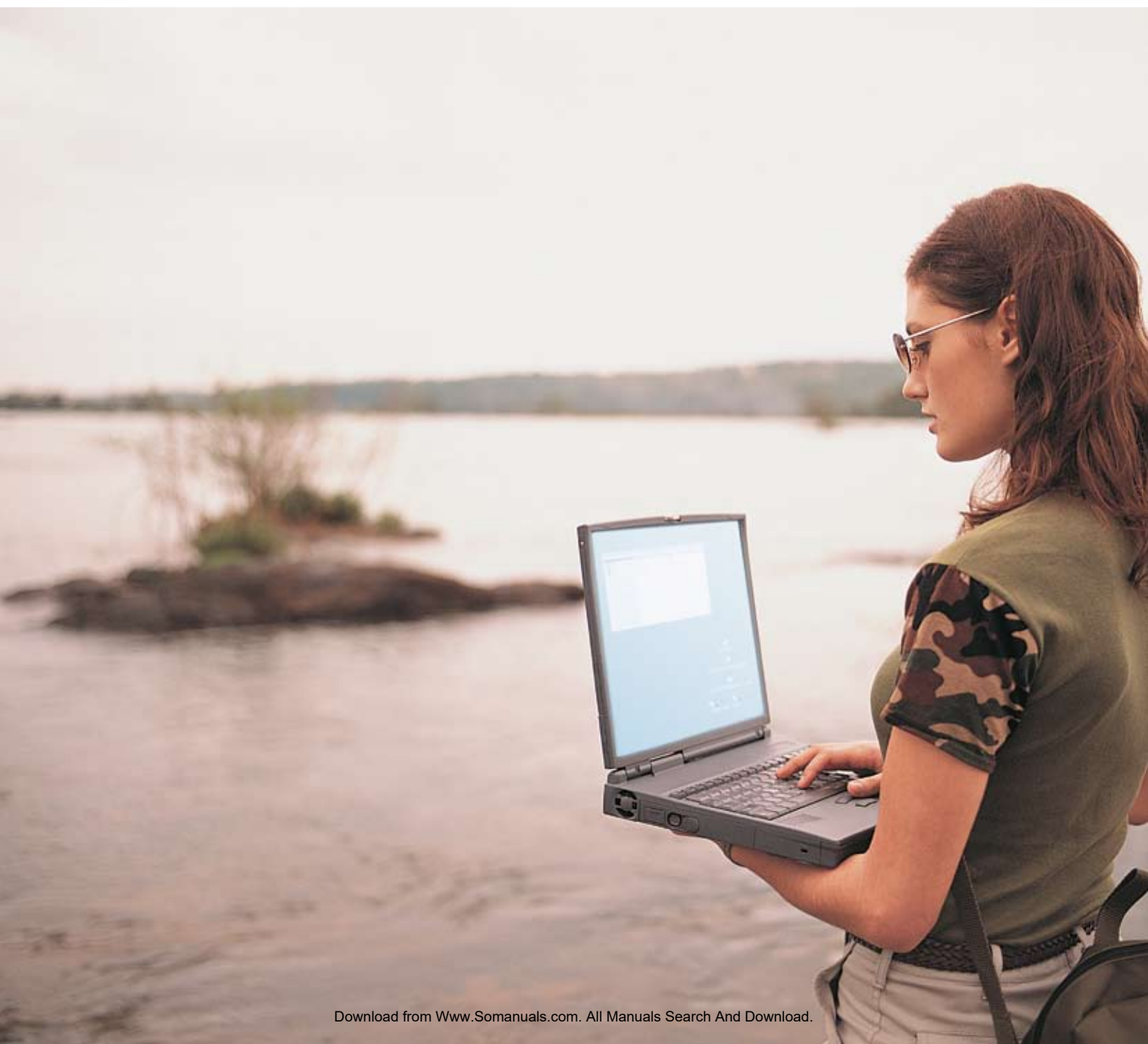


# Alcatel-Lucent End-to-End IP Wireless-Broadband Solution for WiMAX



Delivering speed to market, scalability  
and service evolution, cost effectively





