Alvarion WiMAX Solution and Portfolio

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Pre-Sales Manager

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Agenda

- Alvarion at a Glance
- The Environment
- Product Portfolio
- Alvarion WiMAX Solution
- Success Stories

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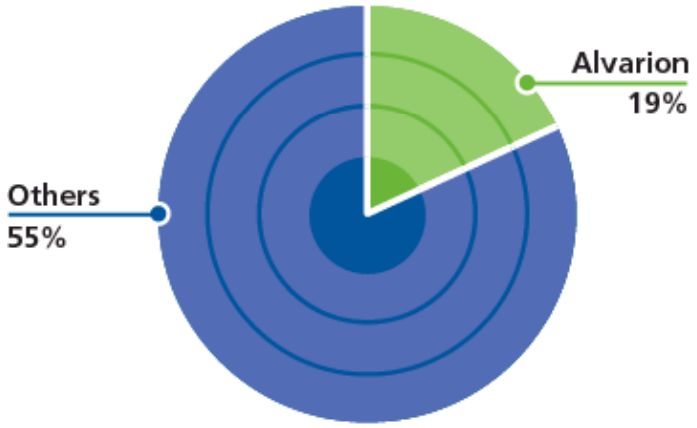
Alvarion at a Glance

Alvarion

Highlights

- WiMAX pure player
- OPEN WiMAX end-to-end offering
- Innovation in broadband wireless IP technologies
- World's preferred WiMAX choice



Source: Sky Light Research,Sept 2008

Facts and Figures

- Founded: 1992
- Employees: 1200, including 500+ R&D engineers
- International presence: over 25 offices worldwide
- Publicly-traded (NASDAQ: ALV)
- 225+ commercial WiMAX deployments
- 50+ mobile WiMAX deployments; 30+customer trials (Q2/08)
- 7+ years of WiMAX experience
- 15+ years of broadband wireless IP experience

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Mission and Strategy

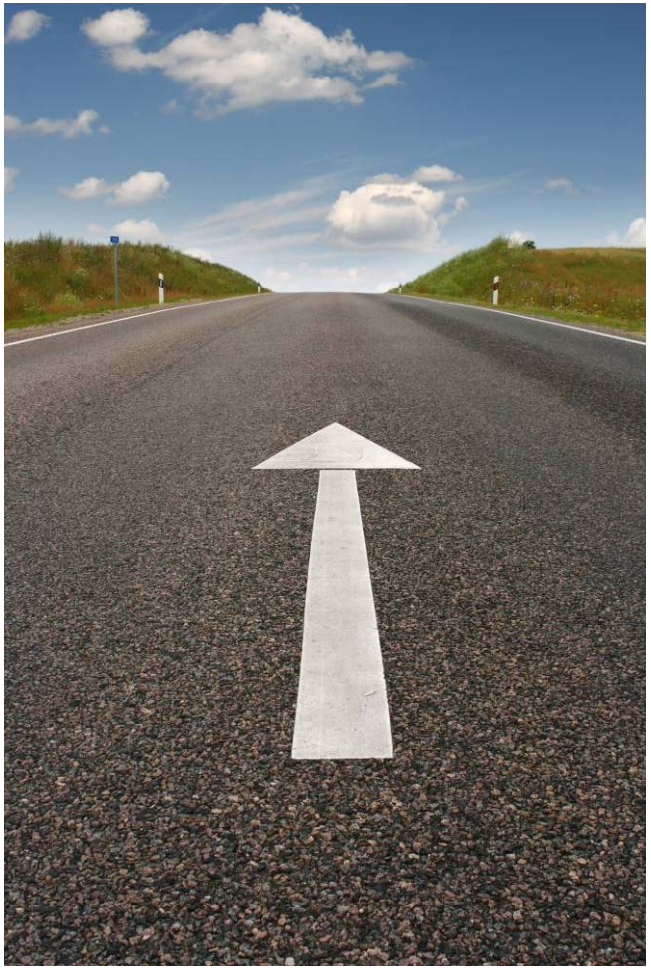
Mission

Be a dominant global player in the broadband wireless industry

Strategy

Maintain broadband wireless access market leadership and growth

Leverage on assets to lead the WiMAX Personal Broadband market



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Company Values

- Do the right thing right
- Respect the individual
- Excellence
- Customer-centric focus
- Strength of purpose

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The Environment

The Business of WiMAX (1)

Personal Broadband

Where…

Developed markets

High broadband penetration

What…

Broadband anywhere, any time, and on my devices

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The Business of WiMAX (2)

Primary Broadband and Voice Services

Where…

Emerging markets
Rural and urban regions in developed markets

What…

High speed Internet and voice services

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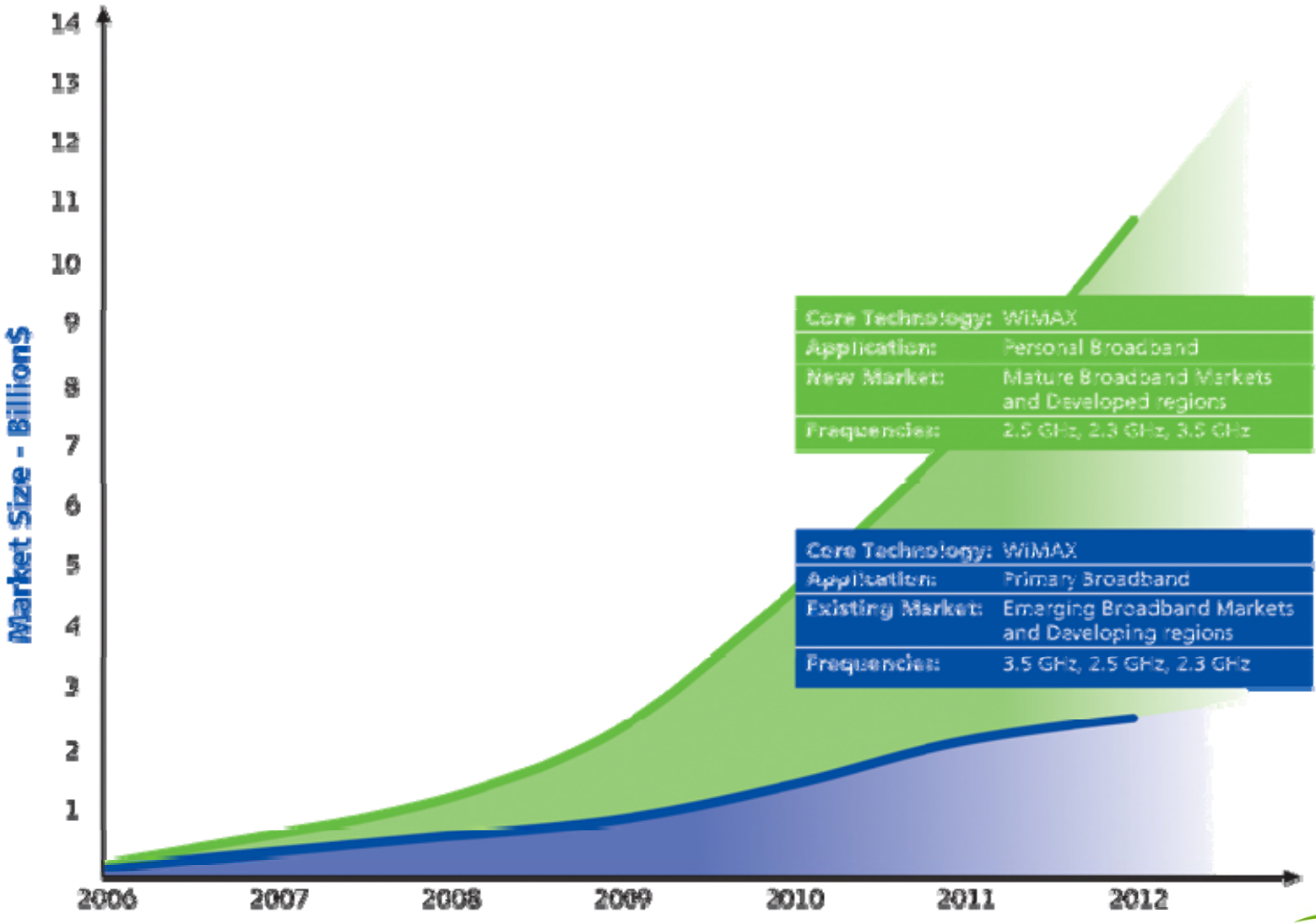
Primary & Personal Broadband



