



## Role of CSN and challenges addressed in WiMAX 802.16e Ecosystem

World Interoperability for Microwave Access (WiMAX) reduces the barriers to widespread broadband access that is standard based compliant wireless solutions engineered to deliver fixed and mobile services such as Voice over IP (VoIP), messaging, video, streaming media, and other IP traffic. WiMAX Technology enables the delivery of wireless broadband access as an alternative to fixed cable and DSL technologies. Many companies are closely examining WiMAX for "last mile" connectivity as it provides access to mobile wireless Internet economically and easily in regions where wire-line infrastructure is either non-existent or only accessible to a small part of the population and where the current broadband technologies cannot reach feasibly. The resulting competition may bring lower pricing for both home and business customers and bring broadband access to places where it has been economically unavailable.

WiMAX delivers high-speed wireless internet access over large coverage areas. This technology is 3 - 5 times faster and 5 times more cost effective than existing 3G technologies. WiMAX, based on IEEE 802.16e, supports both fixed and mobile applications at the same time delivering higher levels of service, allowing the user to access internet on the move.

### TYPES OF WiMAX

There are two types of WiMAX: Fixed and Mobile.

- Fixed WiMAX - based on IEEE 802.16-2004 standard Suitable for delivering wireless last mile access for fixed broadband services, like DSL or cable modem service.
- Mobile WiMAX - based on IEEE 802.16-2005 standard For both fixed and mobile applications with improved performance and capacity while adding full mobility.

WiMAX has a definite advantage over fixed cable and DSL technologies and it is going to change the way people would communicate in future. However, such an opportunity brings with it some unique challenges, which have to be tackled to make WiMAX commercially viable. While providing a plethora of services and applications, Service Providers deploying WiMAX need to understand that the decisions they make with regard to the CSN Platform can have a significant impact on their WiMAX business and service rollout.

### KEY CHALLENGES

#### ● AAA requirements and expectations specific to WiMAX 802.16e

**An integrated policy engine and database** that supports flexible network, service, and user policies defined at many levels of granularity including domains, user groups, individual users, and wholesale and retail subscriber bases and new business models, to allow flexible service creation and reduce management overhead.

**A centralized, network-wide subscriber management system** that gives Service Providers the ability to centrally manage all subscribers, create comprehensive profiles that define access entitlements across all available services and networks, and avoid re-provisioning subscribers into multiple databases as new network types are integrated. A unified subscriber view also enables fast, flexible service creation that leads to other revenue opportunities.

#### Mobile IP Key derivation:

Mobile IP (MIPv4 OR MIPv6) is the Technology used to maintain the Session during the handoffs and Legacy AAA servers do not typically support mobile IP (MIP). Derivation & Distribution of Mobility Keys and other Keys is the Main Challenge for AAA to protect Interface between MS & BS and to Protect Mobile IP Signaling.

### Accounting & Scalability requirements

AAA servers in Wi-Fi networks are used for authentication once per session while authentication for WiMAX may occur a number of times during a session because of the nature of mobile service, hence AAA should be scalable to handle multiple instances per session. Two types of accounting methods are used in WiMAX 802.16e, they are IP Session based and PD Flow based accounting AAA should be capable enough to process both because In IP based accounting single accounting record would be generated but in Flow based for every Flow accounting a new record would be generated.

### Tariff Switching

Tariff switching relates to cases where differential tariff is offered to customer based on time at which service is accessed. Implementation of Tariff Switching is quite different in case of WiMAX due to its requirement of parameters like Tariff Switch Interval (TSI) & Time Interval After Tariff Switch Update (TITSU). Typical cases like slow consumption of allocated Quota by users, and if TITSU reached, then AAA receives reauthorization request for more Quota Reservation have to be addressed. AAA and rating system will have to adopt this seamlessly so that tariff switching can be supported on WiMAX deployments.

### QoS (Quality of Service) Support:

Unlike the simplistic QoS in Wi-Fi for example, related only to pure bandwidth with maximum rates specified the AAA server in WiMAX must be able to provide QoS parameters to the network elements. Provisioning different QoS parameter for different service (E.g. Voice & Data) is challenge for AAA because different service would have different QoS requirements. During network authentication AAA sends the QoS profile includes the permissible number and schedule type of WiMAX service flows and permissible range of values for associated QoS parameters.

### Intelligent Hotlining

WiMAX needs Hotlining support for subscriber redirection to reduce revenue leakage and create new revenues from top-up services, for example- The ability to divert postpaid subscribers from their desired destination to Service Provider portal is particularly useful when requiring prepayment for services or delinquent postpaid accounts or even during account updates or other marketing activities. Intelligent Hotlining goes a step further where rules are defined based on subscriber profile and credit history and appropriate redirection is made. Hot-Lining is very evolving concept in Mobile WiMAX Standard and Mapping is open to vendors WiMAX Solution.

