MOTOROLA wi4 WiMAX SOLUTIONS GUIDE CONTENTS

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Wi4 WiMAX SOLUTIONS GUIDE
OVERVIEW
WiMAX is a powerful technology. It differs from all mobile networks deployed to date in that it uses IP at the network layer for all communications. This fundamental difference is the source of its power. Motorola’s wi4 WiMAX is a versatile, multi-service platform that delivers the power of WiMAX with the flexibility needed to create solutions that serve your specific market requirements and service types. Motorola enables you to deliver a personal media experience to your end-users.

**End-to-end WiMAX solutions that address the full scope of your deployment requirements**

Motorola wi4 WiMAX leads the industry in versatility. Whether you plan to offer service spanning broadband access, fixed voice line replacement, mobile data access, or full mobile communications you will find that Motorola’s portfolio offers the products and services you need to meet your unique goals. Motorola has products at every tier that enable fast time to revenue and high profits. This unique versatility is designed to enable even a diverse set of customers to choose from the wide array of business models possible with WiMAX. With Motorola wi4 WiMAX, you have all the options necessary to make WiMAX a business success regardless of your region of the world and whether you are a new operator or have existing business in wireline, wireless, or ISP services.
MOTOROLA wi4 WiMAX PRODUCTS & SERVICES:
MARKET-LEADING AND AVAILABLE TODAY
Motorola’s products and services lead the market in innovation, enabling you to have confidence that your WiMAX business venture will be a success. Best of all, our market-leading products and services are available today and currently delivering WiMAX 802.16e service to end-users around the globe.

MARKET-LEADING SOLUTIONS:

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCESS POINTS</td>
<td>Wide breadth of options to enable a best-fit network</td>
</tr>
<tr>
<td>ASN GATEWAY</td>
<td>Optimized mobility for super-low latency</td>
</tr>
<tr>
<td>FIXED &amp; NOMADIC DEVICES</td>
<td>Powerful performance that reduces overall network cost</td>
</tr>
<tr>
<td>MOBILE DEVICES</td>
<td>Cool designs that enable the personal media experience</td>
</tr>
<tr>
<td>IMS &amp; SDP</td>
<td>Scalable platforms to enable and monetize rich applications</td>
</tr>
<tr>
<td>MOTOROLA SERVICES</td>
<td>Comprehensive services that deliver optimal networks</td>
</tr>
</tbody>
</table>

Partnering with you to develop an optimal business model tailored to match your market profile and service goals with focus on speed-to-revenue

FIXED, MOBILE, OR FIXED THEN MOBILE
Motorola’s wi4 WiMAX solution is designed with the flexibility needed to keep your service options open. Choose to go directly to mobile service, or lower your initial CapEx costs and time-to-revenue by offering fixed service first. Motorola’s entire portfolio of products is designed to make this transition easy.

With each WiMAX site that is deployed, the service perimeter surrounding that site can be leveraged to deliver fixed connections analogous to traditional wireline broadband as well as nomadic, hot spot coverage similar to Wi-Fi but with greater reach. As the number of sites in your deployment grows to provide more pervasive coverage over a greater geography, you will have the option to introduce mobile WiMAX services in addition to the existing fixed offering.

The flexible, software definable radios incorporated into Motorola’s wi4 WiMAX equipment allows for simple software updates to enable full mobility application—giving you the confidence to deliver fixed, nomadic applications today and to evolve into fully mobile applications as your offerings strategy and market requirements demand the capability.
SERVING THE NEEDS OF DIVERSE OPERATOR REQUIREMENTS

Introducing “Excitement Wireless, Inc.” and “Connect-me Networks Corp.” Motorola’s wi4 WiMAX solution is highly flexible and capable of meeting the unique demands of operators around the world, regardless of location, situation, or requirements. To illustrate this flexibility we have created two hypothetical service providers, “Excitement Wireless, Inc.” and “Connect-me Networks Corp.”, who will appear in each section of this document to show how you can leverage Motorola’s wi4 WiMAX solution for your unique business needs. Let us introduce you to Excitement Wireless and Connect-me Networks.

Flexible solutions spanning core, applications, infrastructure, devices, chipsets, operations & management, and comprehensive services portfolio
Excitement Wireless, Inc.

**Wants to Offer Fixed and Mobile Service Today**

Formed by leaders in the wireless industry, Excitement Wireless, Inc. is trying to accelerate advanced wireless broadband service in a major Tier 1 market.

**WHAT YOU NEED TO KNOW**

- Planning a nationwide network, with initial focus on urban/suburban markets to gain maximum users with mobile broadband needs
- Wants to offer mobile applications as quickly as possible but will offer fixed service as well in Phase 1 to gain market presence, market share and revenue
- Places a high priority on user experience and wants new subscribers to be awed by the performance of the service
- Plans to issue contracts with multiple vendors for infrastructure and devices, and therefore requires interoperability
- Wants its brand to be seen as cutting-edge, making speed-to-market critical
- Owns spectrum in key markets but will need to build roaming relationships

Connect-me Networks Corp.

**Focused on Broadband Access First, with Future Options Open**

Based in a rapidly developing country, Connect-me Networks is eyeing an opportunity to address low broadband availability in key markets and deliver a service that allows users to easily and simply connect to others and via the Internet. Many of Connect-me Networks’ target customers are not close to urban centers.