Operators deploying WiMAX need a reliable, streamlined way to roll out broadband Internet and voice services today — while preparing for high-speed growth and new mobile interactive multimedia services. Alcatel-Lucent provides the industry's first comprehensive package of WiMAX infrastructure and services to meet these crucial requirements. Fully integrated and tested, the solution includes:

- All elements required for launching essential services — quality high-speed Internet and voice — with minimal start-up pain and risk
- An optimized end-to-end approach that maintains unrivalled QoS and quality of experience for end users, even amid rapid expansion of subscribers and traffic
- The tools needed to introduce mobile interactive multimedia services at the right time for your WiMAX business



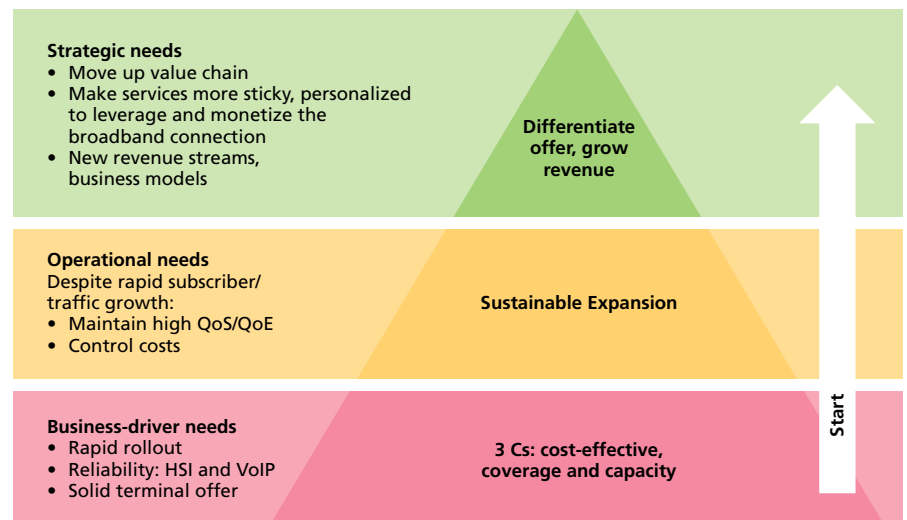
## Meeting the fast-paced challenges of universal broadband

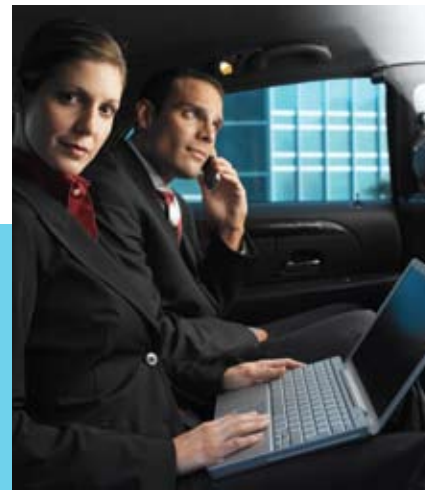
WiMAX offers operators the opportunity to capture the three main pieces of the universal broadband industry trend in a single technology, regardless of whether they are building on an existing business and subscriber base, or starting from scratch:

- *Ubiquity* – untethering the broadband experience from fixed locations, for access anywhere
- *Always on* – continuous broadband availability from the moment the end user wakes in the morning until they retire at night
- *All-IP* – delivery of broadband over 100 percent IP networks offering optimized economics, simplicity and performance

However, in deploying WiMAX today, operators find themselves in unfamiliar territory. The radio technology is new so standard procedures are not established, and even for experienced mobile service providers, the IP networking aspect is a whole new world. There is an elevated need for assurances of a fast, ready-to-market approach, reduced risk and reduced network complexity — both for the initial and subsequent steps in the business. Significant market changes must be anticipated, as the arrival of mobile WiMAX devices and handhelds will soon begin to change users' needs from more classical PC-oriented services to more personalized ones. The rapid ramp-up in subscribers and traffic will also put pressure on service providers to maintain consistent, high-quality service delivery.

