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Your Open WiMAX Choice

Ensuring Long Term Business Competitiveness with OPEN™ WiMAX

White Paper

Ensuring Long Term Business Competitiveness
with OPEN™ WiMAX

This white paper presents the benefits of OPEN™ WiMAX network strategy from business and technology perspectives, and shows the similar process that the wireline IP market went through, solving the open networks vs. closed networks dilemma by clearly opting for openness.

What is OPEN WiMAX?

What OPEN WiMAX really means and why closed vendors try to avoid it.

Openness - Key Success Factor for the WiMAX Market

The advantages of an open environment and how the entire WiMAX market can benefit from open networks.

Openness in the Wireline IP Market

The wireline IP market (WAN and LAN) was posed with a similar open-closed dilemma and clearly opted for openness.

The Advantages of Openness

How operators benefit from the advantages of OPEN WiMAX.

Executive Summary

As the WiMAX™ market continues to expand, and massive deployments of IEEE 802.16e Mobile WiMAX™ are at the doorstep, operators are faced with two options of equipment vendors – open network or closed network vendors.

In essence, open vendors focus their **business and product strategy** so as to facilitate easy integration of their products, with other WiMAX vendors' products. Open vendors invest significant efforts in creating a comfortable **business environment** (e.g. easy and quick interoperability and integration processes) that fosters cooperation and enables seamless integration between their products and other vendors' products. In addition, open vendors design inherent flexibility into their **product architecture** and **interfaces**, thus accommodating for possible feature additions in products of other WiMAX vendors.

Closed vendors, on the other hand, are focused on promoting a homegrown end-to-end solutions. As such, their products and interfaces are closely tailored to fit their own components. The implementation of standard interfaces within their end-to-end solution really only implements the very minimal requirements, and does not allow feature additions by other WiMAX vendors.

Consequently, open vendor components can be integrated quite easily with other open vendor components, while closed vendor components can only be integrated with the same vendor components. This way customers can avoid time and effort consuming ordeals of development and integration cycles. This paper outlines the reasoning for OPEN WiMAX, as a truly viable strategy, for an operator's long-term competitiveness.

The first section describes the essence of OPEN WiMAX and the motivation of closed vendors to avoid openness. **The second section** describes the vibrant nature of the WiMAX market, which can only flourish in an open environment. **The third section** presents another connectivity market – the wireline IP market (WAN and LAN) – that was posed with a similar open-closed dilemma and clearly opted for openness. This section also describes the market dynamics that led to this choice and contends that similar processes and forces are prevalent in the WiMAX market, driving it to an identical conclusion. **The final section** systematically highlights the advantages of OPEN WiMAX, which are essential and extremely beneficial for the operator.

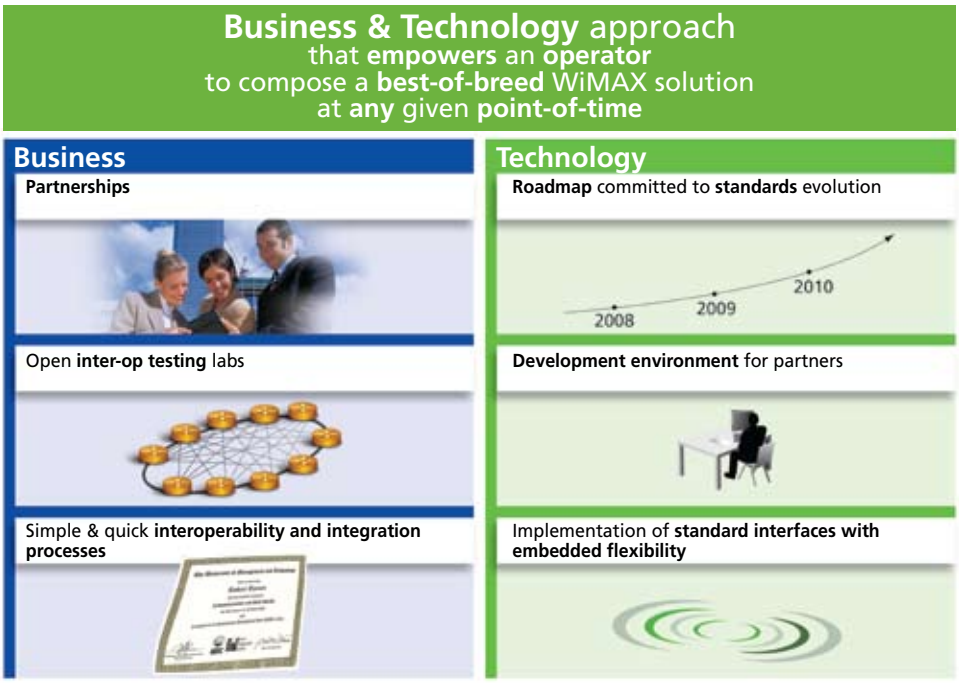
What is OPEN WiMAX?