**WHAT YOU NEED TO KNOW**

- Has limited resources; planning to initially target select regions but needs flexibility to expand if uptake looks good
- Plans to offer fixed service now but license allows for mobility in the future
- User experience is important but cost-effective coverage and reasonable throughput is sufficient
- Planning to go with a single vendor initially for end-to-end design, deployment, and operations to manage costs and complexity
- Investors are looking for business model validation, therefore pressure is high to show profits, however time to market is slightly less critical
- Can negotiate with the government for needed spectrum
Wi4 WiMAX
ACCESS POINTS
Flexible Access Point Portfolio
An optimal WiMAX network requires consideration for your specific market requirements, deployment geography, end-user demands, and planned service offerings—both for today as well as for tomorrow.

Motorola’s Flexible wi4 WiMAX Access Point Portfolio can be easily configured to support a wide assortment of coverage, capacity, and application scenarios utilizing an array of options including macro, micro, sectorized, omni, tower-top electronics, high power distributed electronics, MIMO and smart antenna techniques. With wi4 WiMAX, you will be able to deploy a hybrid network that maximizes performance on a site-by-site basis throughout your service area while tuning your investment to realize the optimal business model.

A best-fit network using a flexible portfolio of infrastructure options

Flexible Deployment Options
Flexible deployment options including outdoor and indoor, wall mounted for on-building installation, pole mounted for existing towers, base mounted for rooftop or ground based systems, and rack mounted where existing sheds are available, provide you with strategic options to manage the over 15% contribution site costs typically pose on network ownership costs.

Motorola’s wi4 WiMAX Access Points are fully compliant to the IEEE 802.16e-2005 technology standard and will be delivered for WiMAX certification to ensure interoperability among the global WiMAX ecosystem.

MOTOROLA wI4 WiMAX ACCESS POINT ADVANTAGES

Rapid Deployment
Speed to market
Designed for ease of installation, management and operations, the light infrastructure solutions deliver flexible deployment options and lead the industry in time to deploy

High Performance
Higher speeds throughout more of the cell
Multi-antenna operations with 2, 4 and 8 element configurations leveraging MIMO A, MIMO B, and Beamforming provide highest coverage and capacity available from any wireless technology platform today

Flexible, Future-Proof Technology
Maximize investments
Motorola Flex™ Modem Technology utilizes advanced, programmable network processors to support advanced antenna algorithms, seamless migration from fixed to mobile application and future technology advancements

Intelligent Mobility
Super-low latency for voice and data
Motorola WiMAX base stations offer dramatic reductions in handover time and latency with dynamic pre-determination of optimal handover scenarios and pre-processing of admission controls

Flat Architecture
Reduced Investment
IP end-to-end, eliminates high-cost centralized boxes, simplifies management, and reduces core transport costs. Integrated design eliminates supporting real estate costs and offers simple, low cost connections between components

Ease of Management
High availability and control
Motorola’s WiMAX Operations & Management platform provides functional and operational features designed to increase system availability, improve service levels, and simplify provisioning and management of network operations.

Interoperability
Motorola is leading extensive interoperability testing and validation initiatives, and has been a lead participant at each of the mobile “plug-fests” sponsored by the WiMAX Forum since 2006. Many chipset suppliers spend considerable time in the Motorola development labs to test and refine their silicon based on interoperability performance with Motorola equipment. If a WiMAX device works with Motorola wi4 WiMAX infrastructure, its path is paved to work with all certified WiMAX infrastructure.
Enhanced Flat IP Architecture
Wi4 WiMAX systems comprised of the WAP 400, WAP 600 and WAP 800 Access Points connect to a simple, peer-to-peer network architecture that features flat, all IP-based design. The architecture significantly reduces the complexity of the network, offers the benefit of faster handovers, provides the foundation for versatile service delivery, and offers freedom in network scalability.

A Trusted Partner
Motorola understands the importance of sound business modeling and system planning tailored to your specific deployment objectives. With a rich history of delivering advanced wireless systems and experience providing WiMAX solutions to markets around the world, Motorola can partner with you to determine the right technology strategy and product mix uniquely suited to your business goals, positioning you to reap the benefits of next generation technology and service.

Fixed, nomadic and mobile connections deliver bandwidth intensive, rich media applications across voice, data, and video services

Addressing diverse deployment scenarios and operating under common management and controls

ACCESS POINT TECHNOLOGY SELECTION
Tower Top and Ground Based
Motorola offers WiMAX base stations with both a more traditional, ground based design as offered with the WAP 600 or with an innovative tower top approach as offered with the WAP 400 and WAP 800. While the tower top approach of the WAP 400 and WAP 800 will offer advantages in operating costs given the light infrastructure design, the ground based WAP 600 can help existing mobile operators leverage current antenna systems, and is capable of delivering higher power transmission that may enhance the downlink coverage area.

MIMO and Smart Antennas
Revolutionary multi-antenna techniques such as MIMO and Smart Antennas at the base station and end-user device, paired with sophisticated signal processing, can dramatically improve the communications link. This enhances the most demanding application scenarios including heavily obstructed propagation environments and high speed mobility service.

The WAP 400 and WAP 600 MIMO systems will demonstrate the greatest capacity gain in environments that offer high scattering conditions such as urban locales—increasing the system capacity by nearly twofold. However, as interference levels increase, the capacity gain that can be realized from these MIMO systems may diminish; requiring techniques that can better manage interference.

The WAP 800 Smart Antenna system provides the greatest performance advantage in high interference environments. The WAP 800 system leverages antenna arrays to control the direction and shape of the radiation pattern—steering and forming the beam to provide an optimal radiation pattern focused in the direction of communication.