Figure 1. Today's requirements for profitable service delivery





### **The requirements for launching a sustainable WiMAX business play out in three steps:**

*Step 1: Cost-effective coverage and capacity* – The initial need is to roll out high-speed Internet and VoIP services quickly and economically, with a high standard of QoS and quality of experience (QoE) for end users.

*Step 2: Sustainable expansion* – In the next phase, as your subscriber base and resulting network traffic grows rapidly, you must maintain this outstanding quality of experience and be able to scale the network at optimized cost.

*Step 3: Differentiated services that grow revenue* – Finally, your competitive need will be to differentiate your service offer, with personalized mobile multimedia applications that enable you to leverage the broadband connection and move up the value chain. Not only can these steps generate new revenue opportunities, but also allow you to take advantage of new business models.

## The Alcatel-Lucent End-to-End IP Wireless-Broadband Solution for WiMAX

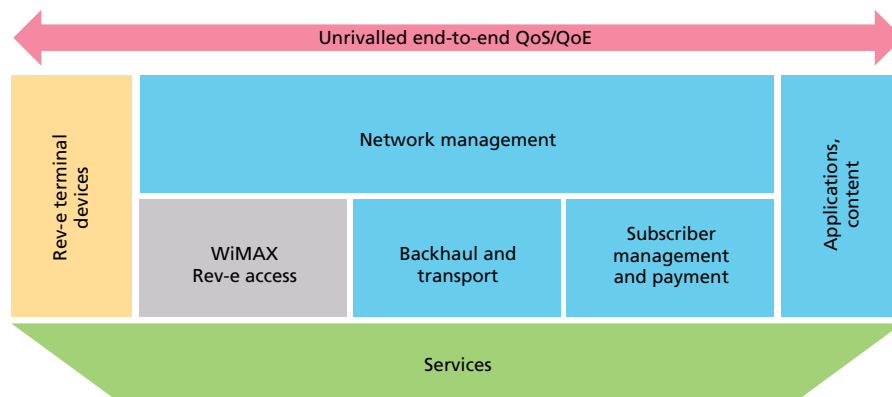


Alcatel-Lucent provides the industry's first comprehensive solution for launching a WiMAX business and addressing the long-term challenges of rapid growth and service evolution. It includes the essentials required for rolling out successful high-speed Internet and VoIP services today, using a fully integrated and tested package that accelerates time to market and minimizes risk. With its optimized, end-to-end approach, this solution supports exceptional QoS and QoE for end users from its onset — and helps maintain service quality as the number of subscribers scales to mass subscriber levels. It is also designed to give you an advanced start when you decide to introduce rich, interactive multimedia services over a growing spectrum of mobile devices. These differentiated offerings can help increase revenues, maintain customer satisfaction and reduce churn.

Only Alcatel-Lucent offers a complete, pre-integrated package of products and services, allowing you to fully benefit from the potential of WiMAX Rev-e today and throughout the next wave of market challenges. The strength of this solution is based on:

- Best-in-class WiMAX Rev-e technology
- Packet-optimized backhaul and transport
- Global IP network integration expertise
- IP mastery for unrivalled QoS/QoE
- Service enablers for revenue growth