Source: Alvarion based on various research reports

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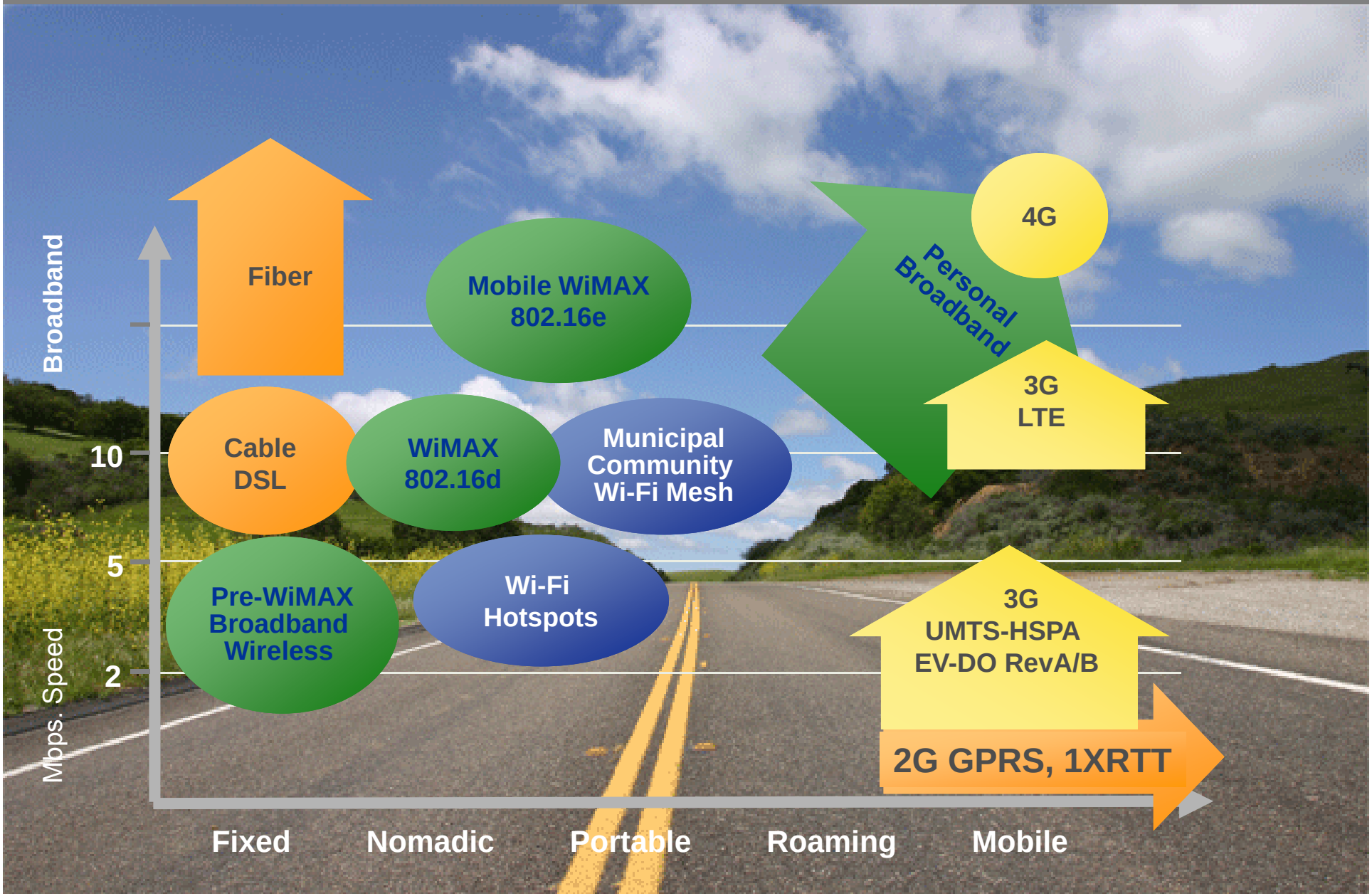
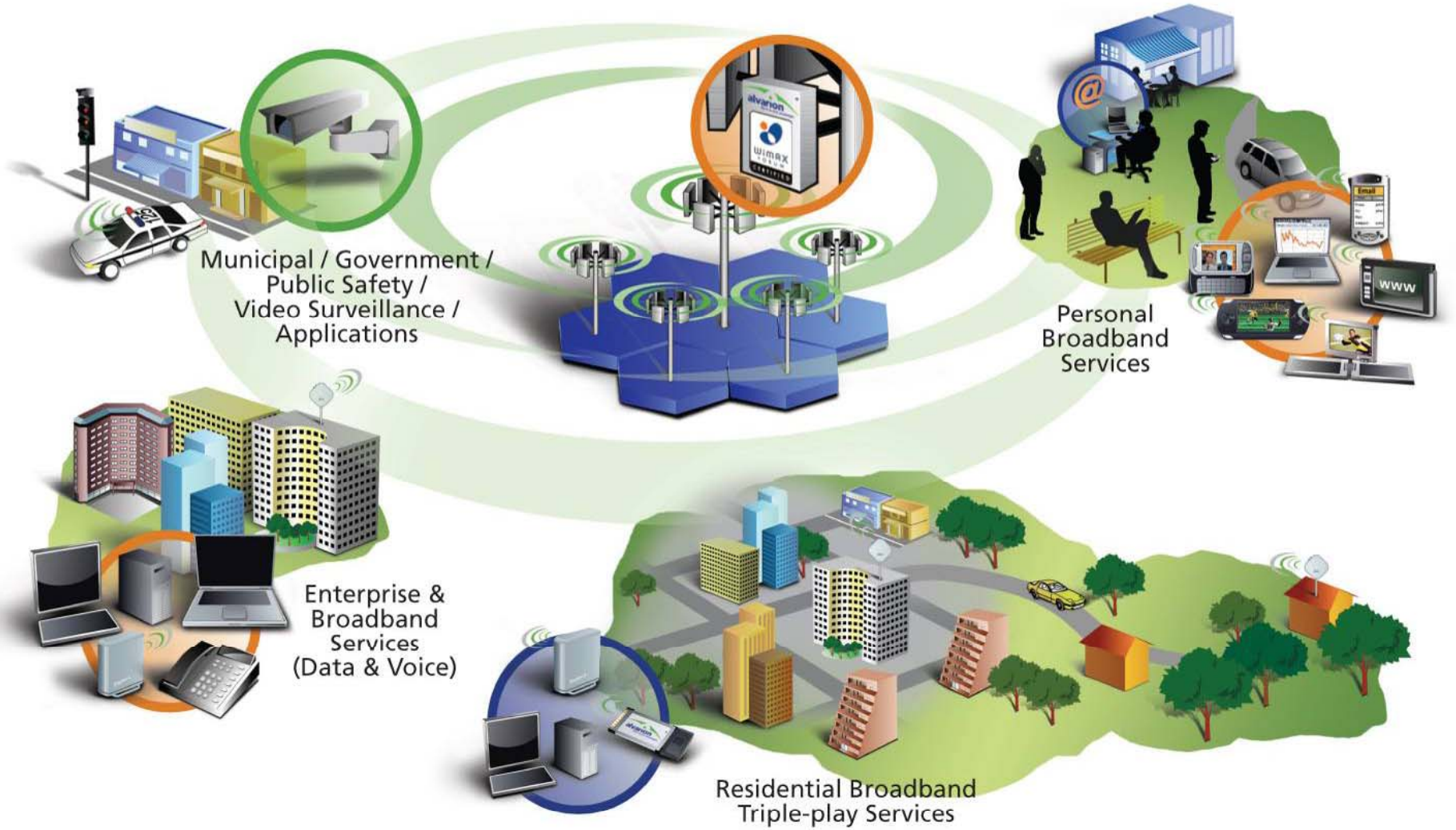
The Road to Personal Broadband



OPEN WiMAX Best-of-Breed Ecosystem

Alvarion Product Portfolio

Alvarion's Business Segments



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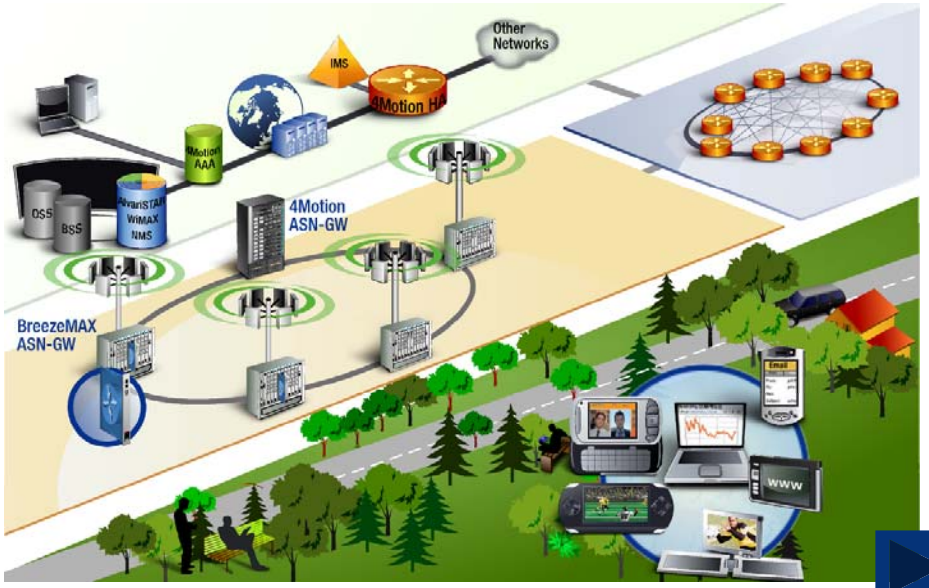
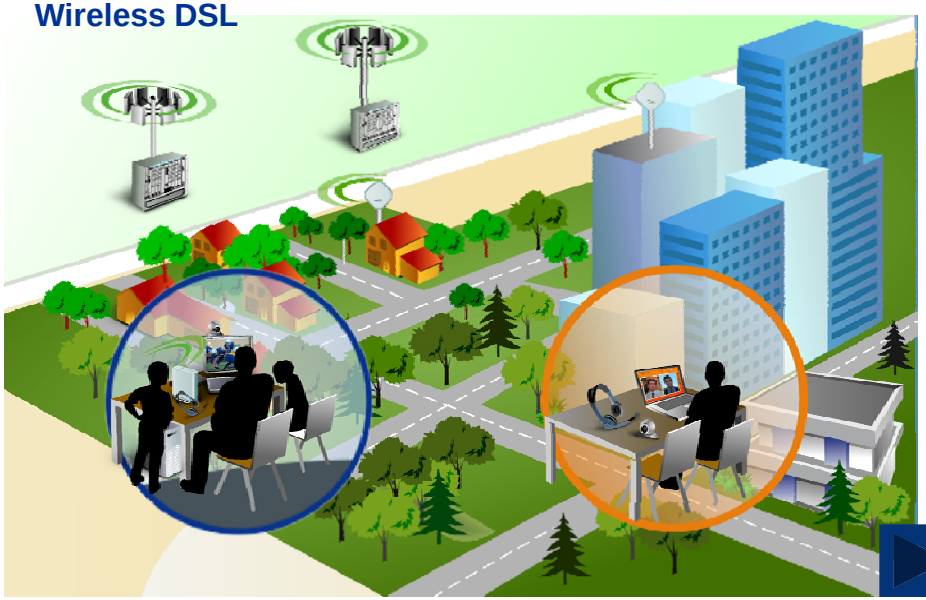
Strategic Segments and Offerings

Personal Broadband Services

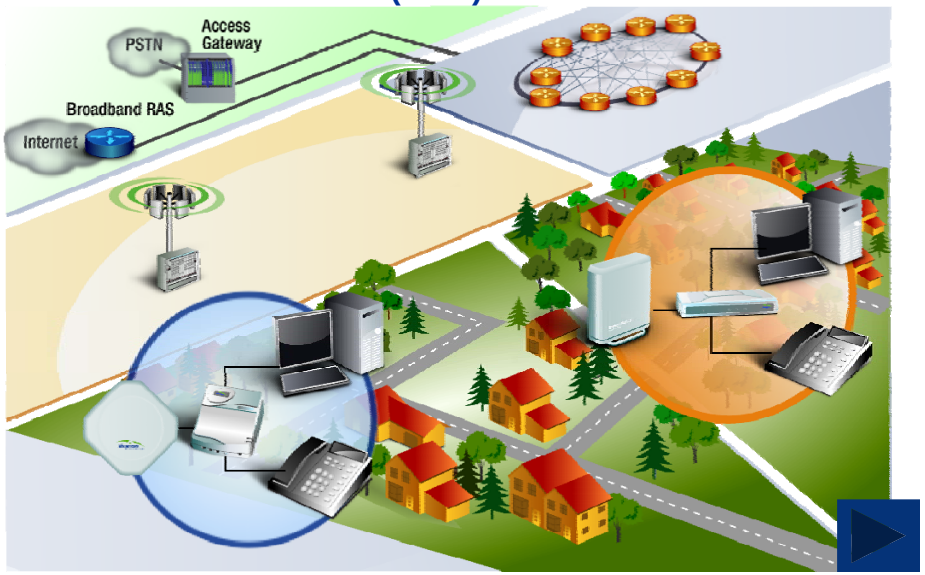


Municipal / Public Safety / Surveillance / Private Networks

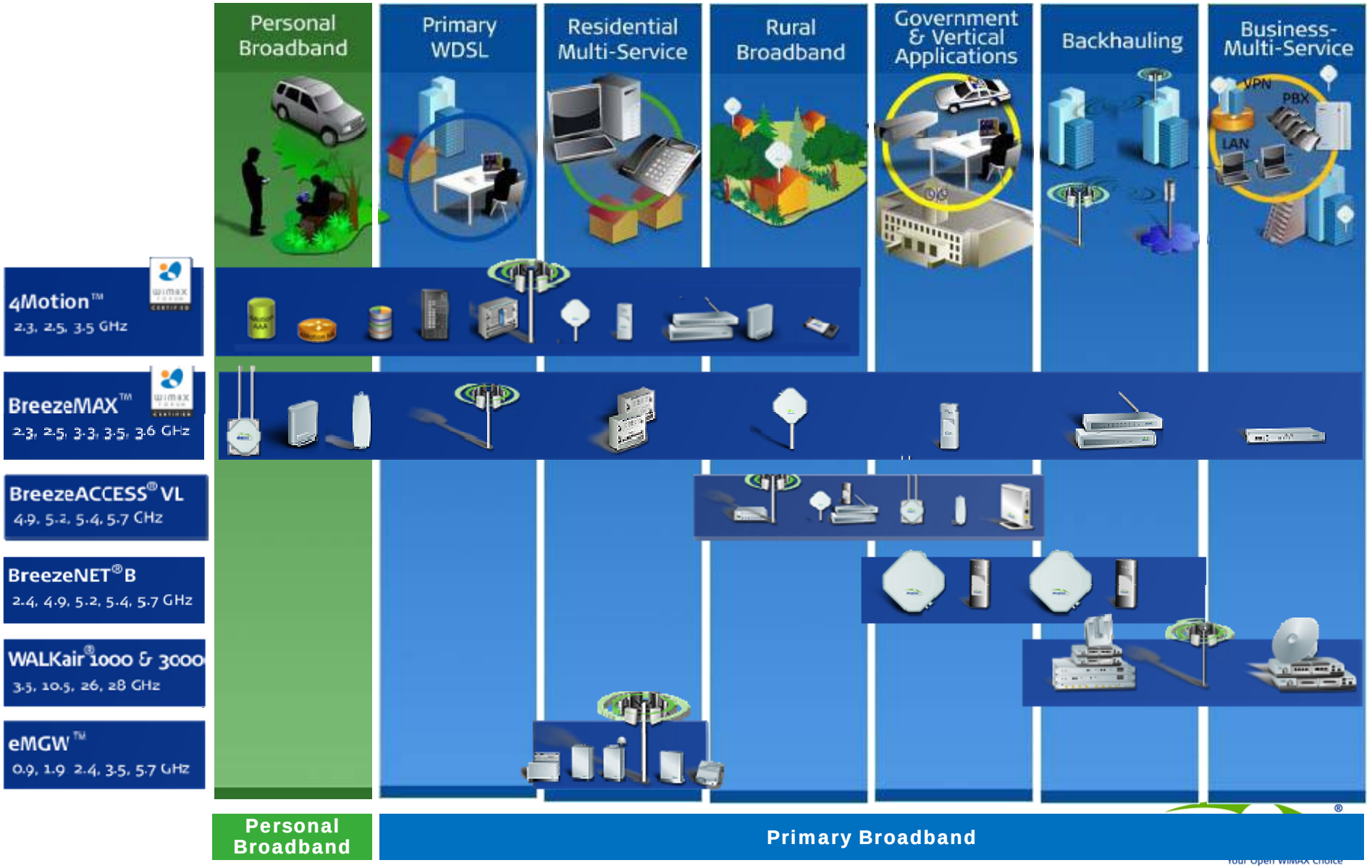
Wireless DSL



Residential Multi-Service (RMS)