OPEN WiMAX is a **business and technology strategy** that facilitates easy integration of network equipment, service and application platforms, and end-user devices from different vendors. This approach is driven by the undisputed reality that no single vendor can excel in every part of a network solution; therefore vendors should allow their equipment to be easily integrated with other vendors' equipment, thus enabling a complete and optimal solution.

Business & Technlogy approach

that **empowers** an **operator**
to compose a **best-of-breed** WiMAX solution
at **any** given **point-of-time**

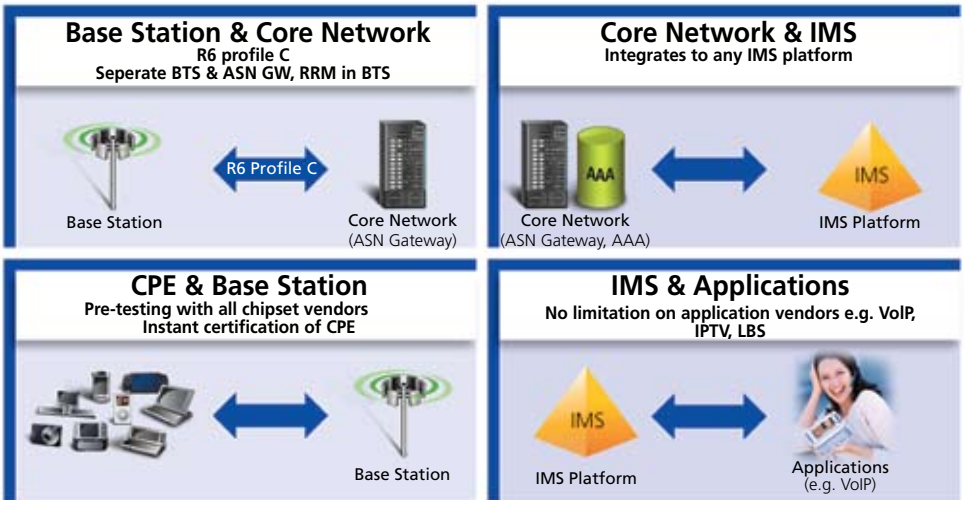
OPEN WiMAX is comprised of a number of business and technology activities. From the **business perspective**, open vendors create optimal conditions for interaction with other vendors; such as a wide network of partnerships and business case requirements for interoperability testing and integration. From the **technology perspective**, open vendors can clearly outline a roadmap, inline with the evolving industry standards, invest in a rich development environment for 3rd party applications and implement standard interfaces with embedded flexibility to accommodate possible variations in other vendors' products.



Standard & Flexible Interfaces – Zoom In

Standard and flexible interfaces are essential for real WiMAX openness. Unlike the traditional 3G environment, where standards are so comprehensive that there is little place for product differentiation, WiMAX standards only regulate some limited core functionality. As a result, various WiMAX vendors may decide to enhance their products in many different ways and features. By implementing interfaces that are not only standard but also allow flexibility, open vendors enable their products to easily integrate with other components irrespectively of their possibly unique, above standard enhancements.

The standard flexible interfaces relate to four domains: radio and IP base station <--> core IP network equipment interface, core IP network equipment <--> IMS interface, IMS <--> application interface and base station <--> devices interface.