Figure 2. Our comprehensive, end-to-end approach



**Only Alcatel-Lucent brings the complete package, allowing operators to exploit the full potential WiMAX Rev-e**





## Best-in-class WiMAX Rev-e

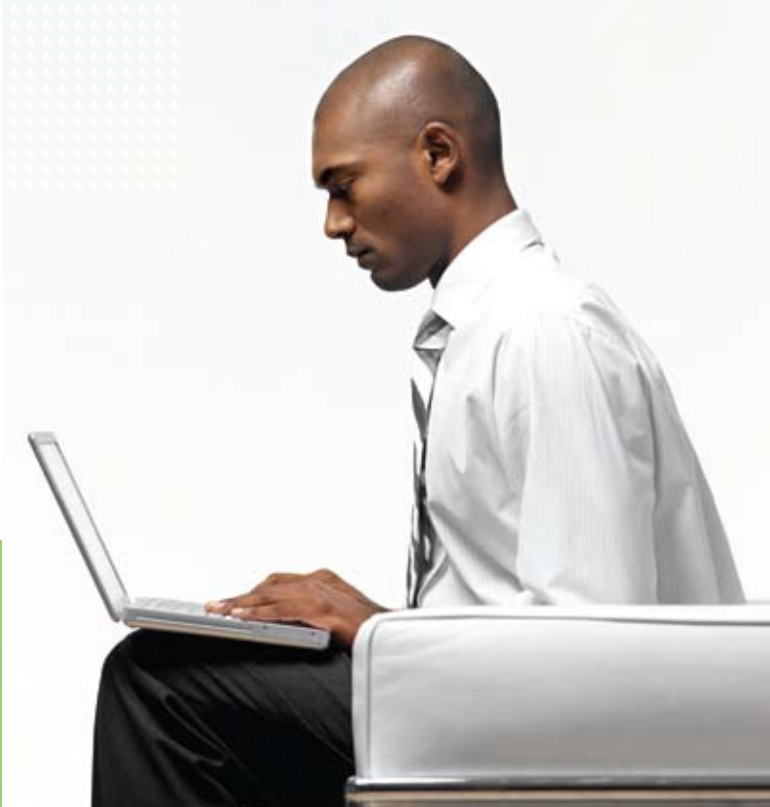
Alcatel-Lucent is the market leader in WiMAX Rev-e access solutions counting the number of commercial network deployments and trials completed or underway worldwide. Our hardened, industrialized base station portfolio is in mass production, supporting all frequencies — and strictly in compliance with Rev-e standards.

*Advanced antenna technology* – Alcatel-Lucent radio solutions incorporate beam forming and MIMO to help optimize coverage and capacity. By reducing interference and increasing spectral efficiency, beam forming offers stable performance in all environments, and coverage improvements can reduce

the number of sites required to establish coverage by up to 40 percent — leading to significant reductions in both CAPEX and OPEX. Combined with MIMO, capacity increases of more than 40 percent become possible — a huge help as networks dimension upwards.

*Diversified base station portfolio* – With compact and light weight distributed remote-radio options (and soon macro form factors), the Alcatel-Lucent portfolio allows for optimized coverage and capacity in any environment, especially as the subscriber population increases in density.





*WiMAX Devices* – Alcatel-Lucent is a leading player in the emergence of an open WiMAX ecosystem. We are driving the early availability of key features by investing in an aggressive interoperability testing (IOT) program, run in WiMAX IOT centers worldwide, as well as by working with over 16 partners — including all major chipset vendors and a growing list of CPE suppliers. We are also reinforcing commercial CPE offerings through multiple go-to-market partnerships and promotional agreements with device partners. The goal is to stimulate competition, making the widest possible array of affordable device choices available to operators. To this end, Alcatel-Lucent is actively involved in the WiMAX Forum standardization and certification process and was a founding member of the Open Patent Alliance, formed to bring transparency to WiMAX-related intellectual property rights.



Alcatel-Lucent 9500 Microwave Packet Radio (MPR)

## Packet-optimized backhaul and transport

As broadband wireless technologies like WiMAX bring unprecedented capacity burdens, backhaul and transport networks are becoming more critical than ever. The industry is late in realizing this area represents one of the highest costs in deploying a WiMAX network. With a wide range of packet-optimized technology options, Alcatel-Lucent offers valuable ways to optimize both the cost of initial deployment and scaling up capacity over time.

Chief among these packet-optimized technologies is microwave backhauling, where Alcatel-Lucent has options for WiMAX — the 9500 Microwave Packet Radio, for example, is full IP with high capacity (2Gb/s), and scalability. The entire microwave portfolio integrates directly into the WiMAX base station cabinet for total cost of ownership (TCO) reductions of up to 18 percent. Alcatel-Lucent's leadership in fixed broadband also brings cutting-edge technology IP/MPLS aggregation and leverages any existing packet optical infrastructure for transport.



## Global IP network integrator expertise

Alcatel-Lucent services capabilities help provide the expertise and global support needed to cope with the many challenges of implementing WiMAX network and business plans. Initially, this means shorter time-to-market and later, it means, growth with optimized cost efficiencies and dimensioning, as well as new service introduction.