Strategic Segments and Solutions



Comprehensive Suite of Services

Support

- Training
- Operations
- Maintenance
- Optimization
- Security
- Network management

Integration

- Planning
- Design
- Installation
- Commissioning
- Turnkey services
- Program management

Solutions

- Vendor comparison and selection
- Integration
- Delivery
- Deployment

Business

- Business case and model
- Option selection
- CAPEX and OPEX optimization
- Rollout plan

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End-to-End Solution Offering

- A complete range of solutions, products, and services for WiMAX networks
- OPEN WiMAX network strategy approach
- Alvarion provides end-to-end solutions

Alvarion takes responsibility for the end-to-end solution

OPEN™ WiMAX in Practice

OPEN WiMAX - In open architectures service providers choose the combination of vendors and partners that best fit their specific requirements

- **Enables operators to choose best of breed solutions**
  - **Best-in-class products**
  - **Best-fit products and solutions**
  - **Limitless mix & match combinations**
- **OPEN WiMAX solution delivered by pure-play vendor alliances**
  - **Leverage expertise of each pure-play vendor**
  - **Winning teaming and cooperation agreements**

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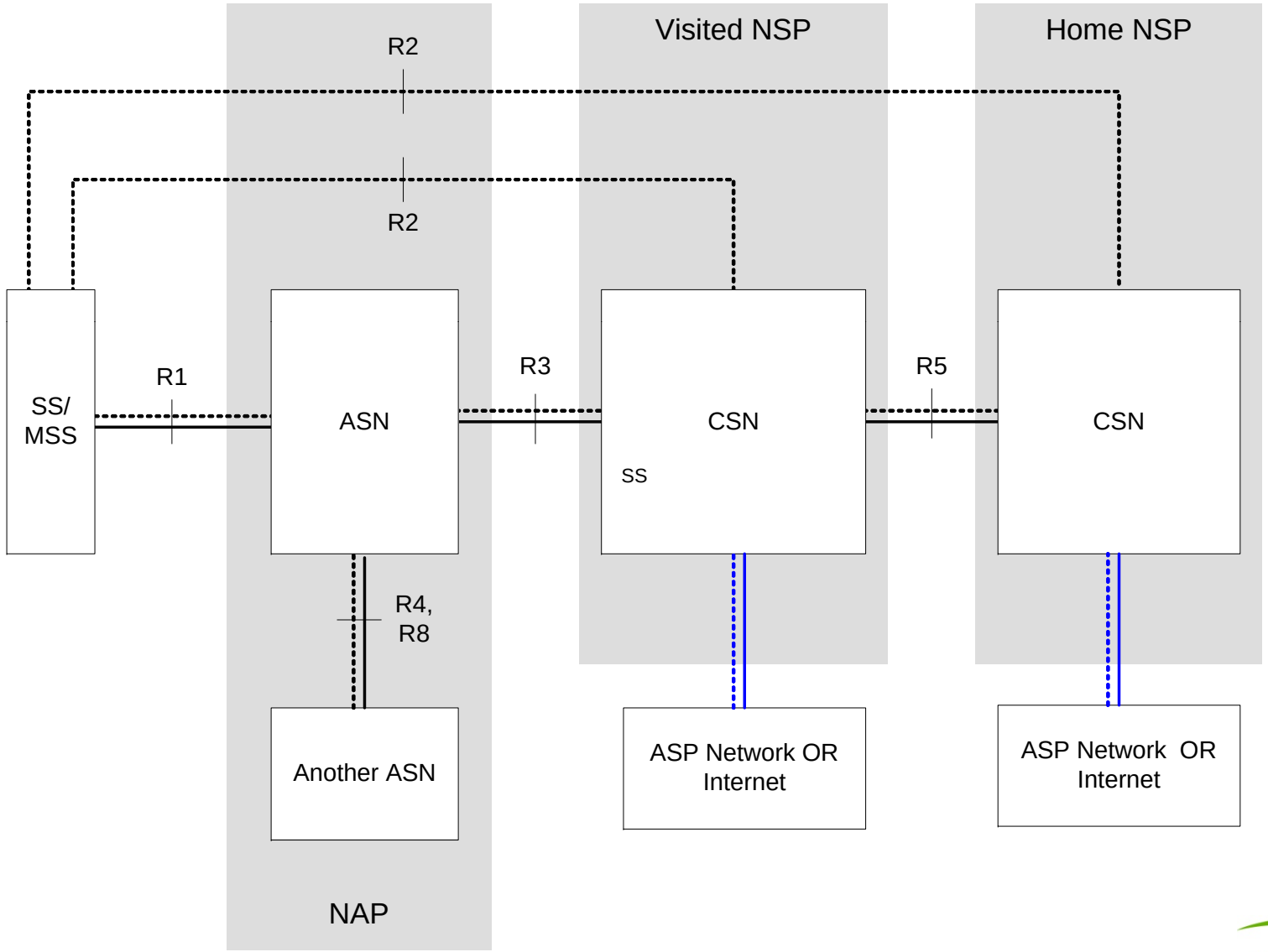
WiMAX Leadership in Transformation: OPEN™ WiMAX Best of Breed

WiMAX Network Reference Model



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WIMAX ASN Profiles

- **Three generic profiles in WIMAX NWG**
- **Profile A (removed by the WiMAX Forum)**
  - **Decomposition of BS and ASN GW (with R6)**
  - **Centralized ASN GW only**
  - **Handover Control (RRM) in ASN GW**
- **Profile B**
  - **BS and ASN GW are not decomposed (R6 is not exposed)**
  - **Probably may work for Centralized and Distributed**
- **Profile C – Supported by Alvarion**
  - **Decomposition of BS and ASN GW (with R6)**
  - **Centralized and Distributed ASN GW**
  - **Handover Control (RRM) in BS; ASN GW is agnostic to the radio intelligence**

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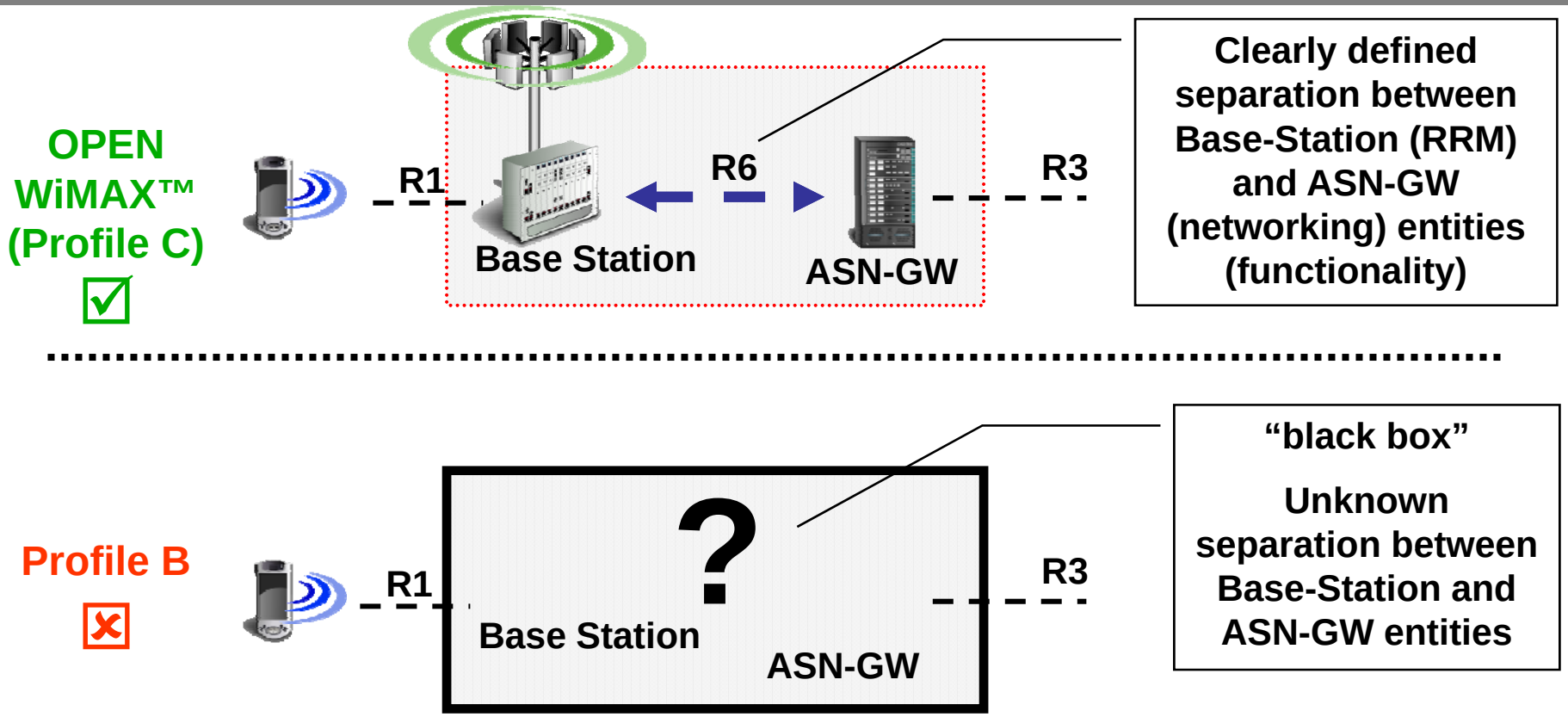
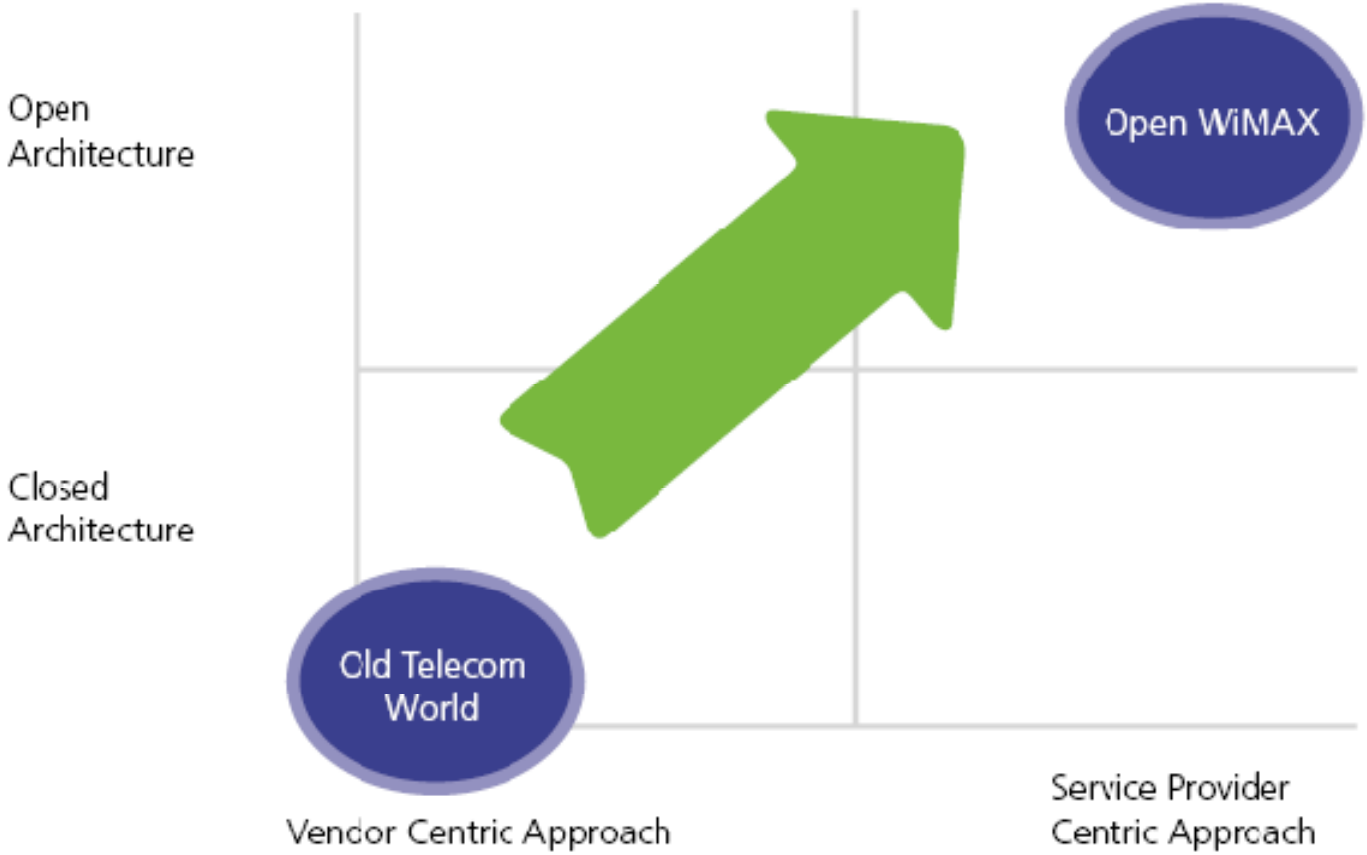
Comparing WiMAX Profiles