### • Subscription Activation And Device Management

WiMAX subscribers increasingly have access to a wide range of devices (laptops, smart phones, and consumer electronic devices) and purchase their devices through operator-independent retail channels. Subscribers expect that these new devices will be recognized and work seamlessly within the operator's WiMAX network, without the need to manually adjust the settings or initiate downloads. Self Provisioning with subscription activation and device management are two crucial areas where operators can differentiate themselves from their competitors.

### • Pre Provisioning & Self Provisioning

In order to reduce the complexities and the time involved in provisioning and activating a customer in the network, the service provider should be able to provide pre-provisioning and self-provisioning of WiMAX CPEs. Self provisioning can be provided through webbased applications that can automate the otherwise manual coordination and communication processes. By means of self-provision, the service provider can not only reduce the internal costs but can also enhance customer satisfaction. However, accomplishing this facility means that the billing system, subscriber acquisition, device management must be integrated seamlessly to bring ease in operations and reduce response time to customer.

### • Product Catalog and QoS

WiMAX provides flexibility of configuring multiple QoS parameters for each service. Service providers offering bundled services (voice & data) will have to integrate their product plans with associated QoS. For Eg: Different customer would have different service package and in that package customer would have subscribed different services so for every service QoS parameter will be different. Thus associated QoS will have to automatically get provisioned during subscriber authentication stage based on configuration done in subscriber plan.

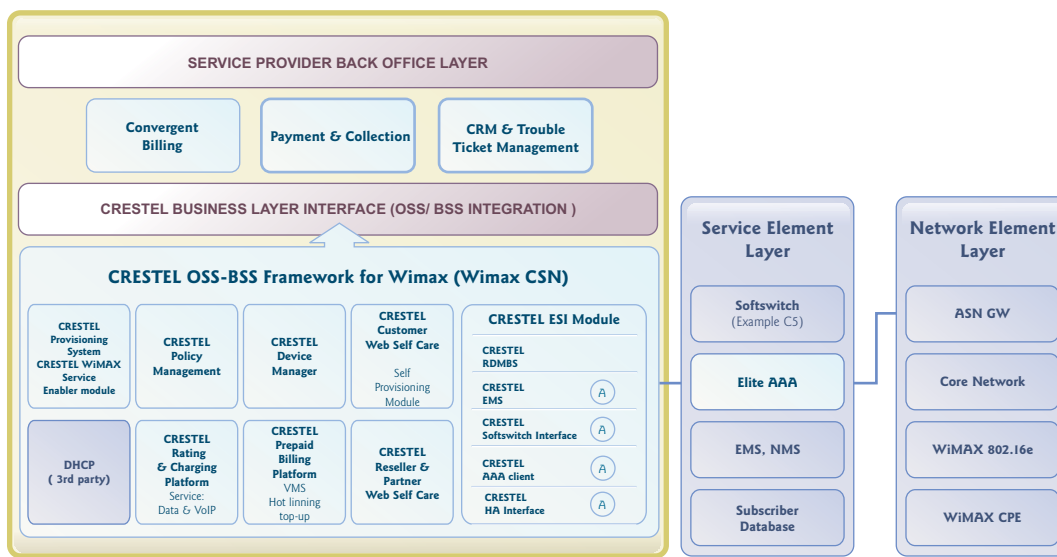
## CONCLUSION

To effectively capitalize on the challenges presented by WiMAX, Service Providers need to carefully select their CSN system, it should be flexible, scalable and designed for WiMAX networks with initial deployments of a few thousand users scaling to support networks of hundreds of thousands of users. The Key components of WiMAX- AAA & OSS BSS systems must be specially designed to cater to WiMAX 802.16e solution. The solution must be a network agnostic functioning through a unified control layer that can seamlessly integrate the WiMax offering with other fixed wireless network. It makes it possible to deliver services to various customer segments from Residential Internet to Large enterprise requirements for end to end internet solutions provides service providers the functionality required to grow their business and remain competitive.

