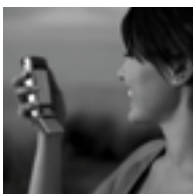
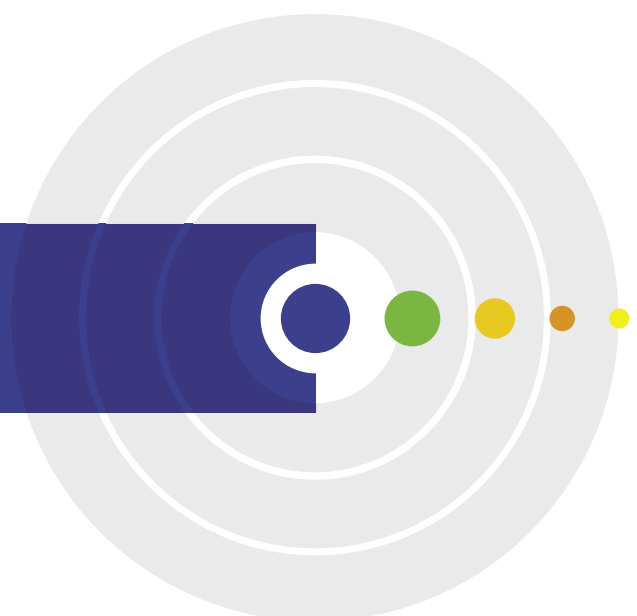




# The Disruptive Approach of Open WiMAX

White Paper



## Introduction

Strategically, large telecom equipment vendors have chosen to be standards-based, but close their solutions for additional vendors. Their goal was to deliver all the elements of the operator's network while controlling it in a closed environment. This environment was not always a best-fit for the needs of the service provider, and created a high dependence on the selected vendor.

Open WiMAX is revolutionizing the Telecom world by bringing a disruptive operator-centric culture to the telecom market. Open WiMAX creates a fresh attitude replacing the vendor-centric environment maintained by the large telecom vendors. Alvarion is one of the key companies pushing Open WiMAX to the front and center.

With Open WiMAX operators will choose the combination of vendors and partners that best fit their specific requirements. Not all standards are born equal. Open WiMAX guarantees open access and interoperability among vendors' equipment for the benefit of the operator.

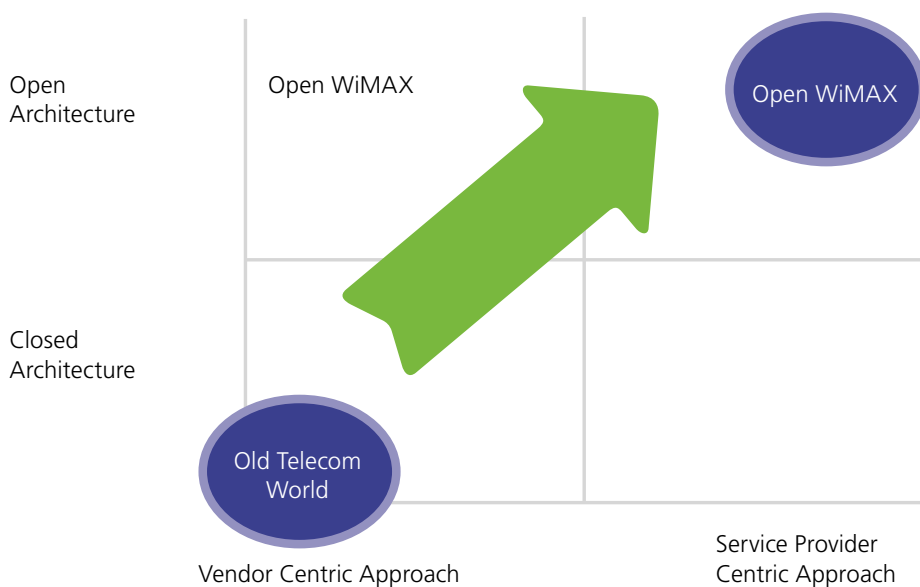


Figure 1: The disruptive approach of Open WiMAX

## What is Open WiMAX

Open WiMAX is an all-IP open architecture for WiMAX access networks. It is endorsed by the WiMAX Forum™ and complies with the WiMAX Forum's Networking Work Group (NWG) specifications. Designed as an open, standardized, interoperable technology, it opens a door to a complete eco-system affecting network equipment, consumer electronics, service offerings, and end-user experience.

## Understanding Open WiMAX

Understanding the benefits of Open WiMAX starts with understanding the WiMAX system architecture.