Neckarcom uses a wi4 WiMAX system to extend broadband service to rural markets in Germany.
## ACCESS POINTS: FEATURE COMPARISON

### WAP 400
Tower Top MIMO
Light infrastructure approach offering lower operating costs

- **MIMO**: Dynamic switching MIMO A & B
- **Ease of Deployment**: Zero-footprint, thin fiber, integrated antenna with RF module
- **Antenna Elements**: 2 Transmit, 2 Receive
- **Best Fit**: - High scattering conditions
  - High uplink requirements

### WAP 600
Ground Based MIMO
High power system delivering broad coverage for downlink

- **MIMO**: Dynamic switching MIMO A & B
- **Ease of Deployment**: Zero-footprint, thin fiber, integrated antenna with RF module
- **Antenna Elements**: 2 Transmit, 2 Receive
- **Best Fit**: - High scattering conditions
  - Downlink focused requirements

### WAP 800
Tower Top Beamforming
Broad coverage, balanced throughput, noise tolerance

- **Smart Antenna**: Beamforming, MRT, EBF
- **Ease of Deployment**: Zero-footprint, thin fiber, integrated antenna with RF module
- **Antenna Elements**: 4 Transmit, 8 Receive
- **Best Fit**: - High interference environments
  - Balanced downlink & uplink

### Relative Coverage Area

<table>
<thead>
<tr>
<th>UL</th>
<th>DL</th>
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</thead>
</table>

### Relative Capacity

- **MIMO Benefit**

### Interference Noise Tolerance

<table>
<thead>
<tr>
<th>Low SINR</th>
<th>High SINR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MODERATE TOLERANCE</strong></td>
<td><strong>MODERATE TOLERANCE</strong></td>
</tr>
</tbody>
</table>
**ACCESS POINTS: DECISION POINT**

**Wi4 WiMAX ACCESS POINT SELECTION**

**EXCITEMENT WIRELESS INC.**

With a business focus on rapid deployment of a nationwide network, Excitement Wireless is focusing initially on coverage and has selected the WAP 800 in urban environments to provide good coverage radius and deep indoor penetration. For their suburban and rural markets, Excitement has selected to deploy the WAP 600 in their existing cellular sheds to provide efficiencies with their current cellular operations and benefit from the extended coverage offered by the WAP 600 to a segment that typically utilizes more downlink capacity than uplink capacity. Based on Excitement Wireless subscriber forecasts, they will begin introducing the WAP 400 in urban areas in 12-18 months time to address increased capacity focused build-out.

**Connect-me NETWORKS CORP.**

Connect-me Networks has selected the WAP 400 to benefit from the flexible deployment options and lower operating costs of the integrated electronics platform. Connect-me Networks has managed to secure attractive site costs by negotiating with municipal facilities operating companies to mount the equipment on water towers, building walls and rooftops. The WAP 400 installations are being dimensioned for coverage, and given their planned service offerings, they expect to have excess capacity that is forecasted to track subscriber uptake for the next 18 months without additional capacity focused build-out. Connect-me Networks has a rapid deployment plan where they will run localized residential marketing campaigns associated with each new base site to speed time-to-revenue.

*See Section 2, “Serving the Needs of Diverse Operator Requirements,” for a description of these two hypothetical service providers that have been created for the purpose of this brochure to illustrate how the Motorola WiMAX portfolio can meet diverse requirements.*
Wi4 WiMAX ACCESS SERVICE NETWORK GATEWAY
Motorola’s WiMAX Access Service Network Gateway

The WiMAX network architecture lets you differentiate your services in a digital, converged, mobile IP world by leveraging the IP foundations of the WiMAX technology platform and the demonstrated benefits of IP systems including rapid cost declines and ease of management.

The ASN Gateway provides a critical piece of the end-to-end WiMAX network architecture connecting the WiMAX radio access network to a common IP core and offering a centralized platform for those functions best served by localized management including security and mobility management.

With Motorola’s ASN Gateway, the WiMAX experience is optimized and the WiMAX system simply becomes an extension of the IP network to the mobile user.

Seamlessly connect the WiMAX radio network to the IP core, facilitating revenue generating service delivery

Motorola’s WiMAX Access Service Network Gateway
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Seamlessly connect the WiMAX radio network to the IP core, facilitating revenue generating service delivery
Motorola’s ASN Gateway is functionally aligned to the Profile C specification represented by the WiMAX Forum. Motorola’s ASN Gateway implementation allows greater efficiency in radio resource management. Profile C offers a means for cross-vendor interoperability across WiMAX base stations and ASN Gateways where vendors’ solutions have demonstrated necessary capabilities in Network Inter-Operability Testing.

**Motorola’s ASN Gateway**

- Functionally aligned to the Profile C specification represented by the WiMAX Forum.
- Implementation allows greater efficiency in radio resource management.
- Offers a means for cross-vendor interoperability across WiMAX base stations and ASN Gateways where vendors’ solutions have demonstrated necessary capabilities in Network Inter-Operability Testing.

### Profile C

**Platform approach***
- ASN GW and BS implemented in single platform

**R6 Interface***
- R6 interface unexposed

**High Level System Diagram***

```
CSN

↑
R3

ASN GW & BS

RRC  RRA
```

### Profile B

**Platform approach***
- ASN GW and BS implemented in separate platforms

**R6 Interface***
- R6 interface unexposed

**High Level System Diagram***

```
CSN

↑
R3

ASN GW & BS

RRC  RRA
```

---

Motorola ASN Gateway functionally aligns to the Profile C specification offering greater efficiency in radio resource management and paving the way for interoperability.
Excitement Wireless is deploying multiple ASN Gateways to address each of the regional markets they will be serving to address anticipated network loads and align to their regional operating structure. Excitement Wireless has scaled the ASN Gateways to support the mobile subscriber base forecasted by their marketing organization as well as to offer a wholesale service to a number of regional ISPs who have signed agreements to offer service over Excitement Wireless’s WiMAX network. Excitement Wireless has selected two vendors for their nationwide installation and will interoperate between vendor ASN Gateways via the R4 interface for nationwide roaming.