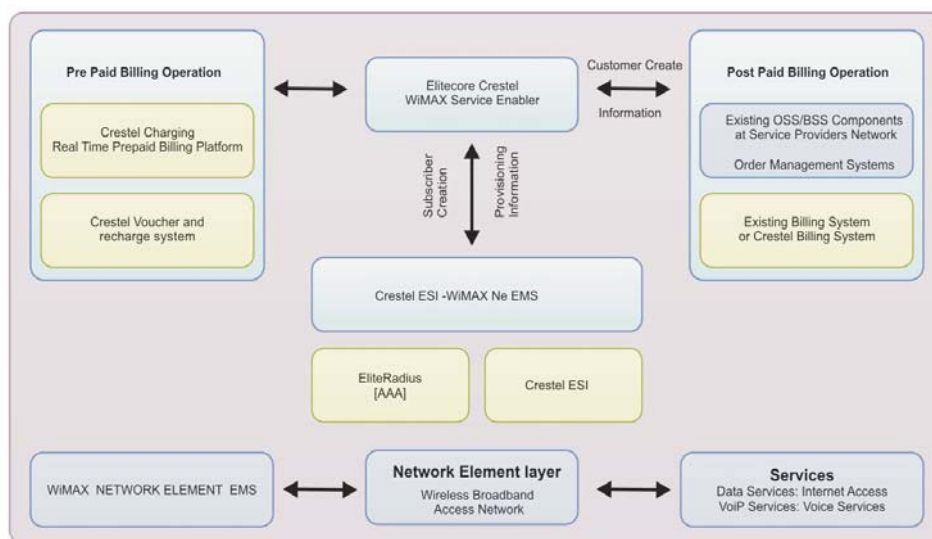
## CRESTEL for WiMAX

CRESTEL CSN solution ensures rapid service rollout and integration with existing networks, delivering a cost-effective WiMAX service. Its partnership with global equipment vendors supports auto provisioning of CPE, ensuring rapid service rollouts and customer activation in addition to preventing single vendor lock-in. CRESTEL's inbuilt dual AAA brings to providers real-time rating and charging and a single service delivery platform for prepaid and postpaid billing with support to innovative value-added services on WiMAX.

A highly scalable solution, it is designed to meet the requirements of WiMAX networks with initial deployments of a few thousand users, with rapid scalability to hundreds of thousands of users. In addition, it offers great flexibility, allowing service providers with legacy OSS / BSS systems to deploy just the CRESTEL WiMAX Service Enabler module, or a combination of the Prepaid Billing System and Service Enabler Module or the complete CRESTEL Convergent Billing Solution.



## CRESTEL SERVICE DELIVERY PLATFORM – OFFERING FOR WIMAX



### Option-1

- Crestel Service Enabler Module
- 3rd Party OSS/BSS API

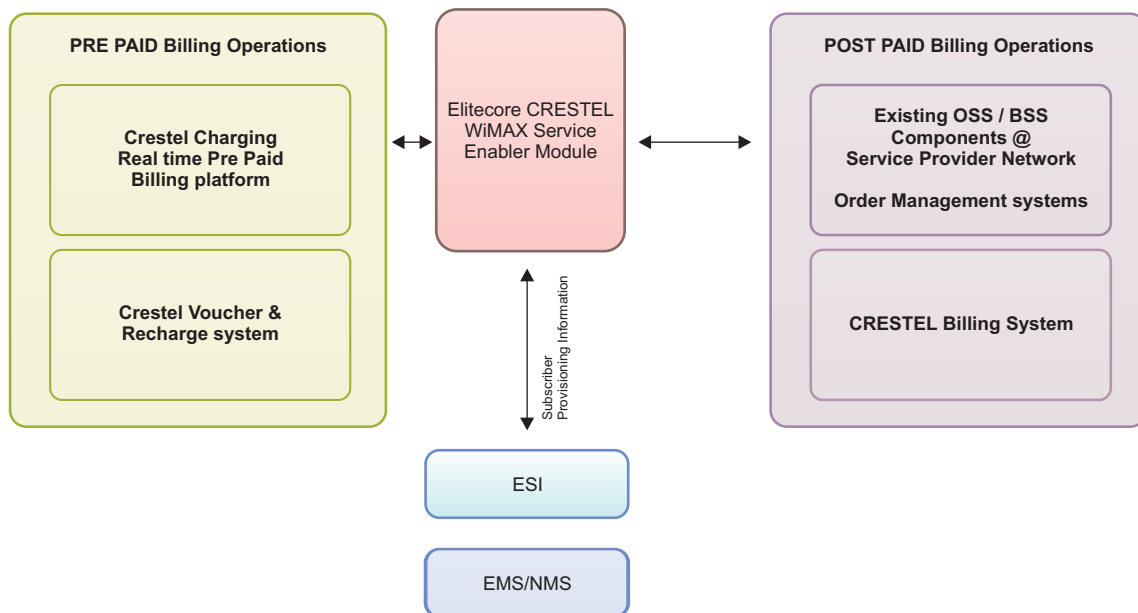
### Option-2

- Crestel Service Enabler Module
- Crestel Prepaid & Charging Platform
- EliteAAA