## The Disruptive Approach of Open WiMAX

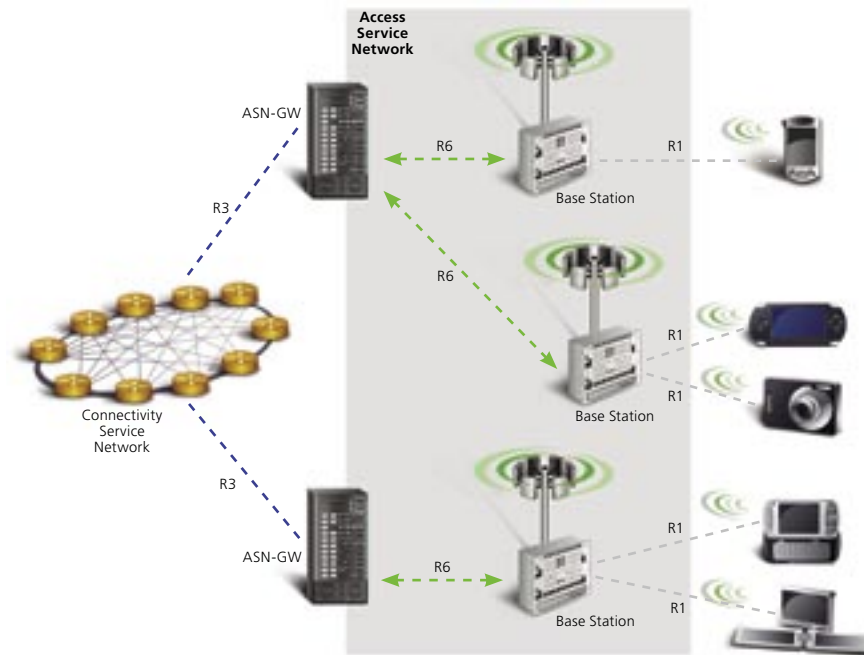


Figure 2: Mobile WiMAX system components and key interfaces

The above figure shows the key components and standard interfaces of a mobile WiMAX system. The interfaces among the different elements of the system were named and defined by the WiMAX Forum's NWG. Particular attention is given to the "R6" interface. R6 connects the WiMAX radio access network (RAN) with the Service Provider's IP network via an access service network gateway (ASN-GW). The ASN-GW is a system component acting as a gateway between the WiMAX network and the IP network, and is also responsible for mobility management in the WiMAX network by offering handover capabilities among connected radio base stations.

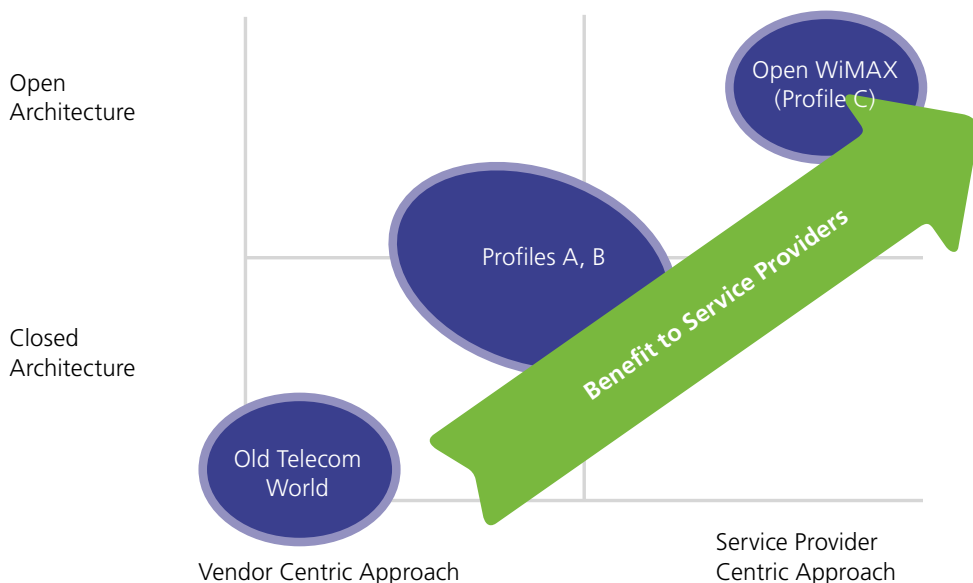
Open WiMAX requires a standard, open R6 with clear separation between RAN functionality and IP networking functionality. That promotes interoperability among many WiMAX vendors. Conversely, with R6 closed in a "black box" only the same vendor may offer interoperable products on both sides of the interface.

## Why Focus on R6?

The focus of attention is given to R6 rather than the R3 interface. R3 connects the IP-based access service network (ASN) to the operator's connectivity service network (CSN). Less attention is given to R3 for the following reasons:

- The majority of the operator's CAPEX is spent on components around R6. Operators want the flexibility in selecting base stations and ASN-GWs from many possible vendors, as well as high level of vendor competitiveness in these offerings.
- R3 resides in the part of the WiMAX network that is already all-IP. Here the large vendors are in an all-IP "open" environment: many vendors, wide range of offering and high level of competition among vendors. Therefore, the focus is on the "characteristics" of R6, where the large telecom vendors want to create a high vendor dependence on their solution.
- R6 is the key interface "bridging" between the RAN and the IP network. Controlling this bridge provides a strategically advantageous position in influencing the other interfaces.

