



# WiMAX technology

An opportunity that can lead African  
Countries to the NET Economy

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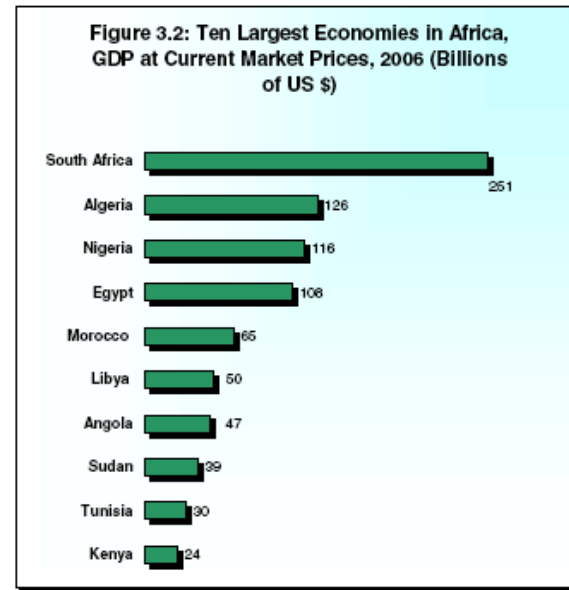


- Telecommunications in Africa: the present picture
- Wi-MAX: an emerging technology
- Trends and opportunities in wireless communications for Africa

# Africa socio economic general picture



- Second most populated region in the world (14% of total in 2006)
- 996 Billion \$ GDP (2% of world total in 2006)
- Aggregate growth rate increasing
- Uneven economic growth and wealth distribution