Connect-me Networks is deploying a single instance of the ASN Gateway at their Network Operations Center with management partitioned across each of the selected markets where they plan on delivering service. Data and voice traffic from each market will be sent off-network via a local media gateway to reduce the number of network hops to the Internet while all control functions including authentication and service provisioning will be routed to the centralized ASN Gateway for management. Connect-me Networks will independently scale the control and bearer paths of the ASN Gateway over the coming years to align with forecasted and realized subscriber uptake, increased data usage, and potential for mobile services.

Motorola’s ASN approach offers innovative advances for optimizing mobility on a WiMAX network. Motorola increases the efficiency of the mobile WiMAX system by leveraging the localization of Radio Resource Management at the Access Points as specified in Profile C and by increasing intelligence in the WiMAX control network. Motorola’s ASN can recognize the mobile subscribers that are likely to engage in a handover between access points. By pre-determining the likelihood, the network can send the necessary context information regarding the subscriber’s service flows and subscription profiles to the target access points ahead of initiation. The Access Point community in concert with the control plane management can identify the optimal handover scenario and process the admission controls well before the actual handover has been initiated. This allows for savings in actual handover time, reduced latency and a completely transparent user experience.
Wi4 WiMAX
FIXED & NOMADIC
DEVICES
**Compelling market-tested, award-winning designs compared with powerful performance**

From exceptional performance and ease of use to sleek styling, the Motorola portfolio of WiMAX fixed and nomadic devices offers solutions that will appeal to a broad range of end-user segments, including:

- Enterprise customers seeking robust, highly-reliable connections
- Advanced residential users seeking access to bandwidth-intense multimedia applications
- New users looking forward to their first connections to voice and data.

Motorola's fixed and nomadic WiMAX devices offer you confidence in delivering high performing, highly differentiated service for the most demanding end-users—right from service launch.

Motorola’s wi4 WiMAX device portfolio is fully compliant to the IEEE 802.16e-2005 technology standard and will be delivered for WiMAX certification to ensure interoperability among the global WiMAX ecosystem.

<table>
<thead>
<tr>
<th>MOTOROLA’S FIXED wi4 WiMAX DEVICE ADVANTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reliability</strong></td>
</tr>
<tr>
<td>High device reliability is critical to ensure both an optimal experience for the end user and low operating costs associated with customer visits, device repair or replacement. Wi4 WiMAX device quality is governed by Motorola Networks Quality Standards and an established Quality Review Board. The quality process employs a system test plan developed and executed by Motorola’s SEI Level 5 Test organization.</td>
</tr>
<tr>
<td><strong>Performance</strong></td>
</tr>
<tr>
<td>Unique design advantages offered by Motorola’s fixed device portfolio substantially improve network performance and end-user experience as well as reduce the total cost of operations. Leveraging MIMO, switched diversity techniques, best-in-industry receiver sensitivity and Wi-Fi / WiMAX isolation, Motorola’s fixed devices increase throughput, optimize utilization of system resources, and reduce the number of access points required to provide service.</td>
</tr>
<tr>
<td><strong>Control &amp; Security</strong></td>
</tr>
<tr>
<td>Motorola wi4 WiMAX fixed devices support remote management capabilities allowing administration and health monitoring of the devices from a centralized network or element management system. Advanced security and authentication protocols protect the end-user and the operator from external threats.</td>
</tr>
<tr>
<td><strong>Plug &amp; Play</strong></td>
</tr>
<tr>
<td>With true Plug-and-Play capability, operators are able to speed time to service and reduce operating costs associated with service turn-up. The WiMAX network automatically detects the Motorola fixed device upon power up and performs the necessary authentication processes. An elegant and user-friendly graphical interface allows end-users to self-diagnose their connections and personalize their service.</td>
</tr>
<tr>
<td><strong>Cool Designs</strong></td>
</tr>
<tr>
<td>Following the Motorola tradition of iconic designs, Motorola fixed wi4 WiMAX devices are designed by the same organizations designing next generation mobile devices and accessories. Strong design principles offer you an important marketing opportunity to inspire subscriber adoption.</td>
</tr>
</tbody>
</table>

**Motorola Fixed wi4 WiMAX Device Portfolio**

<table>
<thead>
<tr>
<th><strong>Fixed Indoor</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-install desktop subscriber units with embedded options for VoIP and Wi-Fi that effectively receive signals through building walls</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Fixed Outdoor</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Outdoor subscriber units with unobtrusive installation and significant advantages in coverage and capacity</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Nomadic, Mobile</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>PC cards, USB, and Express Cards to bring the WiMAX connection directly to the laptop for a nomadic experience</td>
</tr>
</tbody>
</table>
**Receiver Sensitivity**
Motorola’s fixed devices offer best-in-industry receiver sensitivity—more than 3 times higher than WiMAX Forum specifications. You can effectively double the area covered by higher order modulation schemes, improving end-user throughput, deepening indoor penetration, and reducing the number of access points required within the service perimeter.

**Wi-Fi & WiMAX Isolation**
Motorola wi4 WiMAX fixed devices feature significantly higher Wi-Fi and WiMAX isolation than alternative WiMAX devices. This important feature increases the effective throughput for the end-user and minimizes impact to overall system capacity by reducing resource intensive error correction and scheduler processing.