The NWG defined three types of implementation profiles for the R6 interface. Profile C defines Open WiMAX. The NWG also defined profiles "B" and "A". Profile B hides R6 in a locked black box. and in Profile A enables mixing of radio functionality and IP functionality in the BTS and ASN-GW there are the different components tightly coupled, making it impossible for additional vendors to implement an integration point. In addition, Profile C enables both flat and hierarchical ASN-GW system topology, while profile A supports only hierarchical architecture. Finally, in Profile C, the radio resource management (RRM) functionality resides in the BTS only, delivering a faster, optimized handover (HO) mechanism. In Profile A, RRM functionality resides in the ASN-GW (slower HO), and Profile B does not mandate the implementation of an R6 interface at all so the effects on HO is dependant on the proprietary implementation of the BTS.



In an Open WiMAX solution the operator is able to leverage on consumer electronics, much like in the Wi-Fi market and in sharp contrast to 3G CDMA and GSM operations. In this environment WiMAX Certified™ subscriber devices are not necessarily sold by the operator but may be purchased independently by the subscriber, so they have little impact on the operator's CAPEX.

Figure 3: Open WiMAX profile C advantages

## The Benefits of Open WiMAX to the Service Provider

WiMAX is much more than just an advanced radio access technology. It is a disruptive approach. WiMAX is strategically built as an open, all-IP, architecture to leverage on a complete, new, eco system based on the vast markets of consumer electronics rather than the controlled terminal supply chain. Specifically, it was always in the best interest of the large telecom vendors to build the telecom access network in a closed standard architecture. Open WiMAX is an architecture that is open to 'Ethernet creativity' - innovation and mass market consumer electronics combined with the low cost associated with mass production and economies-of-scale.

The constant challenge to raise ARPU is strongly dependent on operators' ability to offer differentiated and advanced services. It is critical to leverage all layers of an open communication architecture and consumer electronics industry to increase subscription numbers.

### Service provider centric

Open WiMAX is highly **scalable** making it equally suitable for large, medium, or small deployments. It enables operators to **optimize** WiMAX network deployment **costs**, fit the expenditures to the desired services-centric network both in terms of CAPEX for the short term and OPEX during the operation of the network. Finally, it facilitates simple and smooth integration with **3<sup>rd</sup> party applications** and services enabling operators to offer a greater variety of revenue-generating service, create brand differentiation, and increase subscriber loyalty.

### Multi-vendor solution

Open WiMAX provides operators with the freedom to choose from a variety of vendors offering WiMAX certified products. This 'mix and match' multi-vendor approach promotes competition, which drives prices down and enhances the product offering.

### Remove entry barriers to newcomers

By creating simple and quick integration processes with standard network elements, Open WiMAX helps new vendors join the market, enhancing overall market dynamics and product offering and variety.

### Encourages creativity and innovation

Creativity flourishes in an open environment with strong vendor competition. Innovative products and services for WiMAX such as mobile TV and mobile gaming for personal use and Virtual Private Network and File Transfer for business use, enable vendors to distinguish themselves from the competition.

## Best of Breed

Best of breed creates a new reality in the Telecom industry. Alliances are forming making a clear statement – pure players, each an expert in its own field, are teaming together to create best of breed offerings to the operator. This puts the large telecom vendors at a disadvantage as a one-stop-shop that can do it all internally.

Open WiMAX empowers service providers to choose Best of Breed products, whether best-in-class or simply the best-fit solution. As a result, many large operators are explicitly advocating the open network approach.

## Alvarion's key role in Open WiMAX

Alvarion is leading the construction of a complete disruptive WiMAX ecosystem to benefit the operators. Open WiMAX enables Alvarion to provide best of breed solutions to communication service providers offering any type of network including community, municipality, hot zone, city, country, nationwide, and global.

### Alvarion's leadership position and operator-centric approach is executed by:

- Driving Open WiMAX best breed end-to-end solutions.
- Leverage partnerships with industry leaders to establish Open WiMAX as the architecture-of-choice for WiMAX deployments worldwide for any type and size communication service provider.

Alvarion's approach of OPEN WiMAX™ encourages a wide range of devices, components, and products all certified and interoperable. All layers of the WiMAX ecosystem are accessible through the implementation and deployment of open architecture. We believe that in open architecture, communication service providers can choose the combination of vendors and partners that best fit their specific requirements. Alvarion's OPEN WiMAX approach creates this overall best value solution by offering complete flexibility to take the best from each ecosystem layer.



**Figure 4:** The freedom of choice built into the multi-vendor environment of Open WiMAX

By leveraging on hands-on experience, broad knowledge, and deep understanding of WiMAX technology, services, architecture and operator requirements, Alvarion is able to offer new and existing operators of all sizes, the best-fit solution offering excellent alliances with market leading partners.

## Conclusion

OPEN WiMAX, promoted by Alvarion, is an inflection point in the evolution of WiMAX and a disruptive approach in the Telecom world. Open WiMAX puts the power back in the hands of the service providers by creating a service-provider centric market dynamics. Open WiMAX works to the benefit of the service providers by creating freedom of choice and a multi-vendor best of breed approach for the benefit of service providers.

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