### Option-3

- Crestel Service Enabler Module
- 3rd Party OSS/BSS API

## Service Enabler Module



- Service Activation through Crestel Service Enabler module – WIMAX ACCESS
- Crestel Service Enabler integrates with WIMAX NE EMS to provide Customer acquisition process and allows the Service Provider to sell Pre Provisioned CPE in the market.
- Crestel Service Enabler integrates with existing OSS/BSS elements to provide:
  - Integration with their customer creation process: Order Management
  - Integration with their Billing system: For creation of the subscriber profile
  - Any other OSS/BSS elements: Crestel provides open interfaces for the same

## Service Enabler Module Components

### Provisioning

- Real time & Self Provisioning
- Multi Vendor Support
- Rules based on class of service provisioned for specific vendor device based on subscribed plan
- Events Supported
  - Assign/Release CPE
  - Change Customer CPE
  - Activate/Deactivate CPE
  - Update CPE attributes class of service
- Protocol Supported
  - CORBA, HTTP, Telnet, JDBC
- Monitoring and Tracking Provisioning Requests

### CPE Management

- Bulk CPE Provisioning
- Bulk CPE Activation/deactivation

### Integration with Subscriber Management System & Billing

- Subscriber Creation, Change Plan, Auto Deactivation/Termination

## ELITE AAA

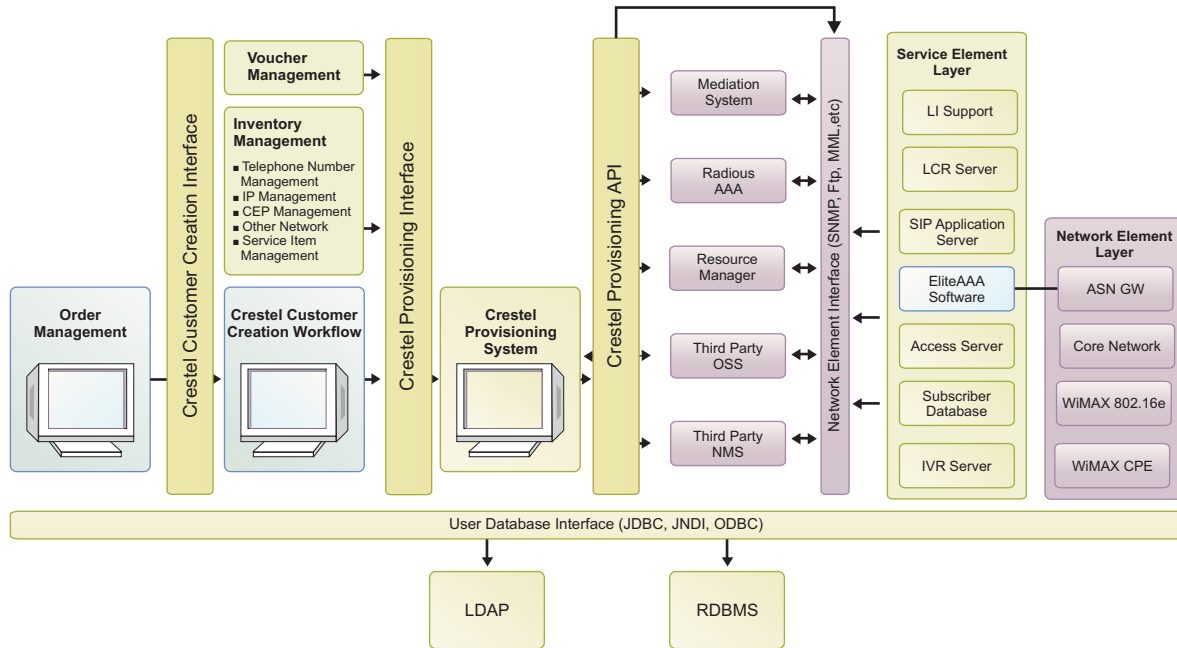
- Restricting the subscriber to service level by multiple business model support by Bandwidth, QoS, limiting the number of concurrent sessions, etc.
- A highly flexible and versatile AAA and policy management solution for Mobile WiMAX CSN System
- An active mediation system, interfaces with Radius standardized for WiMAX, for carrying out the AAA functionality wherein the prepaid users are authenticated and authorized prior to the service usage.
- Flow based accounting enables service providers to deploy innovative flow based pricing schemes
- Pre-provisioned QoS parameters- EliteAAA communicates to network elements also supports bandwidth rates.
- Carrier grade performance and scalability to support business expansion in WiMAX
- Backbone utilization control (Ability to manage the services as per end-user)
- Support for Vendor Specific Attributes is provided for interactions with proprietary security systems.
- Radius & Diameter support for AAA functionality with the latest RFCs compliance.
- Vendor Specific attributes for interactions with proprietary security systems.
- Single-platform solution with common policy and profile repository to control access to advanced services across multiple networks in fixed, mobile & converged deployments
- Real-time session management to enable mobility, roaming, security, and usage tracking
- Support of multiple business models by subscriber policies and profiles centrally with extending local control to business or retail customers
- EliteAAA uses RFC-standard DHCP servers for
  - Management of Global IP Pools
  - Valuable Address Management
  - Allows more than one NAS to Share common centralized Address pools
- Multi-protocol support Dual-stack AAA and Diameter support enables migration to IMS.