**Total Performance Advantage**
Motorola fixed devices offer an 18dB advantage in typical radiated performance over alternative devices. This significant advantage translates into an improvement in network performance and end-user experience as well as a substantial reduction in the number of access points required to deliver service.

The following table represents the components that deliver the performance advantage:

<table>
<thead>
<tr>
<th>Component</th>
<th>Advantage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receiver Sensitivity</td>
<td>+5.0dBm</td>
</tr>
<tr>
<td>Antenna Gain</td>
<td>+1.0dBi</td>
</tr>
<tr>
<td>Diversity Gain</td>
<td>+7.5dB</td>
</tr>
<tr>
<td>Orientation Loss</td>
<td>+4.5dB</td>
</tr>
<tr>
<td><strong>TOTAL ADVANTAGE</strong></td>
<td><strong>+18.0dB</strong></td>
</tr>
</tbody>
</table>

You can effectively double the area covered by higher order modulation schemes.
**Tiered portfolio**
Motorola’s fixed WiMAX devices fit into a tiered portfolio of features and functionality that satisfies diverse market requirements and price points. You have the flexibility to align the best-fit devices to particular end-user segments to deliver an optimized experience with minimized investment.

### Tiered portfolio of devices aligning features and functionality with diverse market requirements and price points

<table>
<thead>
<tr>
<th>FEATURES</th>
<th>FREQUENCY</th>
<th>DESCRIPTION</th>
<th>AVAILABILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Data</strong></td>
<td><strong>VolP</strong></td>
<td><strong>VoIP/ADSL</strong></td>
<td><strong>2.3GHz</strong></td>
</tr>
<tr>
<td>CPE/100</td>
<td>1</td>
<td>*</td>
<td>Cost effective, data-centric</td>
</tr>
<tr>
<td>CPE/150</td>
<td>1</td>
<td>*</td>
<td>Cost effective, data-centric, Wave 2</td>
</tr>
<tr>
<td>CPE/300</td>
<td>2</td>
<td>1</td>
<td>Award winning iconic design with VoIP</td>
</tr>
<tr>
<td>CPE/750</td>
<td>2</td>
<td>1</td>
<td>Iconic Design, Wave 2 ready with VoIP</td>
</tr>
<tr>
<td>CPE/850</td>
<td>2</td>
<td>4</td>
<td>Award winning iconic design, Wave 2 ready with VoIP</td>
</tr>
<tr>
<td><strong>Data</strong></td>
<td><strong>VolP WiFi</strong></td>
<td><strong>VoIP/ADSL</strong></td>
<td><strong>2.3GHz</strong></td>
</tr>
<tr>
<td>CPE/400</td>
<td>1</td>
<td>*</td>
<td>Unobtrusive installation, extended coverage &amp; capacity</td>
</tr>
<tr>
<td><strong>Data</strong></td>
<td><strong>PCMw</strong></td>
<td><strong>VoIP/ADSL</strong></td>
<td><strong>2.3GHz</strong></td>
</tr>
<tr>
<td>PCMw100</td>
<td>1</td>
<td>*</td>
<td>First to market enabling 802.16e mobility</td>
</tr>
<tr>
<td>PCMw200</td>
<td>1</td>
<td>*</td>
<td>Enhanced throughput, Wave 2 ready</td>
</tr>
</tbody>
</table>

*Legend:  = Feature Supported, 1,2,4 = Quantity of Specified Feature*
While the nationwide mobile WiMAX network is being deployed, Excitement Wireless plans to launch their fixed wireless broadband offering on a market-by-market basis as WiMAX base sites are deployed. Excitement Wireless is introducing service with the CPEi 100 and CPEi 300 to offer both data-only and data-plus-voice options. Excitement Wireless will introduce the CPEi 750 and the CPEi 850 in 6 months with a nationwide marketing campaign representing the Excitement Wireless WiMAX experience with their new WiMAX service portal and the stylish designs of the Motorola devices. Excitement Wireless also plans to include the PCCw 100 and PCCw 200 WiMAX data cards targeted to business professionals prior to introduction of their mobile device portfolio.

Connect-me Networks will introduce service with the outdoor CPEo 400 targeted to businesses as well as to residential customers farther away from the WiMAX base sites. Additionally, Connect-me Networks plans to install the CPEo 400 on multi-tenant office buildings where they will split the connection into multiple service streams that they can offer with separate service plans to each tenant. Connect-me Networks will be marketing a low-cost service package for basic data and a package for voice and data using the CPEi 100 and CPEi 300 devices. Connect-me Wireless will also offer the PCCw 100 and PCCw 200 WiMAX data cards to meet connectivity demands of the nomadic business community.

* See Section 2, “Serving the Needs of Diverse Operator Requirements,” for a description of these two hypothetical service providers that have been created for the purpose of this brochure to illustrate how the Motorola wi4 WiMAX portfolio can meet diverse requirements.
Wi4 WiMAX MOBILE *DEVICES*
Mobile Device Portfolio
Mobile WiMAX has the capability to provide rich, multimedia experiences for today’s on-the-go consumer. It can enable services delivered through high speed mobile connectivity for a combination of data, voice, and video applications.

Motorola’s wi4 WiMAX devices will enable personal media on the go and provide a superior experience compared to mobile devices currently available for mobile Internet, multimedia and VoIP. Excellent performance, compelling form-factor and ease-of-use are key features found throughout the portfolio of devices. The portfolio will consider popular device segments such as productivity, entertainment and mobile Internet.

You will likely want WiMAX devices that roam globally and can leverage legacy mobile networks. Motorola will be providing a comprehensive selection of multi-mode / multi-band handheld devices that enable true mobility by providing cellular-like capability and seamless inter-technology handovers.