Examples

- **IMS <--> applications interface** – in an OPEN WiMAX architecture, this interface consists of a fully transparent service platform, enabling 3rd party application vendors full predictability of the applications' expected performance. For instance, an application vendor of Voice over IP, or IPTV can clearly know what type of QoS (quality of service) and optimization capabilities can be expected from the all-IP network. This enables designing the application optimally, as well as adding a buffering mechanism, inserting a broadcasting optimization engine, keeping delay and differential delay at an acceptable level, etc.

  In contrast, closed vendors implement a black-box network infrastructure, which may balance the performance of the network in a way that cannot be fully anticipated and accounted for by a 3rd party application vendor. As a result, 3rd party vendors will seldom be able to design well-functioning applications to run on operators' closed WiMAX networks. Obviously this will significantly impair the operators' long term service portfolio's competitiveness, as it will effectively be limited to offering a small set of applications provided by closed vendors or their closest allied partners.

- **Radio base station <--> core IP network equipment interface** – this interface, named R6 by the WiMAX Forum®, is implemented by closed vendors as a proprietary black-box interface called **R6 profile B**. This implies that an operator can only purchase radio access network base stations and core IP network gateways (known as WiMAX ASN GW) from the same closed vendor. Operators cannot choose to buy the radio base stations from one vendor and the core IP network equipment from another vendor.

  This same interface is implemented by open vendors as a standard, transparent interface called **R6 profile C**. Since the interface is standard and universal across all open vendors, operators can select base stations from one open vendor, and a core network equipment (e.g. ASN-GW) from another. This way operators are guaranteed the best solution, composed of the **best-in-class** radio base stations, as well as ASN GW.

  While OPEN WiMAX offers operators freedom of choice and long term competitiveness, traditional cellular TEMs (telecom equipment manufacturers) leave service providers no choice but to acquire the cellular base stations, controllers and central nodes from a single vendor. OPEN WiMAX brings a new approach and changes this paradigm for the benefit of the service provider.

There is a need to clarify the common misconception that openness implies multiple points-of-contact for the operator due to the multiple vendor components approach. In fact, openness simply implies that operators have the freedom to choose the best components from different vendors. Nevertheless, they can, and usually will, stay with a single point of contact for the implementation of their chosen solution. This single point of contact may be one of the vendors or a system integrator, similar to the way IT and IP-based access network solutions are composed of multiple vendor components, which externalize a single point of contact to their customer.

Openness - Key Success Factor for the WiMAX Market

After fully understanding the real meaning of openness in WiMAX, it is clear that this openness is a critical factor in the success of launching Primary and Personal Broadband services over WiMAX.

The WiMAX-based broadband services market is a dynamic, ever-evolving industry. Such a vibrant environment requires utmost flexibility provided by openness that easily allows new application launches by 3rd party vendors, existence of a variety of business models, and entrance of new equipment vendors.

The **launch of new applications** is the driving force of mobile broadband, residential wireless triple play and high-end wireless enterprise services. These applications are often developed by 3rd party vendors. For example, vertical applications for the enterprise market are explored and implemented by unique corporate-application vendors. Openness provides flexibility to launch such applications over WiMAX infrastructure.

Various business models are currently being explored by WiMAX operators. One model is similar to a regular operator-subscriber model, whereby a subscriber receives a subsidized CPE (customer premises equipment) from the service provider and pays a monthly fee for its services. A second model is a free-zone model where municipalities offer free access to their residents. Another business model is similar to hotspot Wi-Fi contracts, whereby a user subscribes online and can then use broadband access from the service providers using WiMAX-enabled devices. Additional innovative business models are constantly being tested, such as wholesale and virtual network operations. It may be that one of these business models will prevail over others or that several will co-reside. Therefore, WiMAX must enable flexibility for multiple business models. OPEN WiMAX ensures that all these, and potentially other future business models, can be easily implemented, since all components of the WiMAX network are open to all players in the evolving WiMAX value chain.

New components for the WiMAX environment, such as - optimization, content adaptation, etc. are constantly being developed (e.g. broadcast management engine) by innovative companies. Openness can enable such components to be embedded into the product and service platforms as they mature, thus maximizing the WiMAX network performance and end-user's service experience.