*Unparalleled global presence and experience* – Alcatel-Lucent has a network of 20,000 professionals deployed worldwide, including certified project managers, as well as 400 radio and over 300 WiMAX engineers to provide unmatched planning and pre-launch optimization. Alcatel-Lucent operates three IP Transformation Centers on three continents, which facilitate end-to-end solution validation and pre-integration. Backing this is unmatched experience with IP networks, derived from leading roles in several of the world's largest network-transformation projects.

*A broad portfolio of services* – These offerings can assist you through every stage of service planning, deployment and maintenance. They include:

- End-to-end integration, leveraging existing infrastructure wherever possible to optimize economies.
- WiMAX business and network consulting to help you evaluate different approaches to new opportunities
- Site location/acquisition and construction resources to turn your wireless network plans into reality
- Managed operations and maintenance, which allows you to focus on the market



## IP mastery for unrivalled QoS/QoE

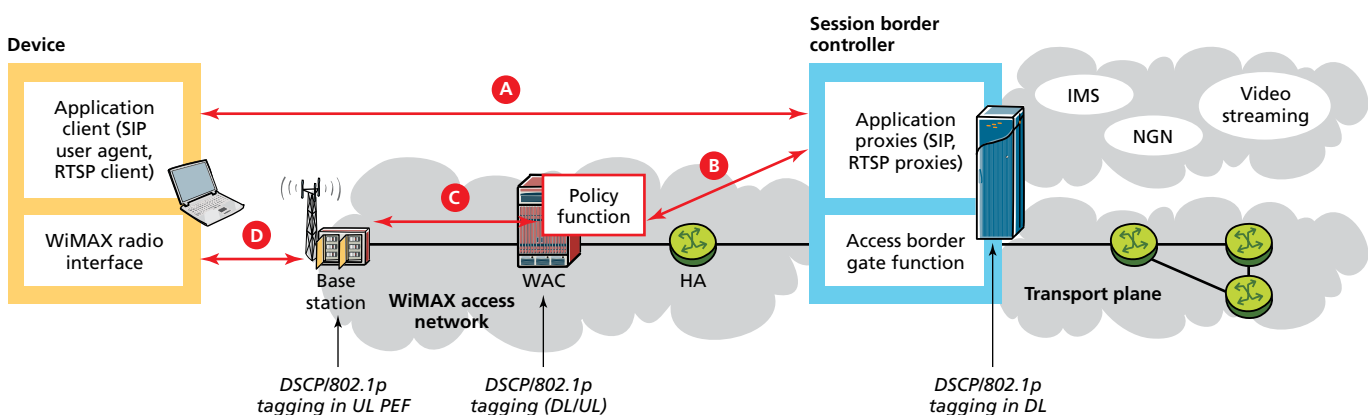
To maintain reliable performance for real-time applications, such as voice over IP and video, the Alcatel-Lucent WiMAX solution manages QoS dynamically, with traffic prioritization across all network levels. Starting with the request from the end-user device, each network level communicates with the others to determine the required QoS level for the session. Then it dynamically checks the network resources available, based on the rights of the subscriber. And finally,

packets are tagged accordingly, establishing end-to-end flows. The result is outstanding QoS. The Alcatel-Lucent WiMAX solution has recorded a voice-quality Mean Opinion Score of 4.1 out of 5.0 in urban field deployments – a higher level of quality than demonstrated with top-quality GSM codecs under ideal radio conditions.

However, IP traffic is much less predictable than in past wireless or cellular networks. The Alcatel-Lucent

End-to-End IP Wireless-Broadband Solution for WiMAX goes even further, incorporating latest innovations from Bell Labs to give unprecedented QoS/QoE guarantees. The Alcatel-Lucent 9900 Wireless Network Guardian is the first product on the market providing simultaneous, real-time visibility over every link of the wireless broadband network where overload could cause the network to crash.