Cool Designs that Enable the Personal Media Experience

Chipsets Designed for the Serious Demands of Mobility
Motorola will be using in our devices an internally designed complete modem solution for WiMAX that we have been developing since early 2005 to be optimized for mobile WiMAX (802.16e-2005).

Motorola’s WTM1000 WiMAX chipset technology provides a small footprint, low power consumption for longer battery life, high performance, and lower cost, enabling device manufacturers to easily meet the needs of a demanding consumer market.
Excitement Wireless is planning to offer Motorola’s complete portfolio of cool devices to capture the excitement of high speed mobile broadband applications. Motorola’s chipsets will ensure the devices are optimized for the mobile environment.

Connect-me Networks, while choosing to focus first on fixed service, will explore the growing needs of its users and work collaboratively with Motorola to determine the best products as their market matures and needs increase. Connect-me networks will benefit from the growing ecosystem of WiMAX enabled consumer electronics, such as video cameras, music players, and gaming devices. Motorola’s wi4 WiMAX solution allows for easy upgrades to mobility with software and capacity.

* See Section 2, “Serving the Needs of Diverse Operator Requirements,” for a description of these two hypothetical service providers that have been created for the purpose of this brochure to illustrate how the Motorola wi4 WiMAX portfolio can meet diverse requirements.
IMS & SERVICE DELIVERY PLATFORM
The combination of Motorola’s IMS and Services Delivery Platform provide an environment that greatly increases your ability to offer new applications, and profit from them. Whether you are a Wireline operator, mobile operator or new entrant, you will be able to offer multimedia services across both next generation, IP based access networks as well as traditional, circuit switched networks. Motorola’s IMS and Service Delivery Platform are standards-based, access agnostic, and utilize open interfaces and functional components that can be readily assembled to support both real-time and on-demand multimedia sessions with tightly enforced policy management and flexible charging.

**Motorola offers a comprehensive IP architectural framework to support optimal delivery and monetization of personal media experiences**

Motorola’s IMS provides the foundation for developing and delivering rich multimedia services and applications that require real-time synchronous operation. Paired with high performing WiMAX connections, you can deliver the compelling personal media experiences that are demanded by end users, necessary for competitive differentiation and new revenue streams.

**Motorola’s IP Multimedia Subsystem (IMS) is a comprehensive, rapidly deployable, standards-based control layer solution for delivering real-time multimedia synchronous services based on an IP backbone**

**MOTOROLA IMS ADVANTAGES**

- **Quality enforcement**
  Motorola IMS offers the strict policy enforcements to ensure a Quality of Service unattainable from traditional IP solutions and necessary for a true, carrier-grade offering. Management of quality is critical to meet the service assurances for applications ranging from basic VoIP to more sophisticated enterprise offerings.

- **Reduced cost**
  With wide industry support across international standards bodies and built on an all-IP framework, operators will benefit from reduced costs following standards-based, IP cost declines as well as benefit from assurances of cross-network interoperability.

- **Scalable Installation**
  Motorola’s IMS platform offers solutions that can be scaled from reduced investment platforms supporting basic VoIP and data services to sophisticated platforms supporting converged IP multimedia applications.
Motorola’s flexible, modular Service Delivery Platform enables rapid application development, and efficient service provisioning and orchestration across multiple access networks, driving fast time-to-revenue.

Service Delivery Platforms allow you to expose application programming interfaces (APIs) for all network infrastructure components, allowing software developers to easily leverage the power of the network in creating exciting new applications. Motorola’s Service Delivery Platform is among the most comprehensive on the market, yet allows remarkable flexibility. The platform supports the complete runtime lifecycle of an application, including creation, deployment, management, execution, and orchestration. At the same time, Motorola’s platform has the capabilities necessary to create innovative retailing options, supporting provisioning of quad-play services and deployment of applications across multiple access networks.

Motorola’s IMS and Service Delivery Platform offer scalable solutions sized to installations both small and large and supporting applications ranging from VoIP to rich multimedia services.

Operational Support Systems (OSS) and Business Support Systems (BSS), such as service management, provisioning, billing, and customer care, are also key architecture components necessary for managing a rich application environment. Both the Motorola IMS and Service Delivery Platform provide robust connectivity to these systems. The Motorola Service Delivery Platform also provides some key OSS/BSS components, such as pre-paid billing mediation, and service management functionality.

**Motorola Service Delivery Platform Advantages**

- **Tailored services**
  With a flexible architecture supporting service creation, provisioning, and billing, you can customize services by combining voice, multimedia, and messaging services with capabilities such as presence, location and identity.

- **Modular design**
  Motorola’s Services Delivery Platform is highly modular, allowing you to only deploy the components needed based on your service offerings and infrastructure. Motorola works with you to customize a solution that includes the necessary Service Delivery Platform capabilities, as well as system integration of applications and application servers.

- **Fast Time-to-Revenue**
  With quad-play provisioning and bundling capabilities, and a rapid application development environment, Motorola’s Service Delivery Platform helps you generate revenue quickly from infrastructure investments.

Motorola works with you to customize solutions meeting the diverse needs of your end-user base.
Motorola WiMAX System Architecture
The following diagram represents the key functional components driving the end-to-end WiMAX system architecture. The system considers a full IP core solution with an IMS combined with a Service Delivery Platform and Application Servers offering a broad base of application enablers. Recognizing that operators are increasingly employing a variety of technologies in their access portfolio to reach their users in multiple domains, the system represents how multiple access technologies may interconnect to the common core and service delivery solutions.
Excitement Wireless is looking to build a rich application ecosystem very quickly. To do this, they will need the capability to support synchronous voice, video and data sessions over IP provided by an IMS, as well as the open service creation environment and management environment that is provided by a Service Delivery Platform. Excitement has therefore chosen to deploy a full IMS implementation and has custom-tailored an SDP deployment that will allow application developers to have access to key enablers, such as location and presence.