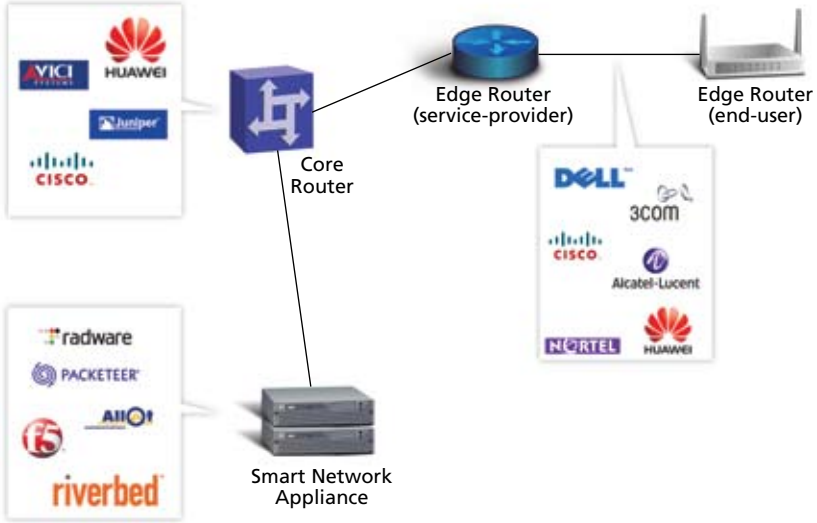
The best example of the evident importance for an open environment to ignite the mobile IP world has recently been demonstrated by Google - the undisputable market leader of IP applications. A few months ago, Google launched an open environment for IP mobile device applications – the Android Operating System. Google's underlying strategy of promoting openness in the mobile IP world, as explained in the Yankee Group's recent report ("Android from Planet Google to save mobile universe", John Jackson, November 2007), is to enable rapid introduction of innovative services by 3rd party ISVs (independent software vendors).

Openness in the Wireline IP Market – Case Study

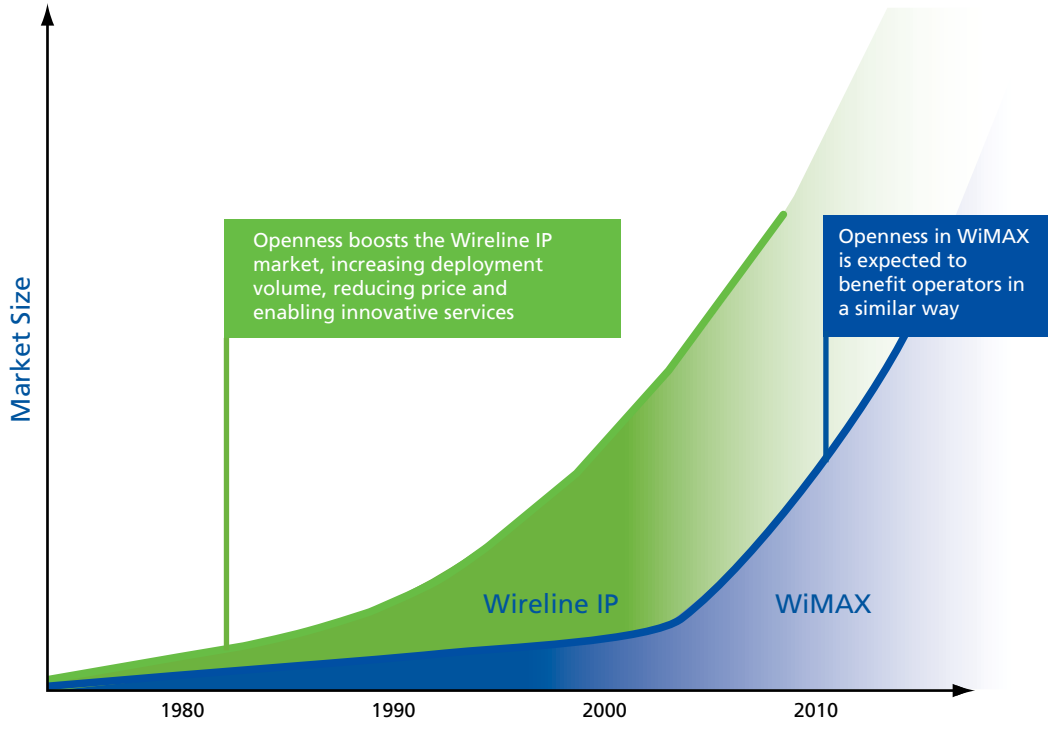
Drawing on the past experience of a similar connectivity market – the wireline IP industry, it is clear that this market's choice of openness further reinforces the conclusion that openness is indeed the ultimate model for the WiMAX industry, as well.