Figure 3. Dynamic QoS managed across the network

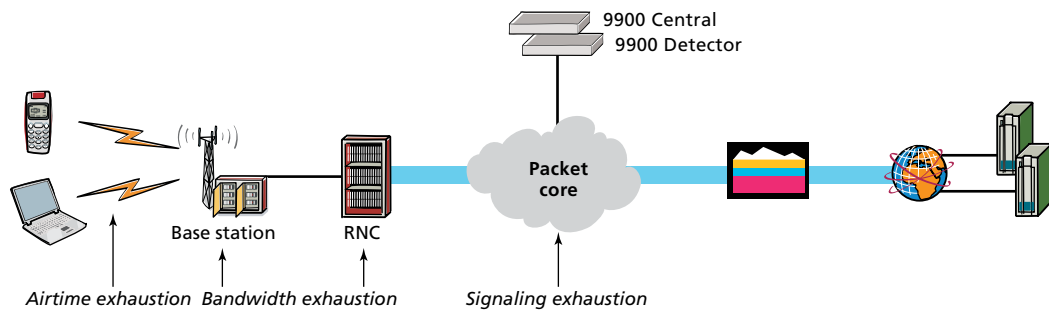
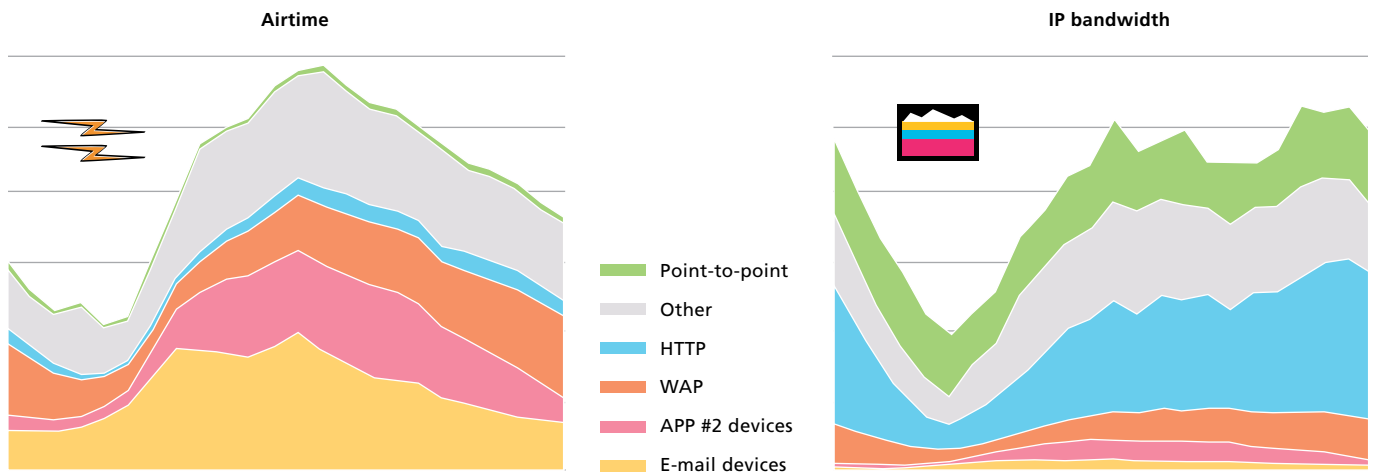




Whereas operators are often attentive to high IP bandwidth consumption such as P2P file-sharing behaviors, airtime and signaling resources can also become exhausted. Leaving VPN connections open for hours when totally unused, for example, can eat up scarce airtime resources in the cell, and mobile e-mail delivery devices create signaling loads disproportionate to the light IP capacity they require. The Alcatel-Lucent 9900 Wireless Network

Guardian provides full visibility into how real end-user behaviors impact network utilization, enabling QoS adjustments in real-time and better network planning. This represents a first step into deep packet inspection technology. The Alcatel-Lucent End-to-End IP Wireless-Broadband Solution roadmap calls for integrating application-assurance capabilities, such as tiered service quality, into the solution using Alcatel-Lucent service-edge routers in the near future.

