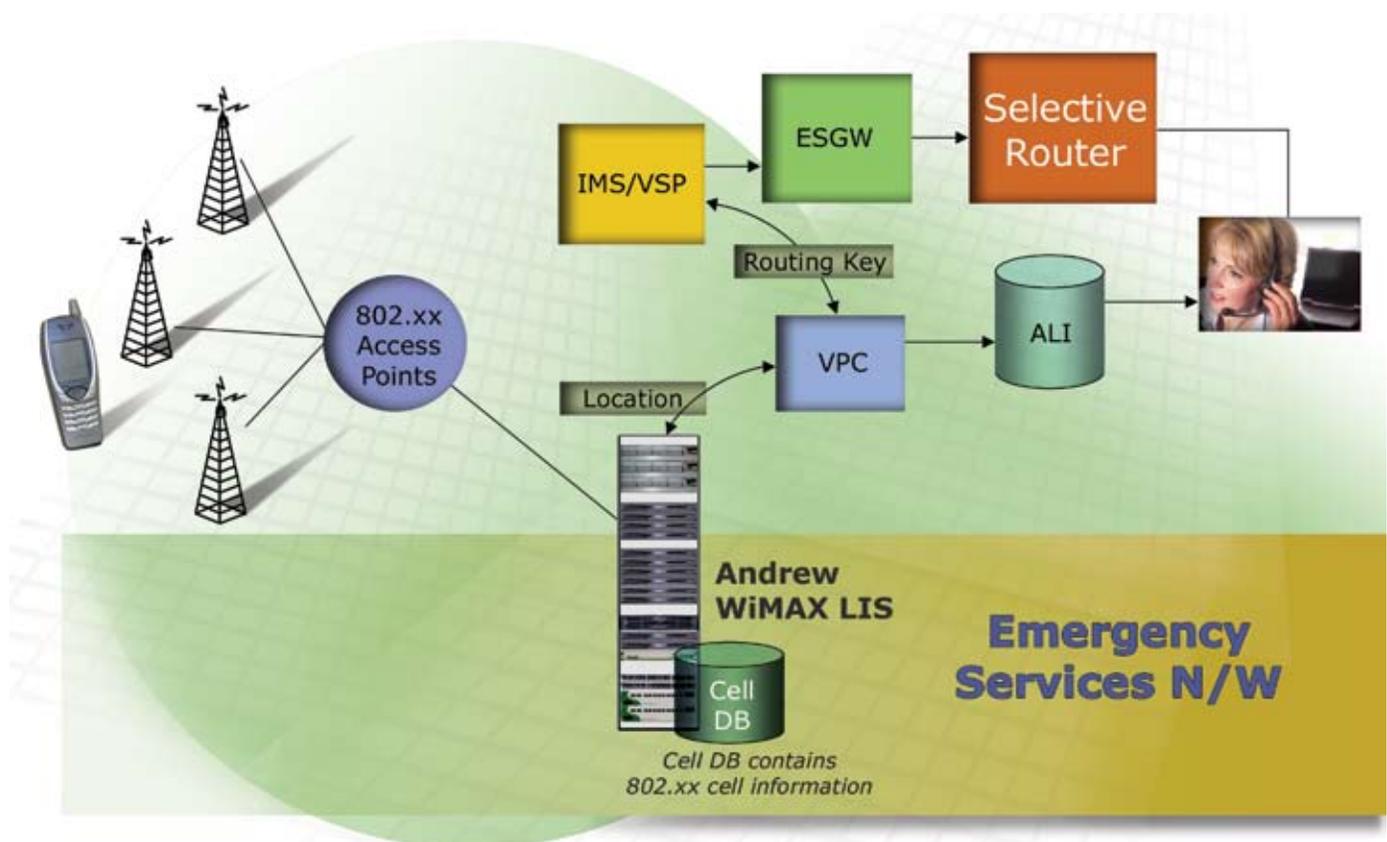
In addition to emergency service calling, voice services can be enhanced by the utilization of location information, such as offering location-based call routing, billing and call-screening functions.

Beyond voice, Internet services can also be significantly enhanced by location information. Content can be tailored by location, and provide services that, for example, identify the ATMs, restaurants or cinemas nearest the caller. Web-based mapping services can "come alive" when the retrieved location information allows the addition of the "you are here" element often critical in making practical use of map and navigation information. Locating friends and family wherever they are using the Internet also becomes possible. From a more somber perspective, national security agencies might utilize operator LIS capabilities to pinpoint the source of threats as they originate on the Internet.