The wireline IP industry, composed of WAN (Wide Access Network), MAN (Metro Access Network) and LAN (Local Access Network), provides end-to-end all-IP connectivity from the edge end-user device to the core network. The WiMAX IP industry bears close resemblance to the wireline IP industry, as it is in essence, the wireless parallel. It is therefore interesting to examine the final steady state to which the wireline IP industry has converged, and draw conclusions regarding the optimal strategy for the WiMAX industry.

For example, one part of the all-IP wireline network is the WAN. The WAN is composed of various components such as core network IP routers, edge IP routers, IP switches and smart IP network appliances. One of the most evident characteristics of the WAN is its complete openness, in the sense that each of these components can be purchased from a number of different vendors with zero or very limited integration effort. For instance, the core network IP routers located at the backbone and responsible for high capacity traffic routing can be provided by companies such as Cisco Systems Inc., Juniper Networks Inc., and Huawei. Same goes for IP network edge routers, which are available from a number of vendors such as 3COM Corp., Alcatel Lucent, Nortel Networks Corp., Cisco, Tellabs and Dell Inc. Similarly, switches can be supplied by Extreme Networks, Foundry Networks, Avaya, Cisco Systems Inc., and Huawei Technologies Co. Ltd., while smart network appliances - such as load balancers and Quality of Service Engines - can be purchased from Radware Ltd., F5, Riverbed Technology Inc., Allot Communications Ltd., and Packeteer Inc.



The introduction of such complete openness has brought about significant benefits to the wireline IP industry. First, the ability to **easily integrate with other vendor's components** resulted in specialized vendors, producing high volumes at low cost. Second, the availability of **numerous alternative vendors for each component**, allows customers such as service providers to exercise significant negotiation power on vendors, further reducing the service provider's CAPEX and OPEX. Third, openness **fosters innovation**, boosting the introduction of smart network appliances such as sophisticated QoS engines that enable service providers to launch new services like high quality VoIP, video conferencing, TV broadcasting, and more.