Profile A was canceled by WiMAX Forum

Disruptive Approach of OPEN WiMAX



- **OPEN WiMAX delivers Operator Centric Approach**
- **End of vendor-centric era in telecommunications**
- **Open architecture guarantees interoperability among vendors**

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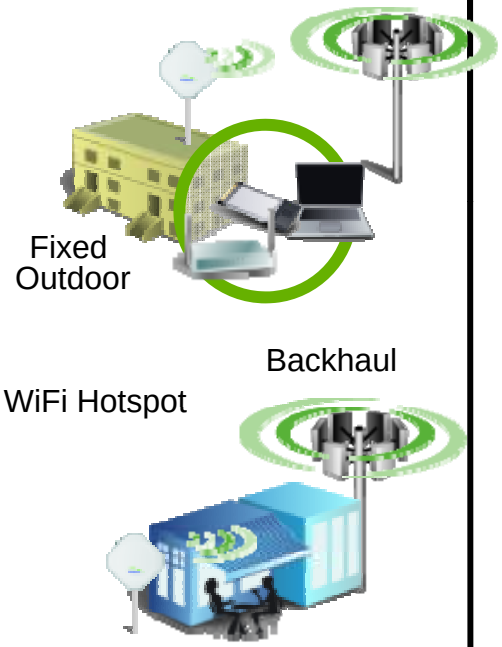
2

Alvarion 4Motion Solution

WiMAX Network Models & Time Frames

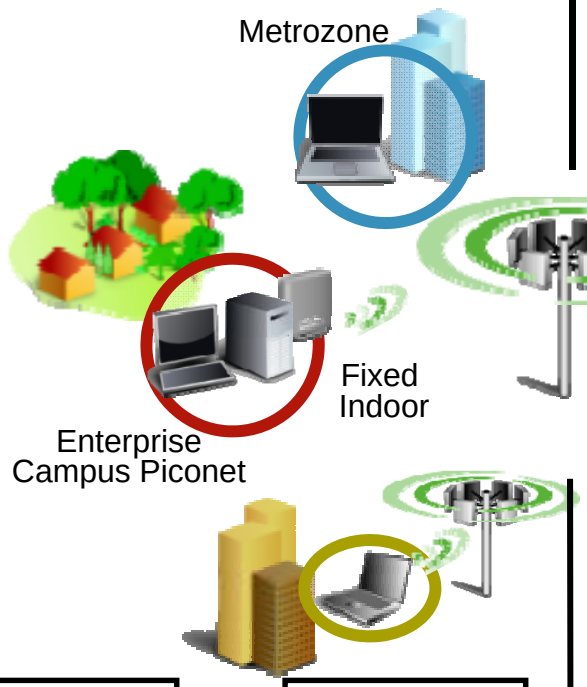
2004 Going Forward….

Access 2004/5



Fixed Access

Nomadic 2006/7/8



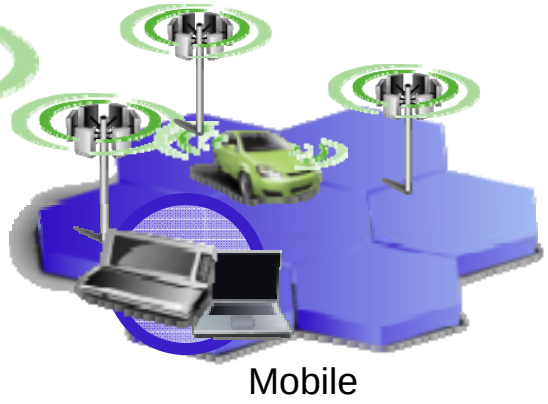
Nomadicity

Stationary BB Access wherever you are

Portability

Pedestrian mobility BE HO – Latency tolerant TCP/IP applications

Portable/Mobile 2009+



Simple Mobility

Up to 60 KMH Guaranteed HO for non RT services Sleep/Idle mode

Full Mobility

Up to 120 KMH Guaranteed HO for all services

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4Motion Solution

Core Network Equipment

End-User Devices

Service Enabling Platforms

Radio Access Network Equipment

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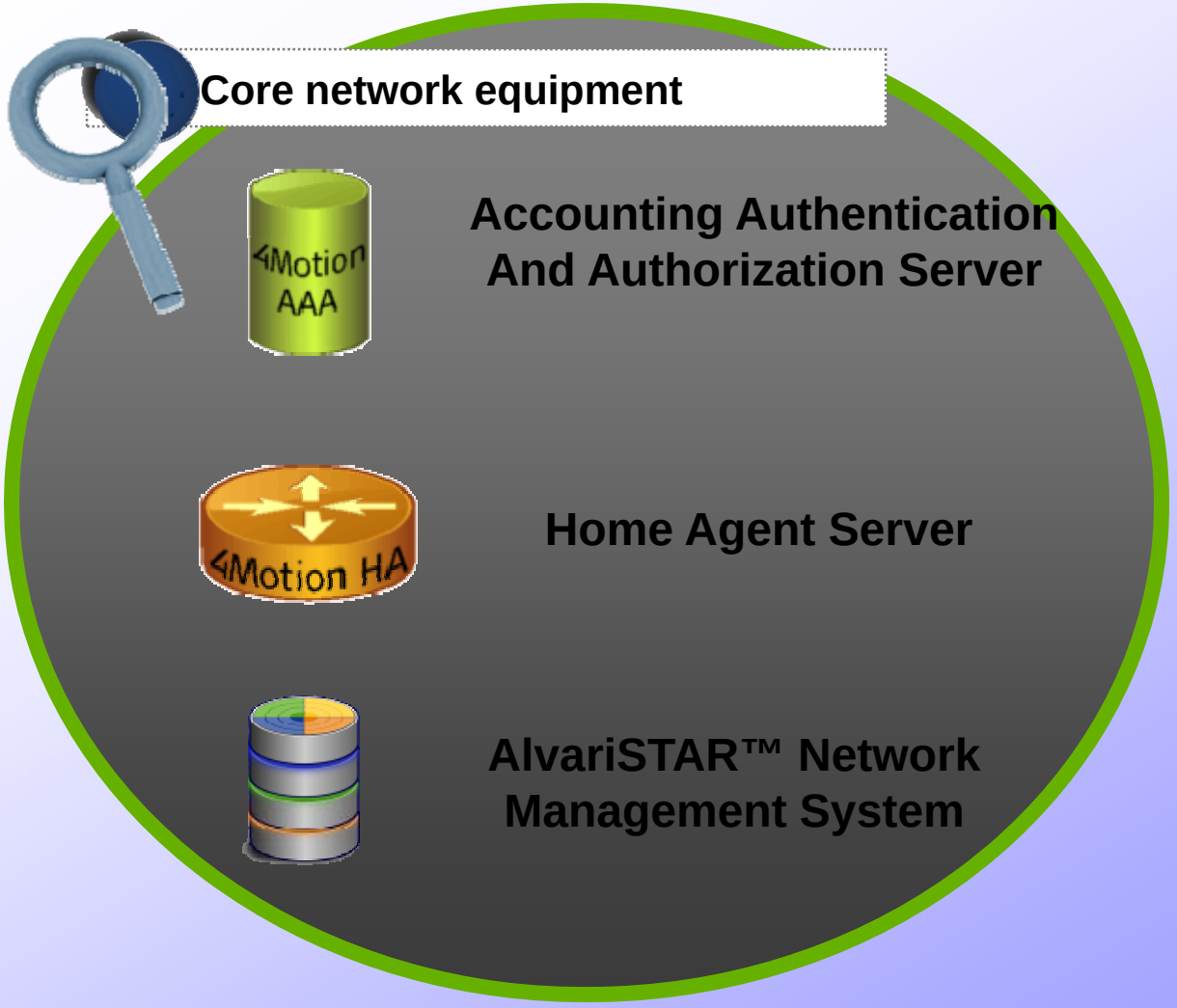
Alvarion 4Motion™ Solution

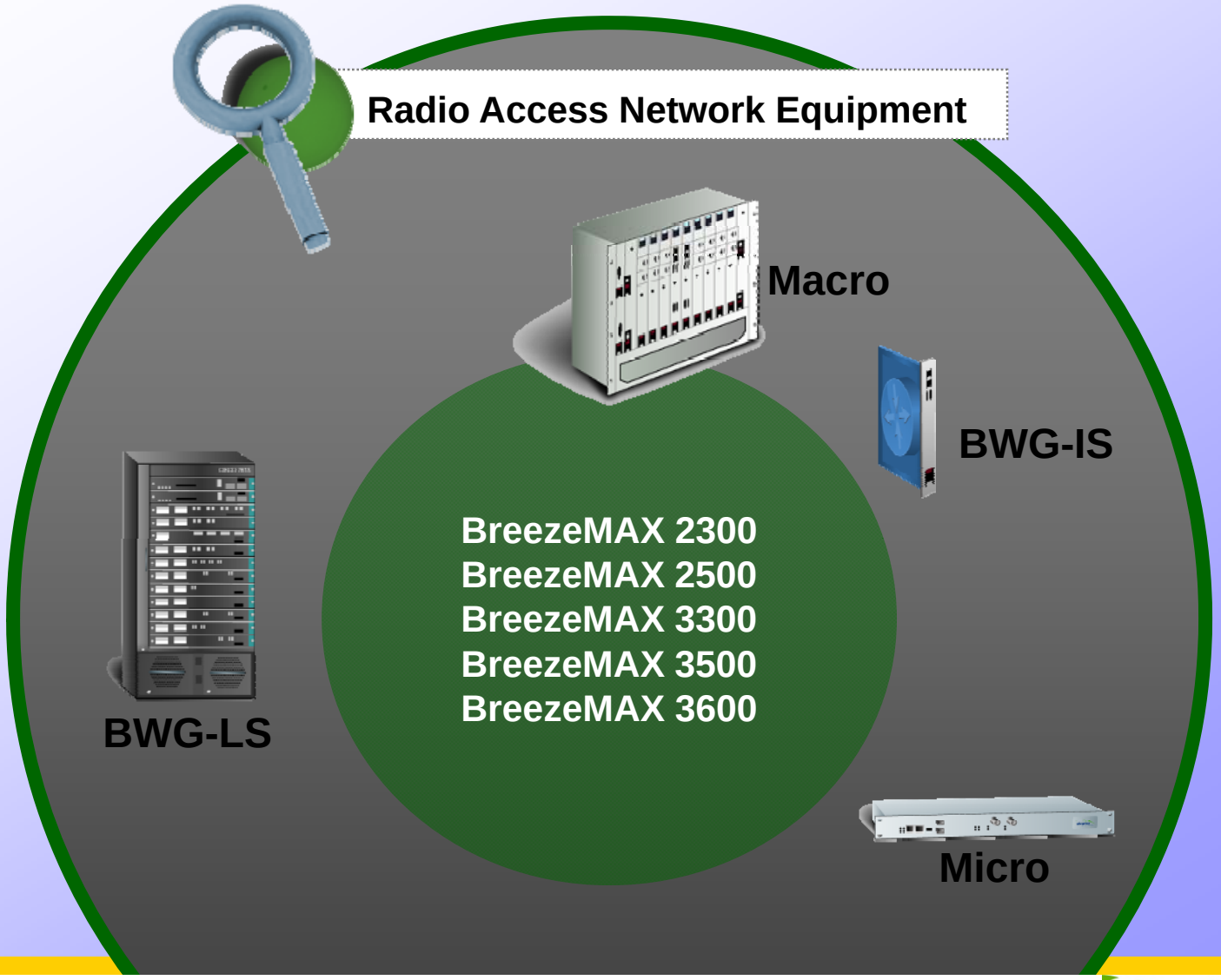
4Motion is a complete OPEN™ WiMAX end-to-end solution