Excitement is planning to integrate their WiMAX network with the networks of the companies that have provided funding for this WiMAX start-up, to allow service bundling and true quad-play offerings. The Service Delivery Platform will allow the provisioning of services across disparate networks. Application developers will also be able to write applications that combine capabilities of the WiMAX network with wireline or existing cellular networks. The IMS will allow call continuity between WiMAX and other access technologies.

Connect-me Networks wants to show return on investment very quickly, however realizes that they need options for future growth. To support both of these goals, they have chosen to deploy the required Service Delivery Platform modules needed to support their current service goals of broadband connectivity and VoIP. They will wait to deploy a full IMS, however they will start deploying key components of IMS, such as SIP servers and Enterprise IP PBX systems, to support IP calls when their network launches. Using Motorola’s scalable, modular platforms, Connect-me Networks will cost-effectively be able to add core network and service layer capabilities that complement current investments in a few years, when they want to begin offering more complex applications to their customers.

* See Section 2, “Serving the Needs of Diverse Operator Requirements,” for a description of these two hypothetical service providers that have been created for the purpose of this brochure to illustrate how the Motorola w4 WiMAX portfolio can meet diverse requirements.
MOTOROLA SERVICES
FOR WiMAX
Motorola Services collaborates with customers to deliver optimal WiMAX solutions across systems and applications addressing the complete lifecycle of a WiMAX deployment.

Motorola currently manages, and continues to build the largest IP-based nationwide WiMAX networks commercially deployed to date.

Motorola integration specialists deploy a WAP 400.

**Optimal Solutions for WiMAX Systems & Applications**

Motorola Services are provided by highly experienced services professionals with proven processes and innovative technology that will ensure you launch your service on-time and on-budget. As you prepare for launch, Motorola can provide Application Services that help you deploy and manage applications to monetize the network, and a service delivery platform to enable an applications ecosystem. We also have the expertise to manage your network, with flexible options based on your requirements and business model. Our people are in every region of the world, and there is no place too remote for us to help you.

With our established, leading-edge network design, systems integration and program management services, supplemented with our proven industry leading experience in successful multi-vendor, multi-technology secured environments, our wi4 WiMAX services have been tried and tested to supply complete solutions as the market moves towards more advanced multimedia, interactive gaming, or Voice over IP (VoIP) services. This expertise enables you to maximize the competitive advantage and efficiencies for your unique WiMAX deployments.

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**SUPPORT SERVICES**

- Support, Training
- Operations, Maintenance
- Optimization
- Security
- Network Management

**INTEGRATION SERVICES**

- Planning & Design
- Installation, Commissioning
- Turnkey Services
- Program Management

**MANAGED SERVICES**

- Out-Tasking
- Out-Sourcing
- Build, Operate, Manage/Transfer
- Hosting Services

**APPLICATION SERVICES**

- Services, Application
- Delivery Framework
- End-User Applications
- Hosting Services
- MVNO

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**REALIZE Implementation**

1. **CONCEPTUAL**
   - Business Assessment/ Modeling
   - Network Evaluation
   - Solution Design
   - Implementation Plan

2. **IMPLEMENTATION**
   - System Integration
   - Program Management
   - Trial—Controlled Introduction

3. **EXTEND Support**
   - Go-to-Market
   - New Service Uptake
   - Monitoring
   - Training
To efficiently plan, design, deploy, manage and maintain WiMAX networks, the Motorola Services business is organized into “practices” that allow us to greatly refine the skills of our people in specific capabilities. These practices are Integration, Support, Applications, and Managed Services.

During a new network roll-out, the capabilities in each of these practices come together to serve you during all phases of the deployment lifecycle. The following are a few examples:

Support Services, offered as Total Network Care, and Integration Services lower total cost of ownership and deliver high network availability

- **Pre-deployment**
  Integration services for design and planning, such as Network Analysis & Modeling

- **Deployment**
  Integration services such as Network Deployment for infrastructure; Value-added Support services such as Network Management and Security

- **Post-deployment**
  Support, Application and Managed services that range from ongoing managed network optimization, to custom development and integration of applications, to a full Managed Services solution that allows you to greatly decrease the risks inherent to operating a network.

Compelling personal media experiences will drive a profitable business model.

**The Motorola Services Difference—IP Integration Meets RAN Expertise**

High-speed wireless broadband networks can be complex to deploy and maintain without the right partner to operationalize the network. Not only are there the demands of integrating IP-based data and multimedia applications, but wireless range over the radio network must be carefully managed to deliver consistent, reliable access for every user.

Motorola currently manages, and continues to build out the largest IP-based nationwide WiMAX network commercially deployed to date, serving wireless broadband to more than four million citizens. We have extensive experience integrating IP with our world-leading RAN capabilities. Motorola Services has been a key component in all of the 17 commercial contracts Motorola has signed for IP-based WiMAX solutions. IP has also been an important component in providing data over other wireless networks, and Motorola has launched more than a thousand wireless networks all over the world.
Application Services provide end-to-end solutions and system integration, from core, to application to device, that allow you to monetize the network and gain fast time-to-revenue.

Managed Services increase efficiency and allow you to focus on acquiring customers while Motorola operates and maintains the network.