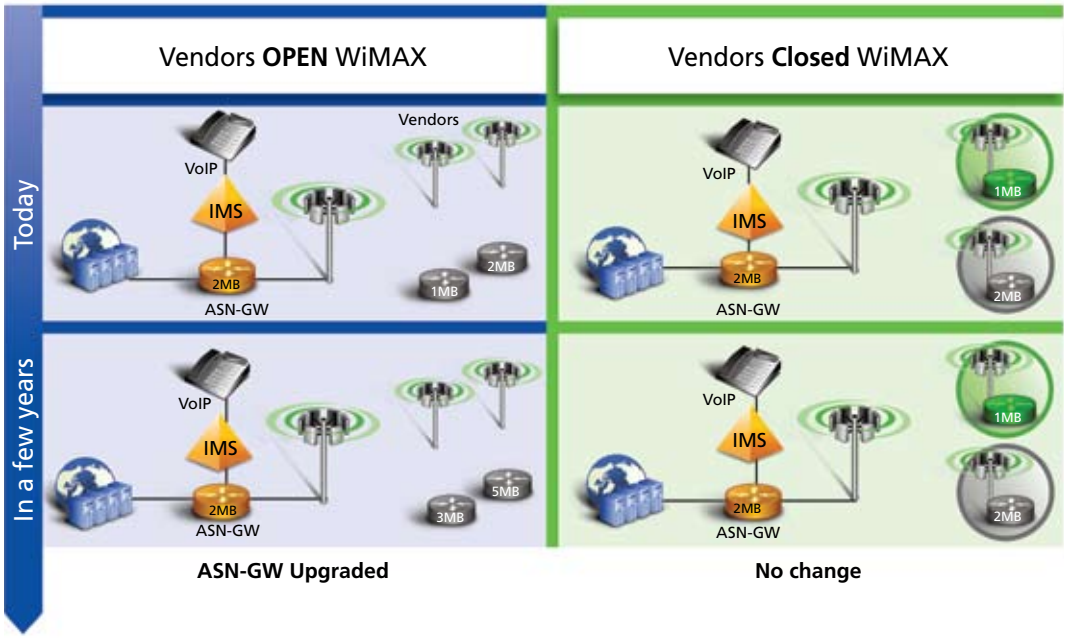
The Advantages of Openness

Best-of-breed – OPEN WiMAX promotes the creation of a best-of-breed ecosystem that is open and standard-based, enabling the optimization of WiMAX networks. Operators enjoy the complete flexibility to take the best from each ecosystem layer, optimizing their overall WiMAX solution. This advantage is reinforced along time, since operators can replace components with the best available components at required points. Operators are not limited to a development and improvement path of a specific vendor.

"Operators like this business model where an underperforming vendor can be easily replaced, but ideally they'd also like one throat to choke. They want system integrators that put all the pieces together, but they want to choose what pieces they use. They want to have a new type of network."

Source: Frost & Sullivan principal analyst for emerging technologies Ronald Gruia, June 2007, regarding operators' expectations from next generation IP networks

Select "best of breed" components - at any point-of-time

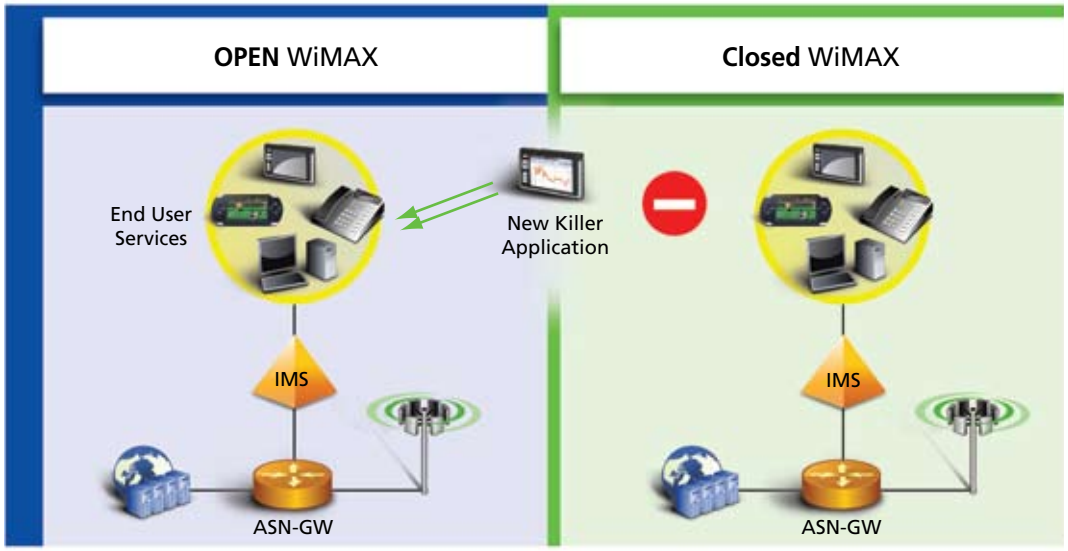


Application innovation – relates to the operator's freedom to add new applications as they evolve. Openness ensures that no proprietary interfaces will block innovative companies from implementing new and innovative applications on the operator's network.

"According to Frost & Sullivan's Ronald Gruia, the operators crave the flexibility and immediacy found in the Internet world. They see how quickly Google can identify a new market and then launch a service to meet it. Telecom operators, which for so long have endured – and in some cases encouraged – long development and launch cycles, want to gain this nimbleness, and the only way is through a complete open network."