- WiMAX IEEE 802.16e-2005 Certified Wave II
- Employs an open, standard all-IP architecture enabling a Best-of-Breed multi-vendor solution
- Delivery of mobile and fixed video, voice, and data services
- Supports the full range of business, residential, and Personal Broadband services

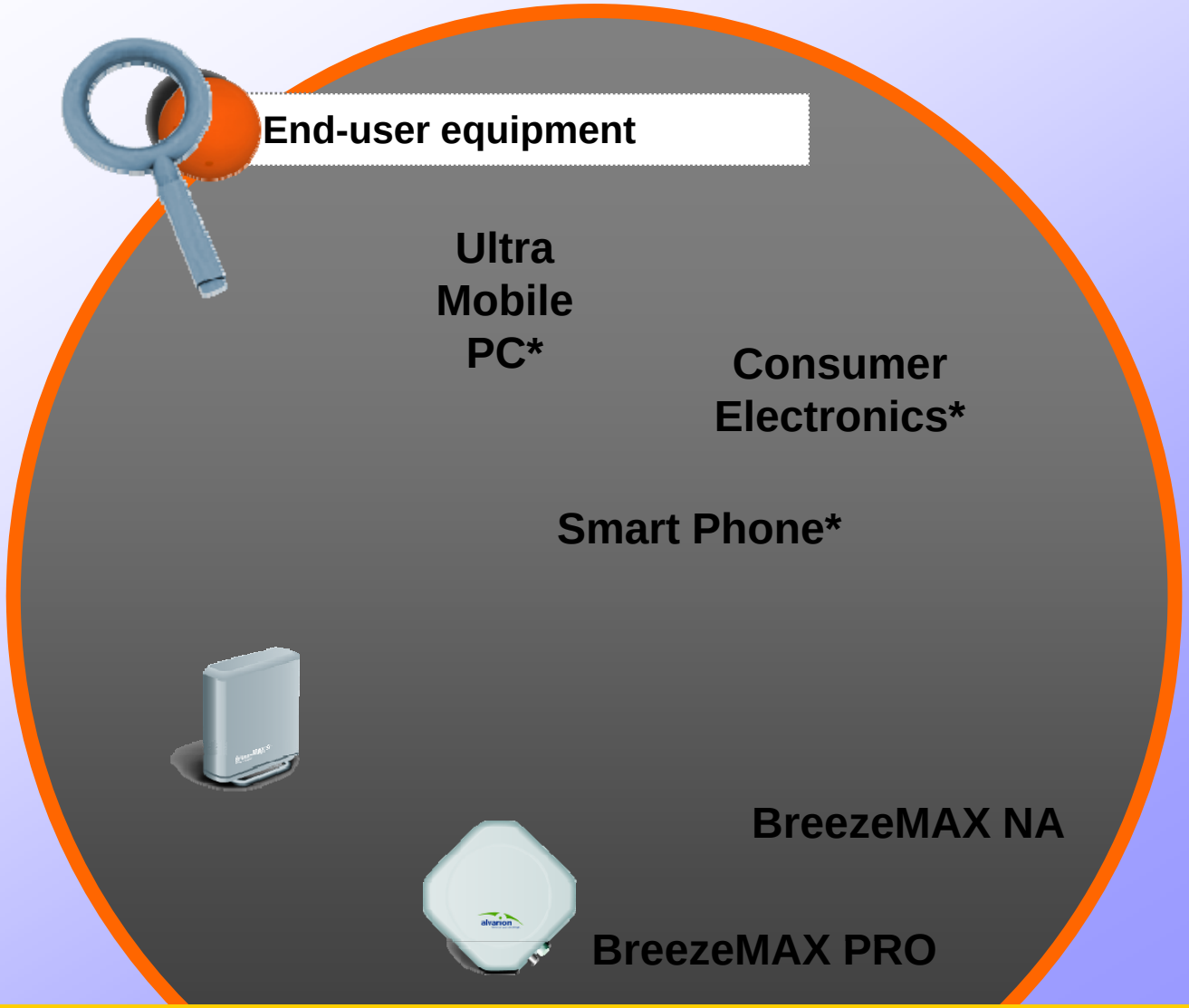
Alvarion 4Motion Solution



Alvarion 4Motion Solution

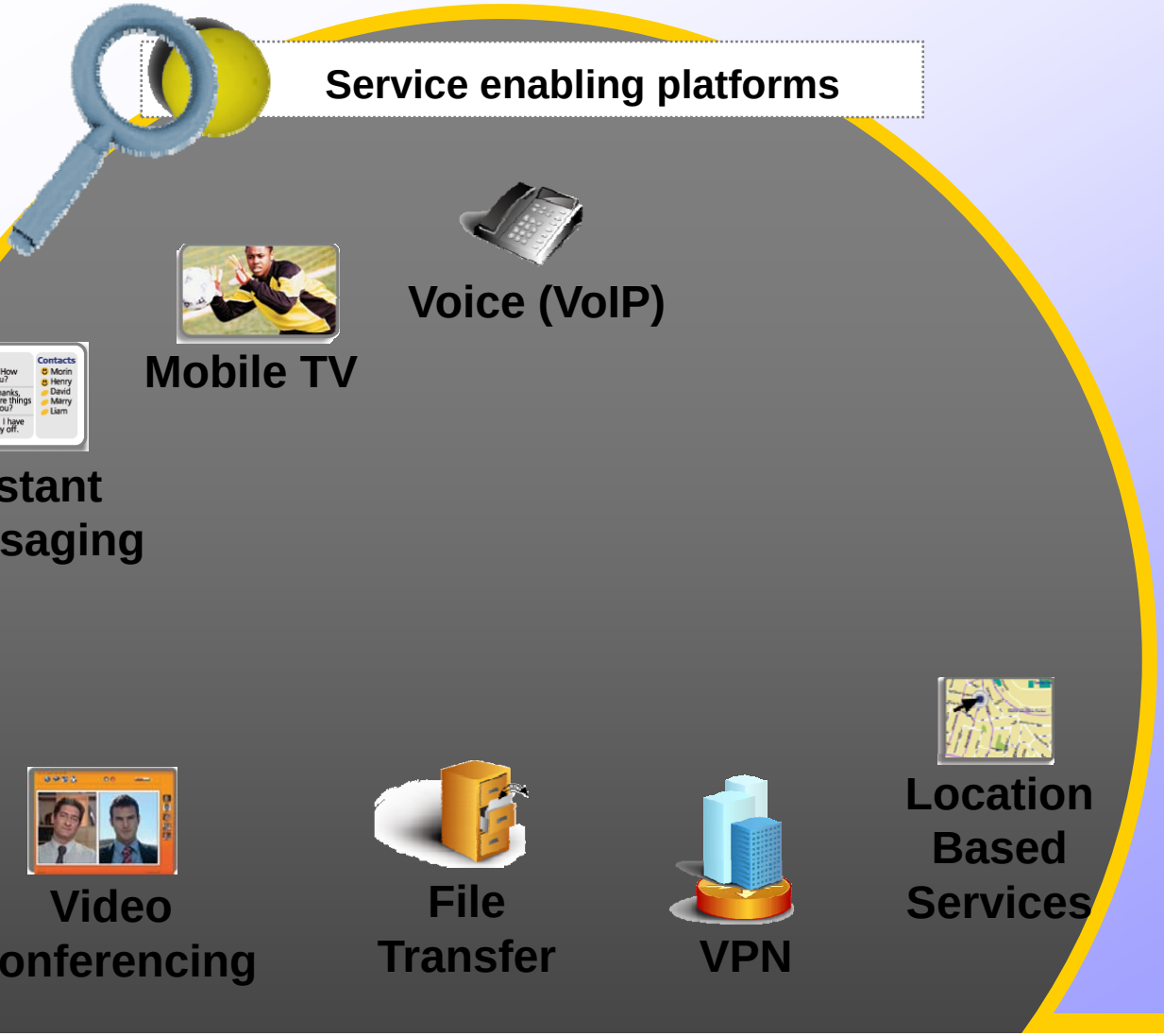


Alvarion 4Motion Solution



* Provided by Alvarion partners and CE manufacturers

Alvarion 4Motion Solution



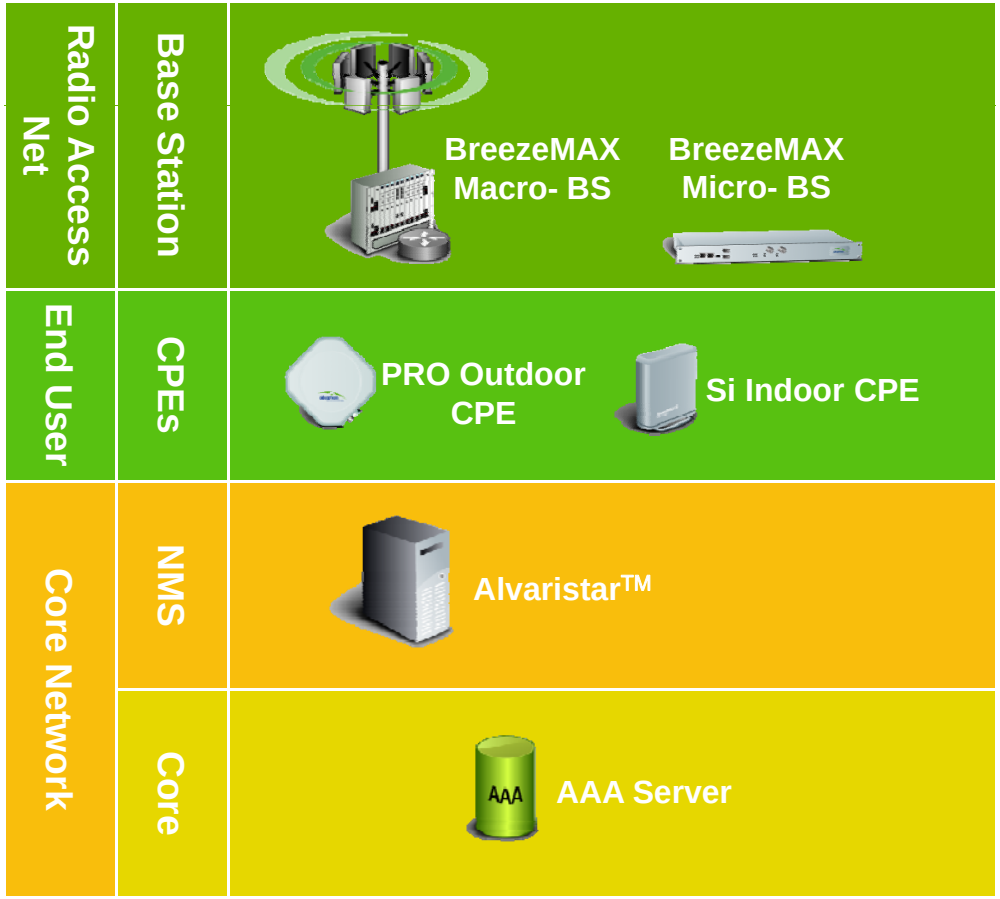
4Motion – OPEN™ WiMAX Architecture

3

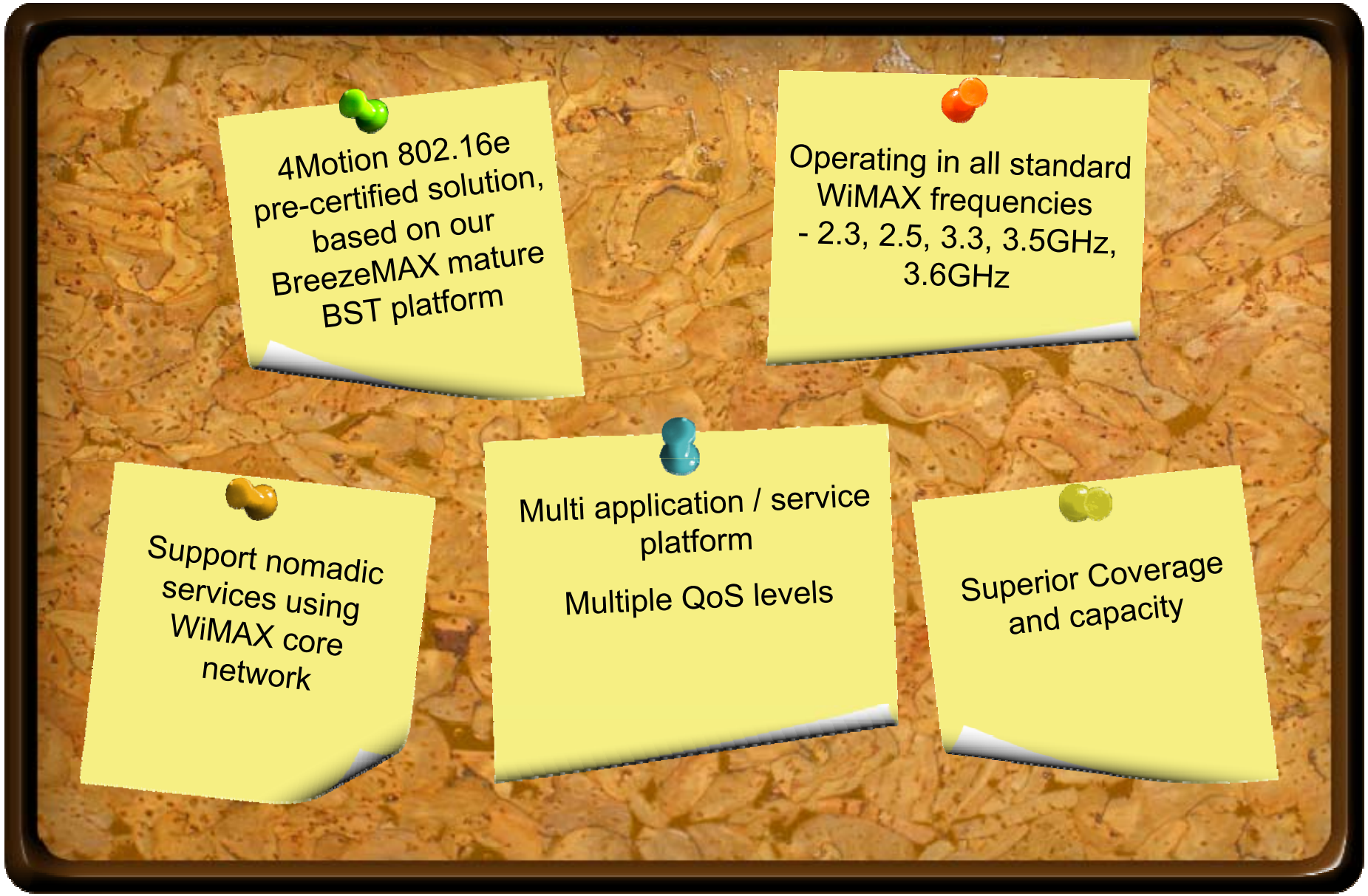
Phase I. Fixed and Nomadic

Phase I. Fixed and nomadic services

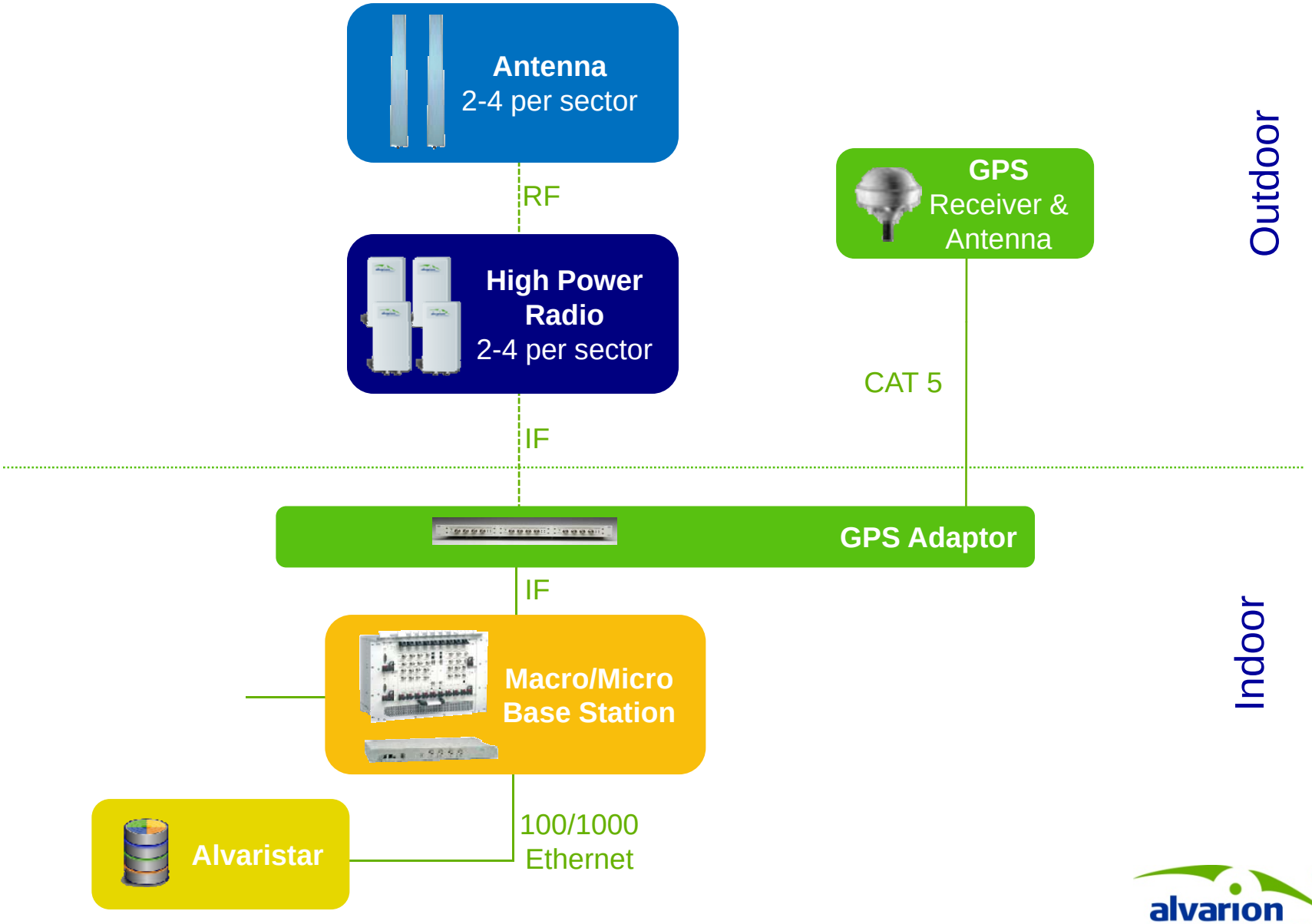
- **The solutions in year 2007 address fixed and nomadic services**
- **Solutions comprised of the following elements:**
  - **RAN (BreezeMAX):**
    - **Macro and Micro BST**
  - **End User Equipment**
    - **Variety of outdoor and indoor CPEs**
  - **Network main components:**
    - **External AAA Server**
    - **AlvariSTAR**



BMAX Advantages



RAN – Base Station Installation Example