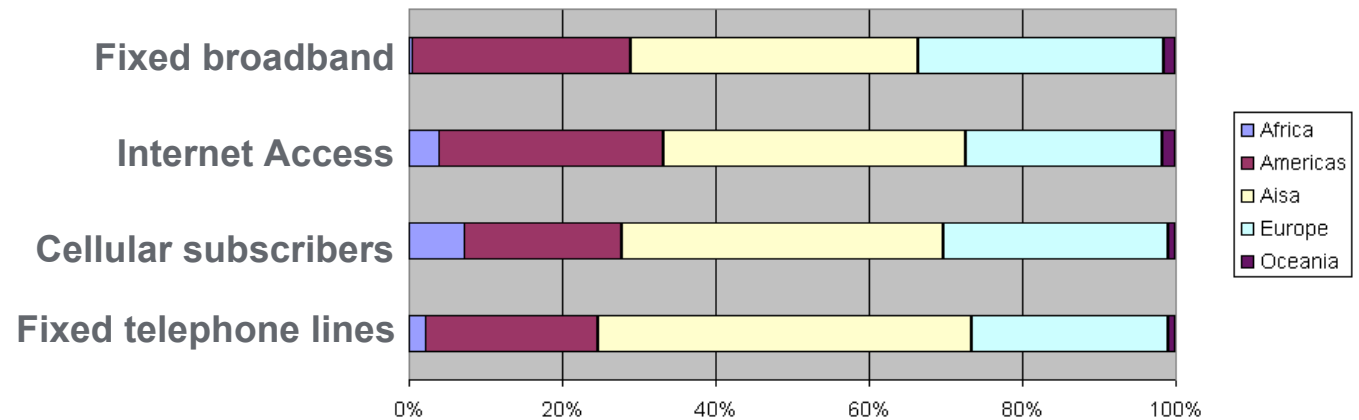


Source: African Development Bank

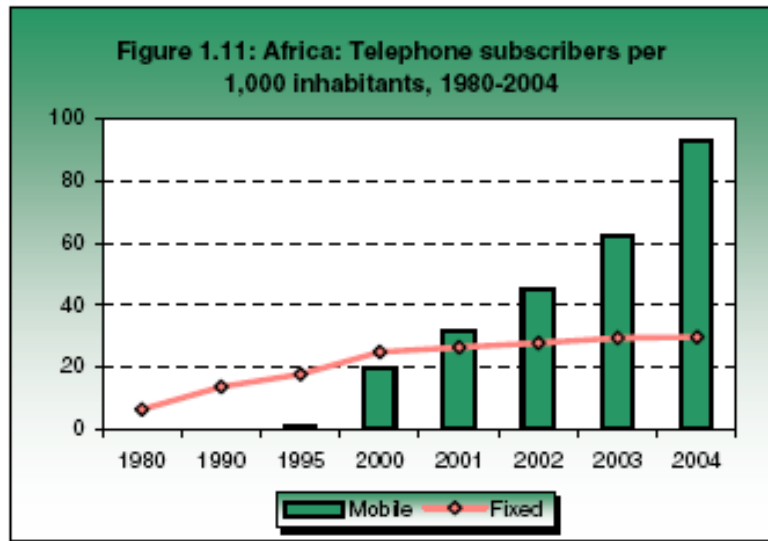
# Telecommunications general framework



## ➤ Low figures in telecom related infrastructures



Source: ITU World Telecommunication Indicators database, 2007



## ➤ Big growth potential with different evolution trends

- Relatively slow increase of fixed line
- Significant increasing mobile penetration
- Uneven distribution of internet access and fixed broadband

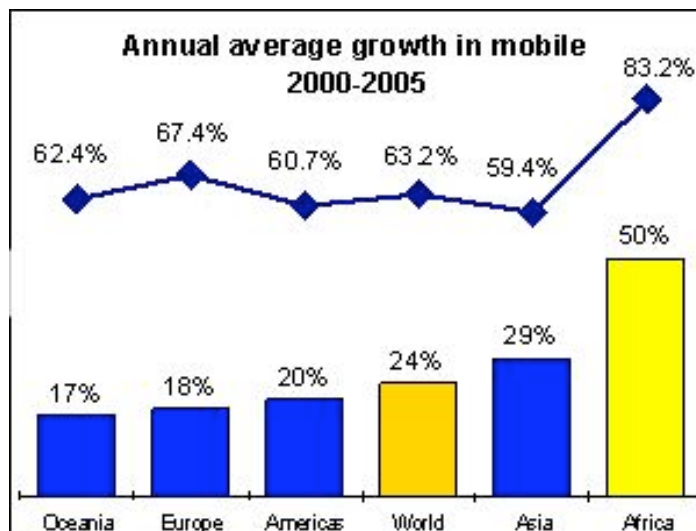
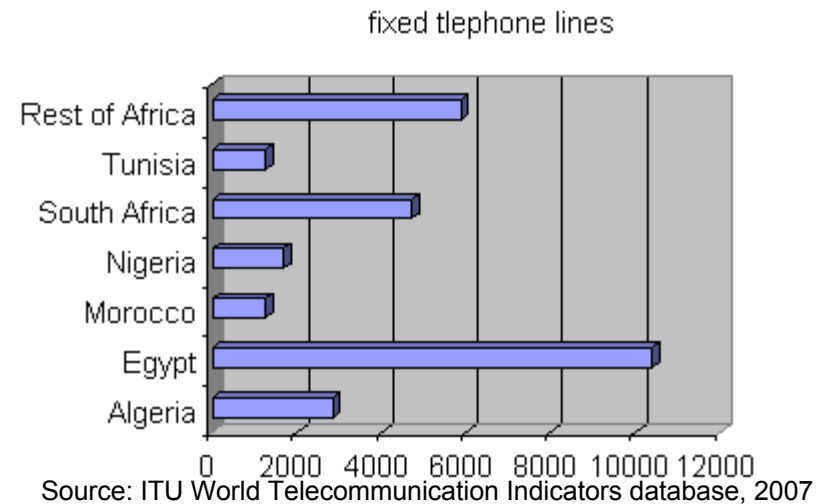
Source: African Development Bank

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# Telecommunications: fixed & mobile market



- Most of fixed lines concentrated in few countries
- Fixed telecom lines located mainly in urban areas
- Fixed lines penetration in villages is very poor