Source: Tekelec's Telephony Tech Update Series - Wednesday, June 06, 2007, Kevin Fitchard

With open architecture operator can add the "killer applications"



Purchasing empowerment – refers to the advantage of keeping the purchasing power in the operator's hands. Negotiability has two aspects: CAPEX-related and OPEX-related.

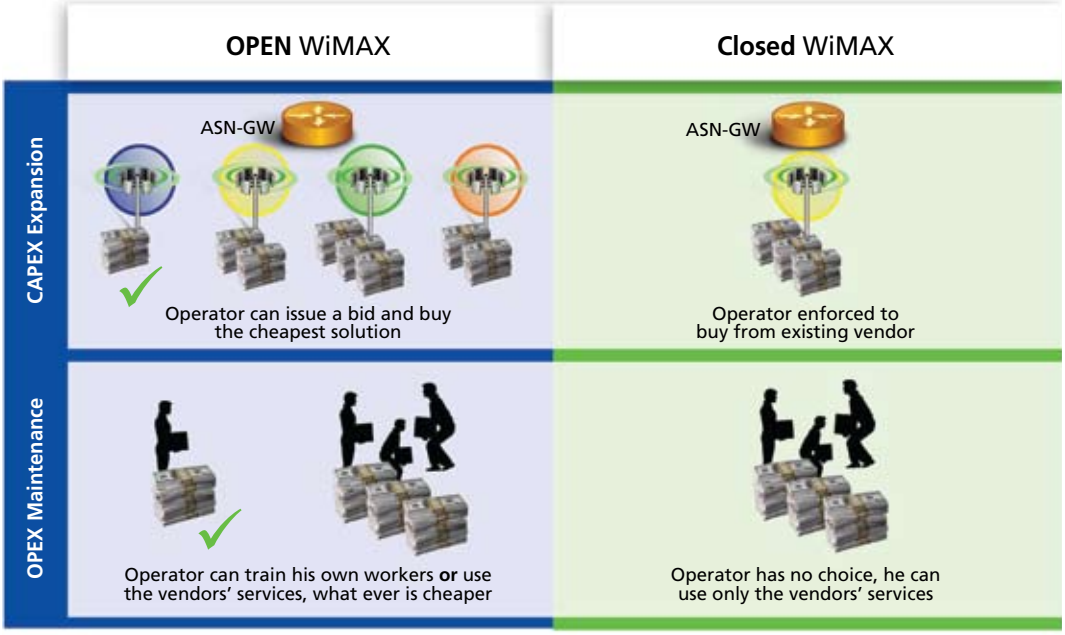
Openness guarantees that the operator can expand with a number of vendors. Therefore, operators can reliably issue a bid and negotiate the best price for their expansion, reducing CAPEX to a minimum. In other words, operators can avoid the frustrating position of being limited to a single vendor.

In a similar way, openness guarantees that maintenance of the fully-transparent WiMAX system can be done by equipment vendors, as well as by the operators themselves or 3rd party support companies. These alternative options again place the operator in a strong negotiation position vs. the equipment vendor, potentially **cutting down OPEX by up to 40%.**

"Our research indicates that robust, credible hardware maintenance competition will typically reduce the incumbent vendor's original bid by more than 20% or save more than 40% by outsourcing to a reliable TPM (Third Party Maintainer)."