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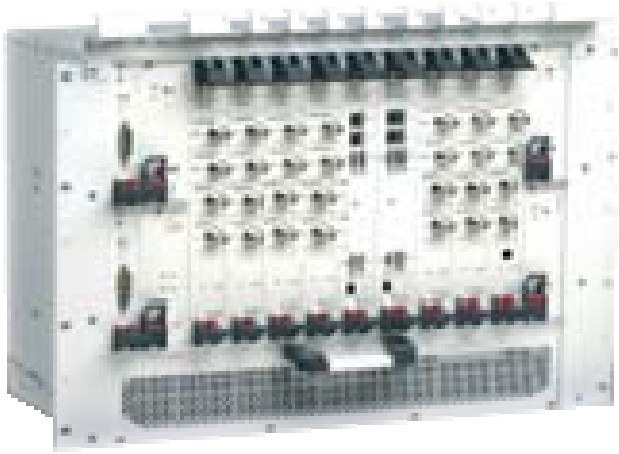
Modular BST – Dense Populated Area

- **Suited for dense Urban/Suburban deployments**
- **Modular, supporting up to:**
  - **3 sectors with two carriers or 6 sectors with one carrier**
- **4 channel AU-IDU**
- **Support 2nd and 4th order diversity**
- **NPU for GPS support**
- **Scalable, Carrier class platform**
  - **Hot swappable functionality**
  - **Centralized management**
- **Standard based Radius interface for operation with AAA server**
- **Local and remote management**



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Micro BST – Sparsely Populated Areas

- **Suits for low dense rural deployments**
- **Based on similar hardware components and provides similar functionality as the Modular BST**
- **A compact 1U 19” shelf**
- **Single carrier for low density rural area**
  - Single sector using directional antenna or OMNI antenna
- **Support 2nd and 4th order diversity**
- **Can operate with all types of HP-ODUs**
- **Standard based Radius interface for operation with AAA server**
- **Local and remote management**