Figure 4. Innovative radio resource visibility, Alcatel-Lucent 9900 Wireless Network Guardian



## Service enablers

The Alcatel-Lucent End-to-End IP Wireless-Broadband Solution for WiMAX provides the tools to support both your initial service rollout today (typically high-speed Internet and voice) and lay the groundwork for rapid launch of mobile multimedia services whenever the business opportunity calls for it. The Alcatel-Lucent 8610 Instant Convergent Charging software suite enables flexible options for growing a subscriber base: prepaid accounts (scratch card or voucher), instant online sign-up, as well as traditional post-paid accounts from its onset. For existing operators, it allows federation of all charging platforms into a single easy-to-manage database, lowering OPEX. The real-time charging platform also allows operators to reduce OPEX on customer-care call centers, with Web-based self-care. This payment system is ready for service evolution to interactive media and Web-based self-service, and the Alcatel-Lucent End-to-End IP Wireless-Broadband Solution roadmap includes future options to introduce content-based charging.



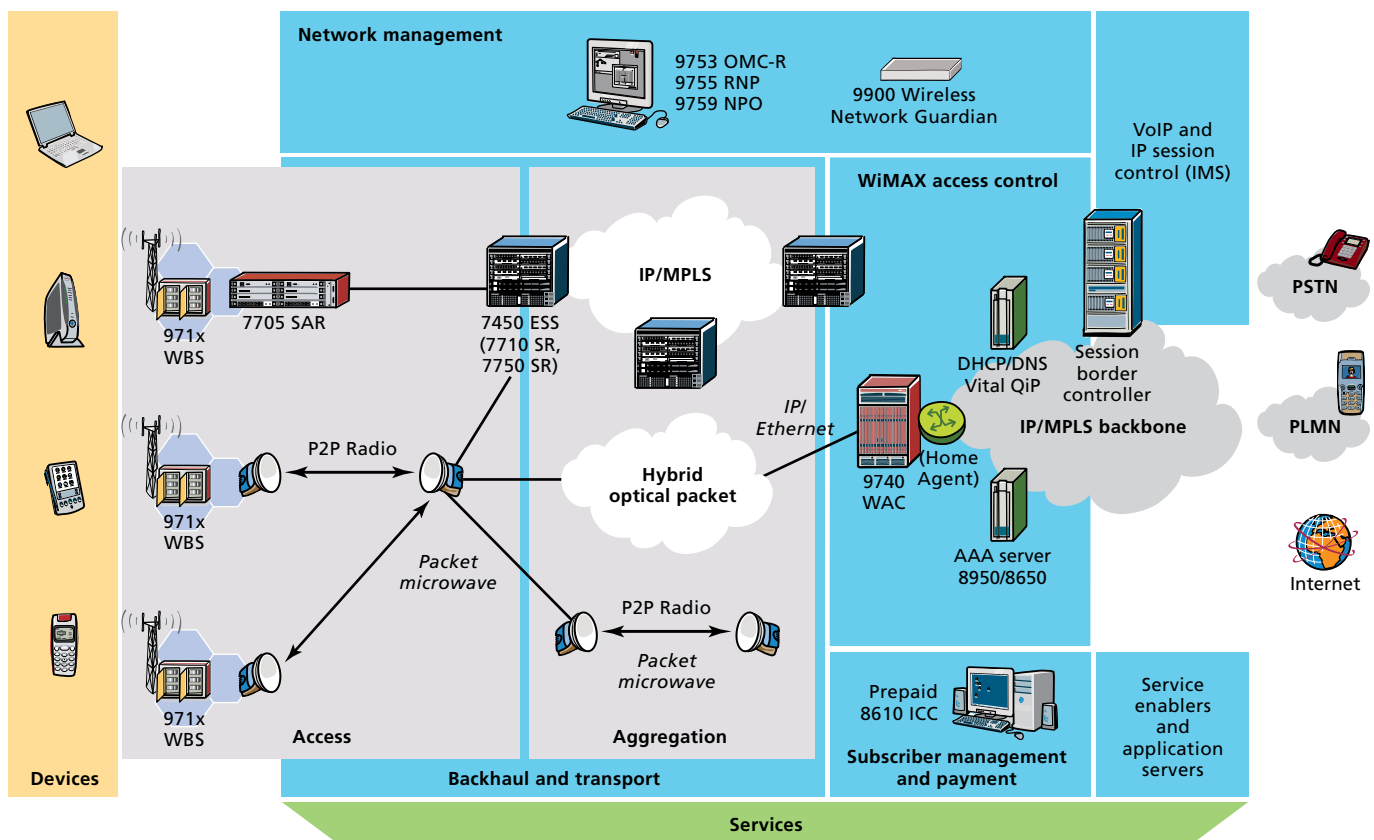


With the Alcatel-Lucent End-to-End IP Wireless-Broadband Solution architecture, you can activate more advanced mobile multimedia services whenever the time is right. The Alcatel-Lucent 5910 Mobile Interactive TV solution enables video on demand (VOD) and streaming music with a consistent end-user experience across both PC and handheld terminals. It provides the required content management, streaming, encryption and digital rights management in a single package, along with an interactive portal. The end-to-end solution can also incorporate Interactive Multimedia Subsystem (IMS), either immediately or as a later step. Once in place, operators can introduce rich multimedia communications services beyond consumer VoIP — for example, presence, multimedia instant messaging, push-to-talk/share/show and online directory. Alcatel-Lucent IMS solutions also enable efficient collaboration with third-party developers to quickly introduce differentiated, sticky new applications.



KEY FEATURES AND BENEFITS	
The industry's first comprehensive end-to-end WiMAX solution, fully integrated and tested	Helps you accelerate time to market, while minimizing costs and risk
An end-to-end IP approach, with full professional support	Enables outstanding performance from onset — and helps maintain both service quality and cost-effectiveness as the number of subscribers grows to mass-market levels