Aggregates, correlates, formats, and automatically streams records to appropriate billing and settlement systems with no human intervention.

## CRESTEL Rating & Charging

- Real Time Rating & Charging with configurable rule based rating engine
- Voucher Management & Recharge System
- Account recharge via credit/debit card and balance transfer
- Supports bundled voice and data services offering
- Rating by duration, volume, step-volume, location
- Tariff switching support
- One-time Charging Support
- Resource Pool Management
  - Time and volume-based prepaid quotas to support multiple service models.
- Balance management
  - Immediately suspends sessions upon completion of a prepaid balance, helps to minimize revenue Leakage.
- Roaming support

## Pre-Provisioning



- CSR generates CPE IDs from Inventory Management
- CSR associates CPE IDs with Voucher Management
- Voucher Pre-registration
  - Provisions CPE IDs in WiMAX EMS
- Voucher labeling in CPE device
- Customer purchases voucher with CPE from service provider/reseller
- Customer power ons CPE and request is received to EMS for CPE verification
- Customer then logs in to WSC and provides its details for communication

## CRESTEL's 4C Benefits

### Customer

- Single Bill of multiple services on WiMAX
- Multi mode recharge
  - IVR, SMS, USSD, CRM, etc
- Flexible options on plans
  - Flat-fee to pay-per-use
- Service available on demand
- Single Platform for
  - Multiple Authentication methods
  - Multiple client device support
- Self Service Selection
- Zero touch service provisioning
- Multiple modes of payment & recharge
- Flexible options of change plans
  - Prepaid <-> Postpaid
  - Time <-> Volume

## Competition

- Convergence support on common platform for
  - Wimax with existing network
  - Prepaid and Postpaid service offering
- Flexible Rating & Charging to support WiMAX model
- Single Vendor interface with interoperability
  - AAA, Policy Management
  - Rating & Charging, SSSS
- Integration support for
  - Upstream billing system
  - Existing WSC
- Multi vendor provisioning support eliminates single vendor lock in

## Channel Partner

- Easy Access to Services and operations
  - Reseller Websselfcare
- Single view of subscribers usage and revenue
- Multiple revenue options
  - Commission based
  - Subscriber usage based
  - Based on sale
  - Revenue sharing
  - Partner settlement
  - Multi-party billing
  - Prevention of revenue leakage

## Content Partner

- Direct access to subscriber and their usage of services
  - Through Subscriber Self Service System
- Online revenue realization and tracking
  - Partner Web self care
- Flexible business model and agreements
  - Support next generation services

## About Crestel

CRESTEL's real time carrier-grade OSS BSS system enables next generation data, voice and video services over wire-line and wireless networks to manage and profit from application, media and communication services offered directly and through distribution channels. CRESTEL offers Convergent billing, Policy Management, Real time charging-Rating & AAA software to meet the ever changing market dynamics in the communications industry. It's open integrated architecture can interface with other systems and applications, enables service providers to introduce new services quickly, providing high business value and low total cost of ownership. . For more information, visit [www.crestel.in](http://www.crestel.in)

## About Elitecore Technologies Limited

Elitecore Technologies Limited is a leading provider of CRESTEL a Telecom OSS BSS system for next generation voice video & data services. CRESTEL offers Convergent billing, Policy Management, Real time Charging-Rating & AAA software. Its another flagship product Cyberoam offers internet security solution to enterprises across the globe. Established in 1999 Elitecore is a dynamic young player led by a strong management team with domain expertise in IP based access technologies & Services having 75% growth rate since inception. Elitecore Technologies is funded by the global private equity firm - The Carlyle Group. With a strong R&D and support center in Ahmedabad (India) serves customers in Asia, South East Asia, Middle East and Africa. For more information, visit Elitecore Technologies Ltd. at [www.elitecore.com](http://www.elitecore.com)



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