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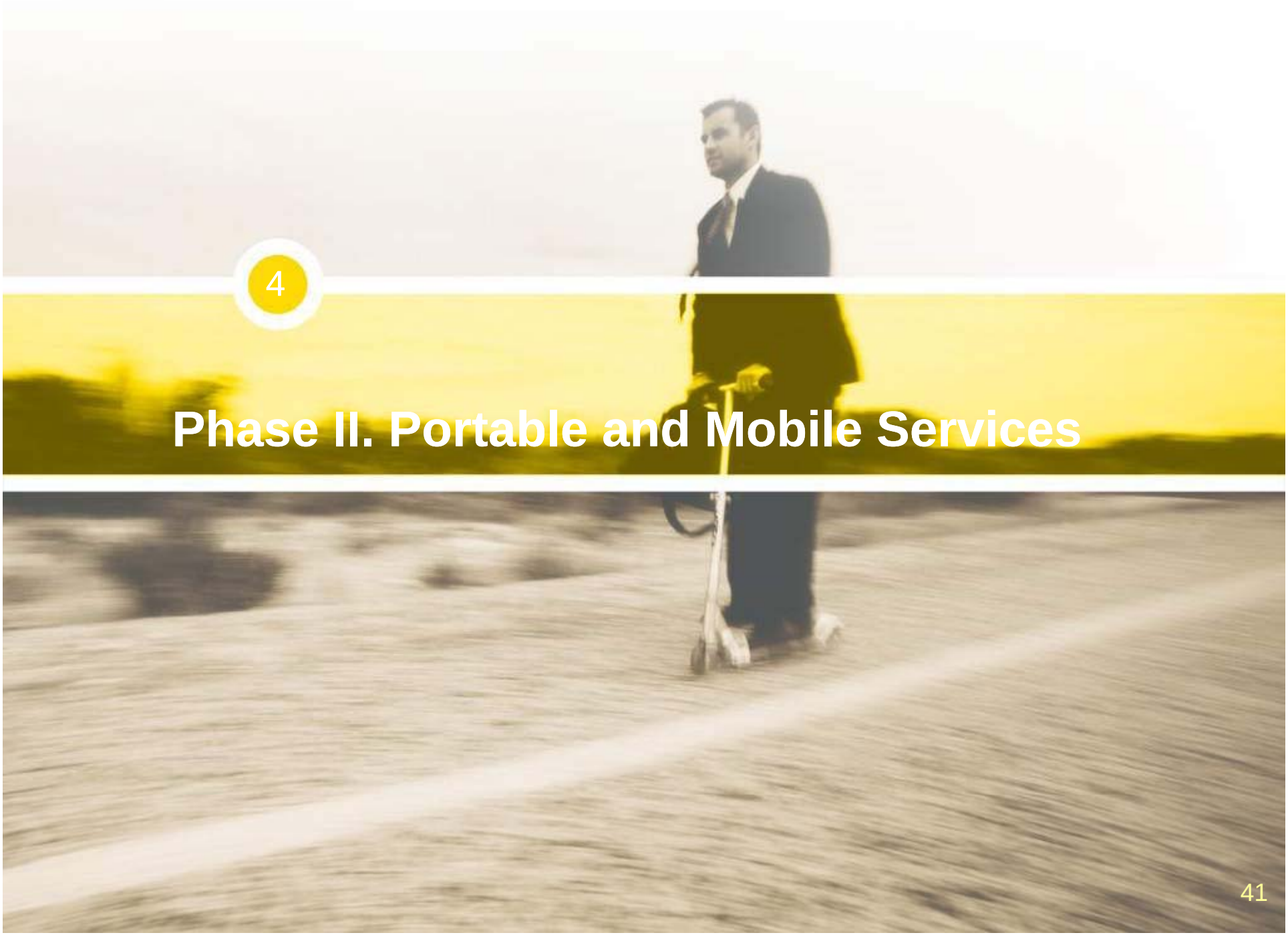

4

Phase II. Portable and Mobile Services

4Motion™ WiMAX Solution

Personal Broadband for you, anytime, anywhere

- **Complete end-to-end IEEE 802.16 solutions**
  - Fixed/Nomadic/Portable/Mobile WiMAX services (Quadruple Play)
  - Fully distributed all-IP architecture
  - Open architecture and interfaces
  - Advanced access technologies
  - Flexible and low cost
- **BreezeMAX 4Motion: High Power, Smart BTS & CPE, WiMAX Compatible - Proven infrastructure sequel of Breezemax**
- **Featuring support**
  - Software defined radios (SDR), scalable OFDMA,
  - smart antennas, MIMO & dynamic bandwidth allocation
- **Delivered by Alvarion and its Technology partners**

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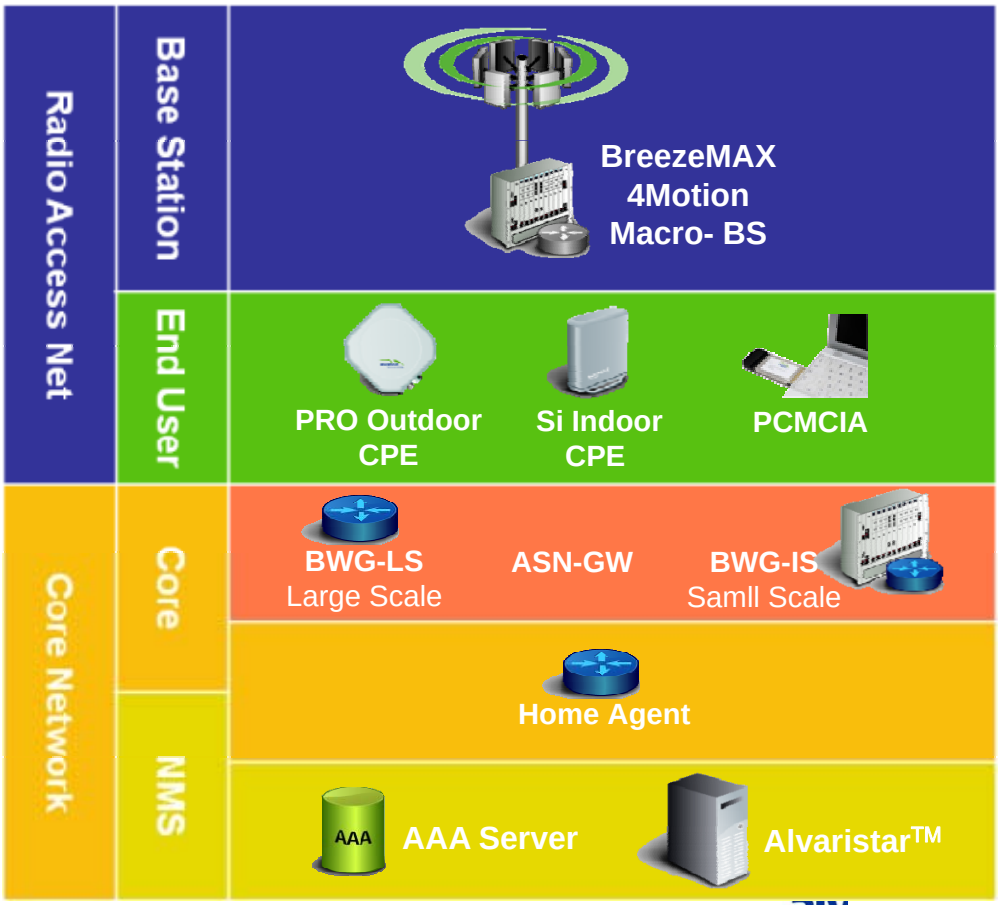
Portable and mobile services

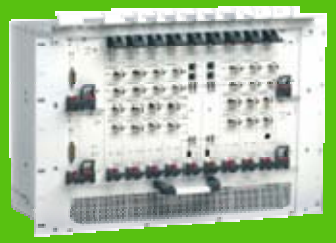
- **The solution in H1/09 addresses Mobile solutions**
  - Greenfield mobile broadband operators
  - Early adopters of Mobile WiMAX technology
- **Comprised of the following elements:**
  - RAN (BreezeMAX-4M):
    - Macro BST
    - New Antenna Arrays [Tx+Rx] – 2+4, 4+4
  - CPE
    - Fix ODU CPE and SI
    - Mobile Station (MS) – PCMCIA, Handset
  - Network main components:
    - ASN GW (Network Gateway)
      - Small Scale Integrated in BMAX-4M
      - Large Scale third partners
    - AAA Server
      - Integrated or external
    - Home Agent (Roaming Agent)
    - AlvariSTAR



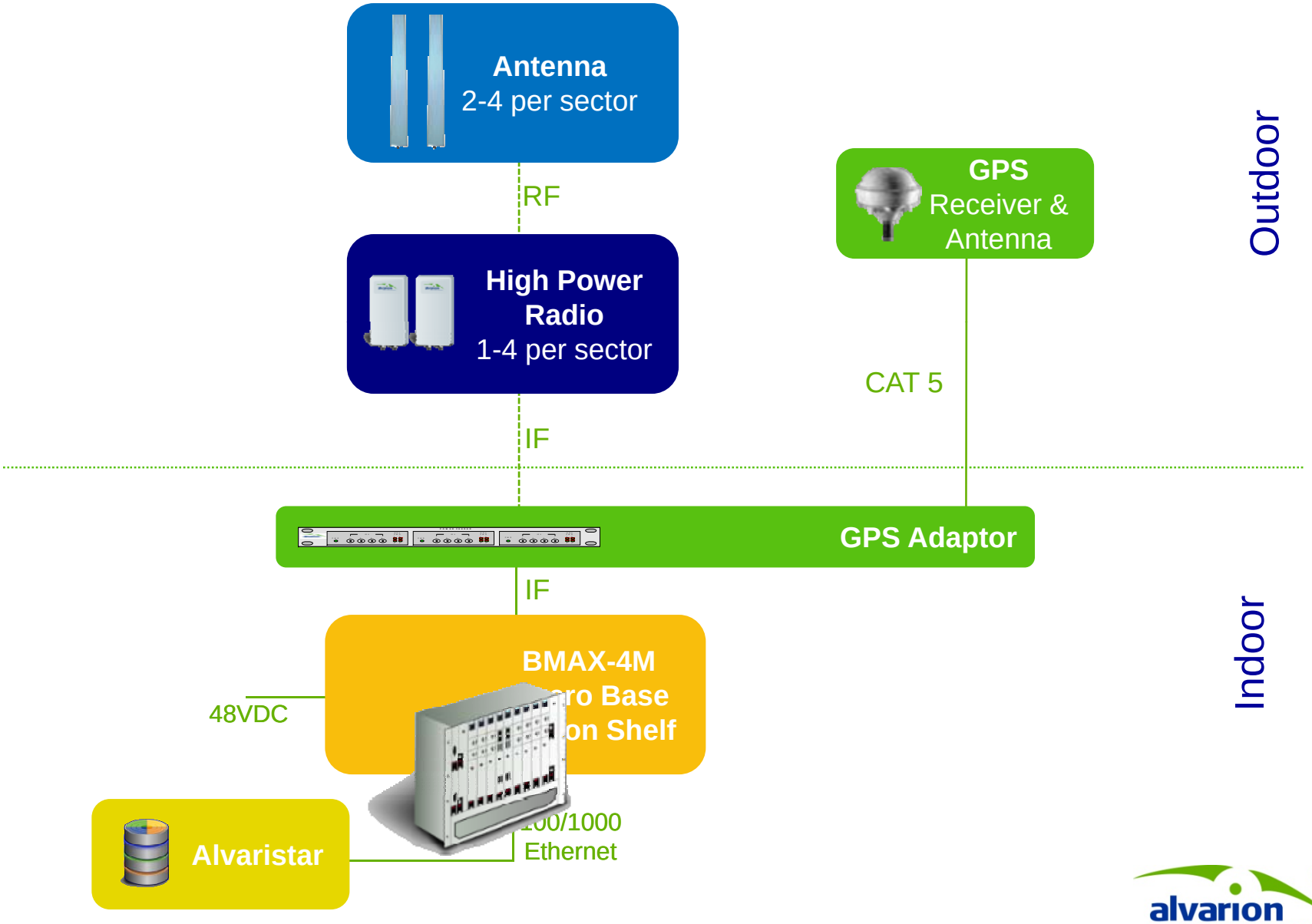
RAN

- **Support Mobile WiMAX service**
  - Intra and Inter BST Handoff
- **4Motion 802.16e Certified Solution**
  - Can upgrade 4Motion TDD BST
- **OPEN™ WiMAX architecture**
  - Standard WiMAX Interfaces offers Best of Breed Network Core devices
- **World Wide WiMAX frequencies coverage (masks)**
  - 2.3, 2.5, and 3.5GHz frequencies
  - At 5,7,10Mhz
- **Investment protection**
  - Migration path using variety of CPEs, upgradeable to 802.16e
  - Future proof migration to AAS technologies (MIMO, Beam Forming)

Network Building Blocks

Component	Description	
ASN GW	Network Gateway Enables Mobility	 BMAX-4M with BWG-IS Integrated ASN-GW
BWG-IS	Small Scale Integrated into BreezMAX BST	
BWG-LS	Large Scale ASN-GW From IOT partners (i.e. Starent, Cisco, Hitachi)	 BWG-LS Cisco 7600 Multiple ASN GW with Integrated HA and Integrated AAA
Home Agent (HA)	Enables Roaming between WiMAX networks From third party	
AAA server	Enables Network Entry Authentication, Authorization, Accounting Complementary to BWG-IS	 Third Party AAA From Bridgewater For BWG-IS