Diverse BTS portfolio integrating advanced radio features, such as MIMO and beam forming	Cost-optimized radio coverage and capacity
Alcatel-Lucent's active engagement with a global device ecosystem	Broadest choice of affordably priced terminal devices
Scalable, high-capacity packet microwave that integrates into WiMAX BTS cabinets, complemented by IP/MPLS aggregation and optical transport options.	Backhaul and transport that optimize costs in both short and long term
Advanced end-to-end QoS/QoE capabilities woven into the entire network	Unmatched quality of experience for end users across a full spectrum of services, higher customer loyalty
Solution offers ability to easily launch new and differentiated mobile multi-media services at the right time for your business	Increase revenues and customer satisfaction, reduce churn

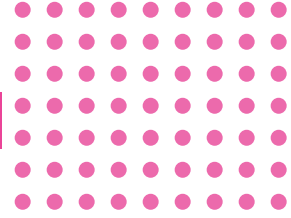
Figure 5. The fully integrated end-to-end solution architecture





## The Alcatel-Lucent advantage

As the world's most experienced partner for IP transformation, only Alcatel-Lucent offers a complete end-to-end package of WiMAX infrastructure and services. This package combines our market leadership in WiMAX radio and IP networking to quickly deliver broadband Internet and voice today. And when your business is ready to grow and add new mobile multimedia services, the solution is ready support your next steps. The following key strengths of this solution are all enhanced and supported by our leading network integration capabilities for wireless IP broadband. The solution offers you a WiMAX business strategy built end-to-end, and built to last.



### **Field-proven WiMAX Rev-e leadership**

- Worldwide leadership in access with dozens of commercial networks, mature products, broad BTS portfolio and radio performance innovation — including both beam forming and MIMO
- Recognized leader in driving an open CPE device ecosystem

### **Universal backhaul and transport solution**

- Recognized leadership in flat-IP architectures
- Packet microwave, and cutting-edge IP/MPLS aggregation and optics options
- Cost-optimization for long-term traffic scaling

### **Sustainable, outstanding QoS and QoE**

- End-to-end managed QoS
- Real-time usage visibility to increase control over network resources

### **Advanced options for increasing revenues and climbing the value chain**

- Full charging and payment capabilities from the onset which evolves as needs change
- Enablers in place for mobile-ready VOD and multimedia, as well as rich multimedia communications
- A roadmap to tiered service quality (application assurance), and content-based charging



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