Collaborate with WiMAX Experts
Motorola Services collaborates with you to deliver optimal wireless solutions in network infrastructure and applications. Our leading expertise in wireless system integration, network optimization, and security for WiMAX is supported by our leadership in OFDMA, our legacy as an RF pioneer and 70+ years of experience with multivendor, multi-technology wireless networks.

WiMAX offers the potential to have a dramatic impact on the business model of wireless service providers—and Motorola’s w4 WiMAX Services are designed to realize that potential, helping operators through the complete lifecycle of a network deployment. Motorola can help you achieve greater profit through maximum network performance, lower cost of ownership, and differentiating applications.

We have helped secure the networks of some of the largest network operators in the world, integrated and optimized hundreds of complex multi-vendor systems for over twenty years, and have managed over 100 networks worldwide.
INTEGRATION SERVICES
Design, Planning, and Deployment
Lower Total Cost of Ownership and Faster Time to Revenue

• **Analysis & Modeling**—Accurately predict network behavior before launch

• **Deployment Services**—Cost-effective, on-time design and deployment under aggressive schedules of end-to-end solution (incl. 3rd party components)

APPLICATION SERVICES
Custom-tailored, Efficient Application Solutions to Monetize the Network
Increased Revenue, Speed to Market, Competitive Differentiation

• **Comprehensive Solutions**—Mobile Entertainment, Mobile Commerce, Mobile Enterprise, Personal & Social Communications

• **Service Delivery Platform**—Full customization and system integration of the Motorola Service Delivery Platform, for faster deployments and a broader applications ecosystem

• **Consultancy**—Advisory services to create compelling user experiences

• **Solution Integration**—Full solution from content to network to devices

SUPPORT SERVICES
“Total Network Care” for Support, and Performance
High Availability, Lower OpEx and CapEx, Higher Customer Satisfaction

Motorola’s Total Network Care consists of multi-vendor, multi-technology support services designed to help you meet the highest performance standards.

• **Basic Support**—Single-point of contact for operational support, maintenance and technical training to reduce site visits and increase operational efficiency and quality.

• **Value Added Services**—Achieve even greater performance and manageability from a fine-tuned network to maximize your investments

  - **Network Optimization**—Optimal performance and enhanced capacity with market-leading analytical tools and processes

  - **Wireless Network Security Services**—Protect the WiMAX network with a holistic, real-world security architecture.

  - **Network and Service Management**—A holistic system view to manage the health of a network, and simplify integration of billing for new applications

MANAGED SERVICES
Out-Tasking, Outsourcing, Management, Hosting
Increased Confidence and Allow Focus on Core Competencies

Motorola monitors some of the largest access networks in the world, and is leveraging that capability as a leader in managed services for wireless broadband.

• **Out-Tasking**—Realize maximum efficiency in specific tasks

• **Outsourcing**—Decrease risk in key functions of your operations

• **Build, Operate, Manage/Transfer**—Gain confidence through service level agreements defined by key performance indicators. Maintain flexibility to manage the network in the future.

• **Hosting**—Deploy applications or systems without large initial investments
Excitement Wireless needs a system integrator that has leading technology, tools and experience with mobile WiMAX. Excitement selects key services such as integration and support to get the network running at peak performance levels, and for fast time to market. Excitement leverages Motorola’s out-tasking services for ongoing optimization of the network after launch. Finally, Excitement uses Motorola’s Application Services to deploy and integrate a WiMAX application layer environment for rapid application deployment, delivery and management, and a 3rd party application ecosystem.

Connect-me Networks has been focused on customer acquisition, therefore needs to leverage the full scope of Motorola’s Managed Services capability. In addition, the ability for Motorola to scale as needed for Connect-me Networks will fit very well with their plan for a staged roll-out of service based on user uptake. To ensure Connect-me can continue cost-effective operations, they will utilize Motorola’s Technical Training solutions to get their people up to speed on operating a WiMAX network as quickly as possible.

*See Section 2, “Serving the Needs of Diverse Operator Requirements,” for a description of these two hypothetical service providers that have been created for the purpose of this brochure to illustrate how the Motorola wi4 WiMAX portfolio can meet diverse requirements.

Motorola manages Wateen’s deployment and network operations in Pakistan.
Wi4 WiMAX

SUMMARY
WIN MARKET SHARE NOW WITH MOTOROLA wi4 WiMAX, AVAILABLE TODAY

WiMAX has created a unique opportunity for service providers to break into new markets, and unleash the power of broadband networks. Motorola wi4 WiMAX is the versatile portfolio needed for delivering all-IP mobile or fixed broadband service to subscribers today.

Motorola has the global deployment and management experience and business model expertise to help service providers of all types, including wireless operators, ISPs, and greenfield operators, to launch a profitable WiMAX service with fast speed-to-revenue. Our solution includes all the components needed to offer service to end-users, and has the flexibility to tailor those components as necessary for very diverse requirements.

Motorola has received significant recognition for its wi4 WiMAX portfolio, including awards for Network Architecture, the Flexible Access Point Portfolio, Customer Premises Equipment, and our global deployments and management. Our aggressive roadmap aims to continue leading the market in WiMAX products and services.

MOTOROLA MOTOwi4 SOLUTIONS

Motorola wi4 WiMAX is part of the Motorola MOTOwi4™ comprehensive wireless broadband portfolio. MOTOwi4™ addresses the needs of the wireless broadband market with end-to-end solutions covering all aspects of the broadband wireless access deployment. With a deep and extensive product and services portfolio, RF leadership, decades of R&D investment, and experience as a global supplier of broadband wireless access solutions, Motorola partners with operators to achieve a best in class wi4 WiMAX network experience.