BMAX-4M Base Station Installation Example



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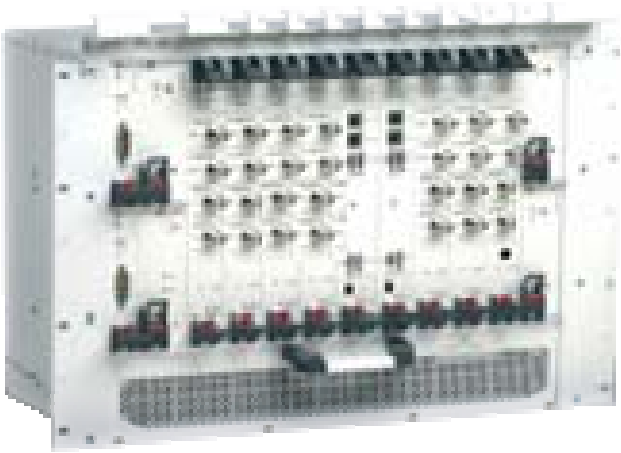
Scalable BMAX-4M Modular BST

- **Suits for Mobile WiMAX deployments**
  - Dense-Urban / Urban / Suburban / Rural
- **Modular, supporting up to carriers:**
  - 3 sectors w/ 2 carriers
- **Always Support 2nd and 4th order diversity**
- **Carrier Grade Resiliency**
  - Hot swappable functionality
  - Centralized management
  - Design for full redundancy
- **Local and remote management**



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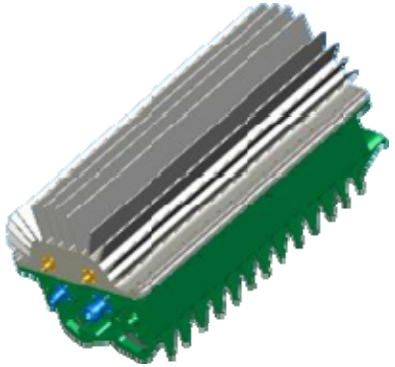
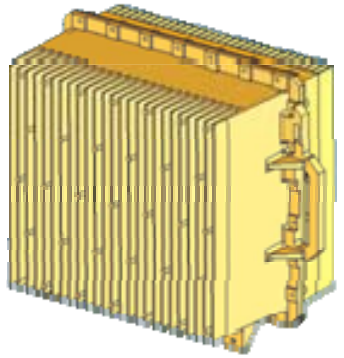
Outdoor unit - ODU

- Designed to support world wide frequencies
- Attached or detached antenna
- 1RX / 1TX, 34-36dbm, up to 10Mhz, models:
  - 2.3GHz ROW / WCS for US
  - 2.5Ghz , 2 models, each is 100MHz
  - 3.5Ghz, 4 models, each is 50Mhz
- 2 Rx /1TX 37-39dbm, up to 10Mhz, models:
  - 3.5Ghz – 1 model, supporting 200MHz
- 4 Rx /2TX 37-39dbm, up to 20Mhz variety of models:
  - 2.3GHz ROW / WCS (future)
  - 2.5Ghz, BW
  - 3.5Ghz, BW
- Fully outdoor
- Optional an add-on H bracket for easy deployment





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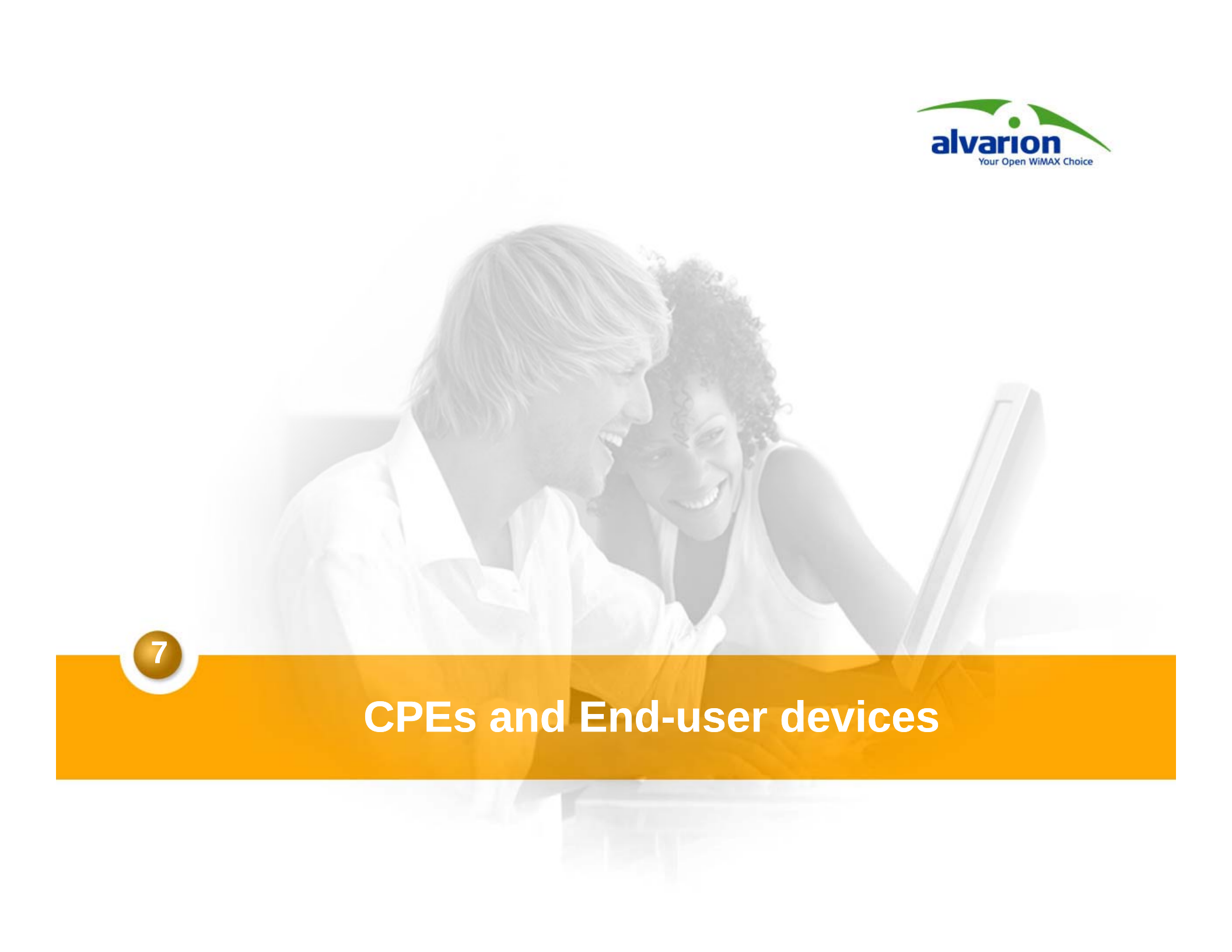

7

CPEs and End-user devices

Product Portfolio

- **Beceem and GCT based – from BreezeMax release V2.0 (Q2'08)**
- **Intel based –**
  - **802.16e pre-certified - from BreezeMax release V1.0 (Q1'07)**
  - **802.16e certified - from BreezeMax release V2.5 (Q3'08)**

Intel Fix/Nomadic

Beceem Fix/Nomadic

Beceem/GCT Nomadic/Mobile

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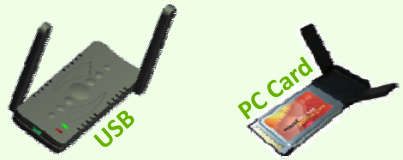
Products Overview

Mobile



Broadband Consumer Electronics

Residential & SOHO

Modem & RGW

Voice GW

Integrated Access Device

Corporate

Data Modem

Primary Voice

Network GW

alvarion®
Your Open WiMAX Choice

BreezeMAX Mobile Terminals

- Designed for WiMAX 802.16e mobile users
- Wave 1 certified, Wave 2 ready
- Self installable and self configurable
- Data Throughput:
  - 7Mbps downlink and 2Mbps uplink for 64k packets
- Based on Beceem BCS200 dual band chipset
- Frequency support
  - 2.3,2.5 and 3.5Ghz
- Key features
  - Max transmit power 23dbm
  - OS support – WinXP & Vista
  - Cardbus interface
  - EAP-AKA, EAP-TLS and EAP-TTLS authentication support
  - Connection Manager Application

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Terminals – BreezeMAX USB Modem

- Designed for WiMAX certified 802.16e fixed and nomadic users
- Basic and Low cost CPE
- Based on GCT chipset
- Designed for residential users with single Desktop PC
- Small form factor – can carry it in your bag…
- Bridge capabilities
  - Same features set as PC card
- Frequency support
  - 2.3,2.5 and 3.5Ghz

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WiMAX Devices Strategy

4 802.16e Offering

3 IOT, ODM

4MOTION AW3

2 WiMAX Chipset

intel SEQUANS Communications BECEEM GCT

1 Alvarion

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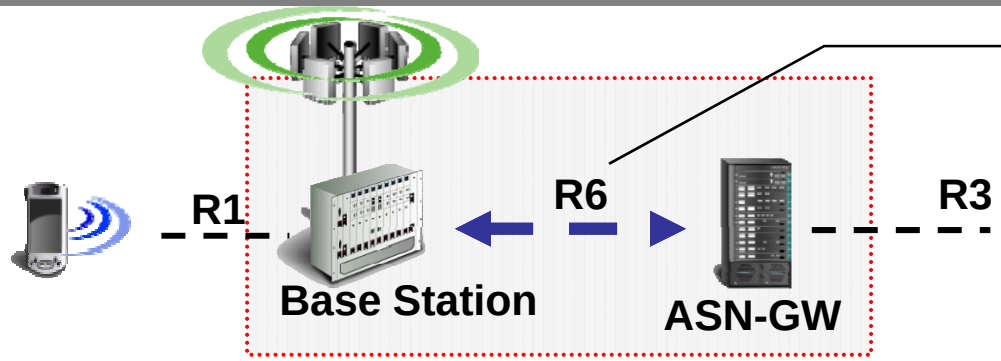
Comparing WiMAX Profiles

OPEN WiMAX™ (Profile C) ☑



Clearly defined separation between Base-Station (RRM) and ASN-GW (networking) entities (functionality)

Profile B ☒

"black box"

Unknown separation between Base-Station and ASN-GW entities

4Motion solution

4Motion Solution

Core Network Equipment

End-User Devices

Service Enabling Platforms

Radio Access Network Equipment

4Motion – OPEN™ WiMAX Architecture

Customers

Top Tier Customers

Western Europe

orange · Deutsche Telekom · france telecom · BT · eircom · vodafone · cegetel · Telefonica

APAC

NTT · Reliance Infocomm · bharti · Chunghwa Telecom · AIRCEL · 中国移动通信 CHINA MOBILE · 中国电信 CHINA TELECOM · CNC 中国网通 · 中国联通 CHINA UNICOM

Eastern Europe

МегаФон · Билайн GSM · Telekom Srbija · Казахтелеком · Энфорта Modern Telecom Services for Business · lattelecom · Golden Telecom · SVYAZ INVEST · bitė · МобиФон · netia · Elion · COMSTAR · TELIA

LATAM

TELMEX · Telefonica · AXtel · ENTEL · Embratel · TELEMOVIL · CABLE & WIRELESS · COTAS unimos personas · telecom · MILLICOM · tigo

Africa

Telkom · MTN · gt Ghana Telecom · TELECOM NAMIBIA · ONATEL · Méditel · vodacom · MWEB Just Like That WiMAX

North America

verizon · TDS telecom · at&t · airband · alltel · Digicel group

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Top Emerging Operators

Western Europe

APAC

Africa

Eastern Europe

LATAM

North America

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Success Stories

WiMAX Customers LATAM

- Telmex Argentina
- Entel in Chile
- Telecel in Paraguay
- Americatel in Peru
- Telmex Perú
- Genesis Venezuela
- Telmex Chile
- Telmex Ecuador

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WiMAX Customers LATAM

- **RACSA Costa Rica**
  - Alvarion 802.16e compliant Technology in 3.5 GHz band
  - Fixed and Portable applications now
  - Path to Mobility applications in the future
- **Telmex Mexico**
  - 802.16e compliant Technology in 3.5 GHz band
  - Commercial Deployment in Tabasco
  - First Telmex WiMAX network in Mexico
  - Tres Marías Project
- **Telgua Guatemala**
  - 2.5 GHz band
- **Telecom El Salvador**
  - 3.5 GHz band
- **Millicom Guatemala**
  - 802.16 compliant Technology in 2.3 GHz band
- **Millicom El Salvador**
  - 802.16 compliant Technology in 2.3 GHz band
- **Tigo Bolivia**

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Thank You