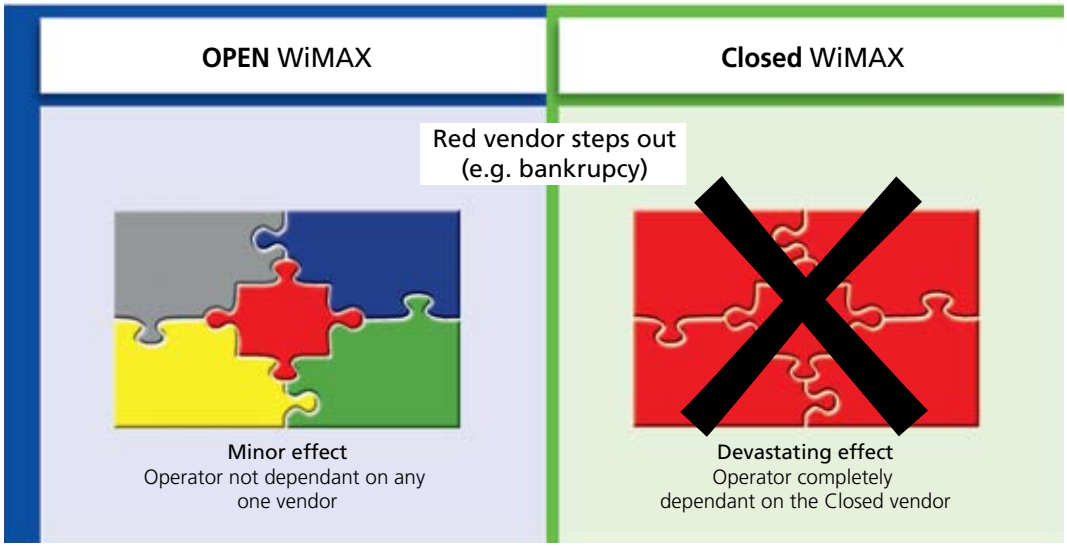
Source: META Group, "Harvesting Hardware Maintenance Savings", Rob Schafer

With open architecture purchasing power remains with the operator



Risk reduction – relates to the benefit of the operator's long-term sustainability against a possible stepping-out (due to specific business unit shut-down, product end-of-life or even bankruptcy) of the WiMAX vendor. The WiMAX market is a compelling place to be in, and many vendors are diverting resources in attempt to capture market share. However, as reality dictates, only some will manage to establish themselves as long term players and others will leave the game whether officially or practically (stop development efforts on new versions of their product). Openness guarantees that such cases will typically affect only part of the operators' network, and can be easily replaced by another vendor of their choice.

With open architecture risk is reduced to minimum



Summary

As clearly illustrated in this paper, the OPEN WiMAX strategy is in the best interest of the industry in general and the operators and service providers in particular. The ability to freely choose each component of the WiMAX solution from the best vendor, ensures an optimal end-to-end solution, boosts competition and reduces prices. In addition, the transparency and intrinsic flexibility designed into OPEN WiMAX systems facilitates easy introduction of innovative, revenue-generating applications of 3rd party vendors running on top of the WiMAX infrastructure. Lastly, market dynamics in similar industries – such as the all-IP wireline equivalent – imply that although TEMs (traditional equipment manufacturers) often do their best to promote their closed, narrow, homegrown solutions, operators quickly realize the risk of totally depending on a specific vendor and strongly opt for open solutions.

Headquarters

International Corporate Headquarters
Tel: +972.3.645.6262
Email: corporate-sales@alvarion.com

North America Headquarters
Tel: +1.650.314.2500
Email: n.america-sales@alvarion.com

Sales Contacts

Australia
Email: australia-sales@alvarion.com

Brazil
Email: brazil-sales@alvarion.com

Canada
Email: canada-sales@alvarion.com

Caribbean
Email: caribbean-sales@alvarion.com

China
Email: china-sales@alvarion.com

Czech Republic
Email: czech-sales@alvarion.com

France
Email: france-sales@alvarion.com

Germany
Email: germany-sales@alvarion.com

Hong Kong
Email: hongkong-sales@alvarion.com

Italy
Email: italy-sales@alvarion.com

Ireland
Email: uk-sales@alvarion.com

Japan
Email: japan-sales@alvarion.com

Latin America
Email: lasales@alvarion.com

Mexico
Email: mexico-sales@alvarion.com

Nigeria
Email: nigeria-sales@alvarion.com

Philippines
Email: far.east-sales@alvarion.com

Poland
Email: poland-sales@alvarion.com

Romania
Email: romania-sales@alvarion.com

Russia
Email: info@alvarion.ru

Singapore
Email: far.east-sales@alvarion.com

South Africa
Email: africa-sales@alvarion.com

Spain
Email: spain-sales@alvarion.com

U.K.
Email: uk-sales@alvarion.com

Uruguay
Email: uruguay-sales@alvarion.com

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