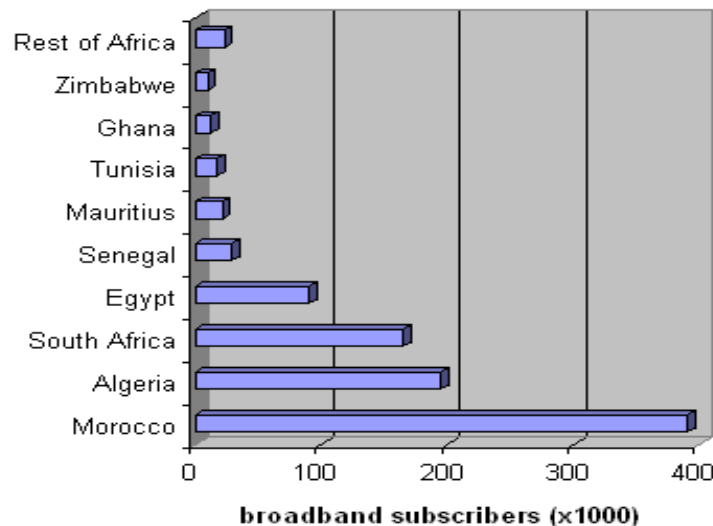
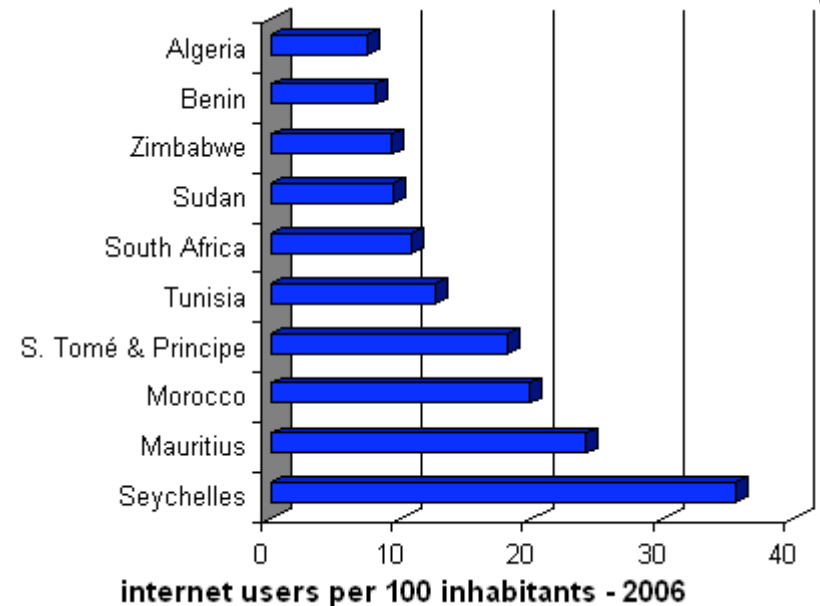
- Impressive growth rate of cellular market
- More revenues from mobile services than fixed services (only region in the World)
- Cellular market far from saturation
- Cellular penetration favored by business models that fit economic characteristic of average users' base: (prepaid SIM, cross border roaming)

Source: ITU World Telecommunication Indicators database, 2005-2007

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# Telecommunications: internet and broadband

- Very low subscriptions figures
- Shared use of internet subscriptions (internet cafe, libraries,...)
- Uneven internet penetration
- Infrastructural shortcomings, unreliable electricity, low Internet bandwidth, few IEX slow down internet diffusion



- Services limited to relatively few wealthier inhabitants
- very limited bandwidth availability (related to rest of the world)
- Uneven bandwidth distribution with Northern Africa leading
- Very high costs related to average GDP

Source: ITU World Telecommunication Indicators database, 2007

- Better ICT connectivity would improve Africa's economic potential: internet access is recognized as a key issue for personal, social and economical growth
- States' administrations are increasingly interested to Internet for diffusion of e-government, plans are undertaken to promote internet knowledge and usage among citizens
- Internet contents in local language are an incentive to use and to learn how to use internet.
- High tariffs are another obstacle to internet diffusion: the access to the internet have to be as cheaper as possible: it has to be compatible with GDP par head.

- Lack of infrastructures is an obstacle for the diffusion of fixed telephone and broadband lines
- Cellular networks have an interesting development but aren't used for internet access due to speed and QoS limitations
- Wireless infrastructures are cheaper than fiber optic networks to provide service to users spread in wide areas
- The diffusion of cellular networks generates the availability of basic backbones and basic infrastructures (sites)

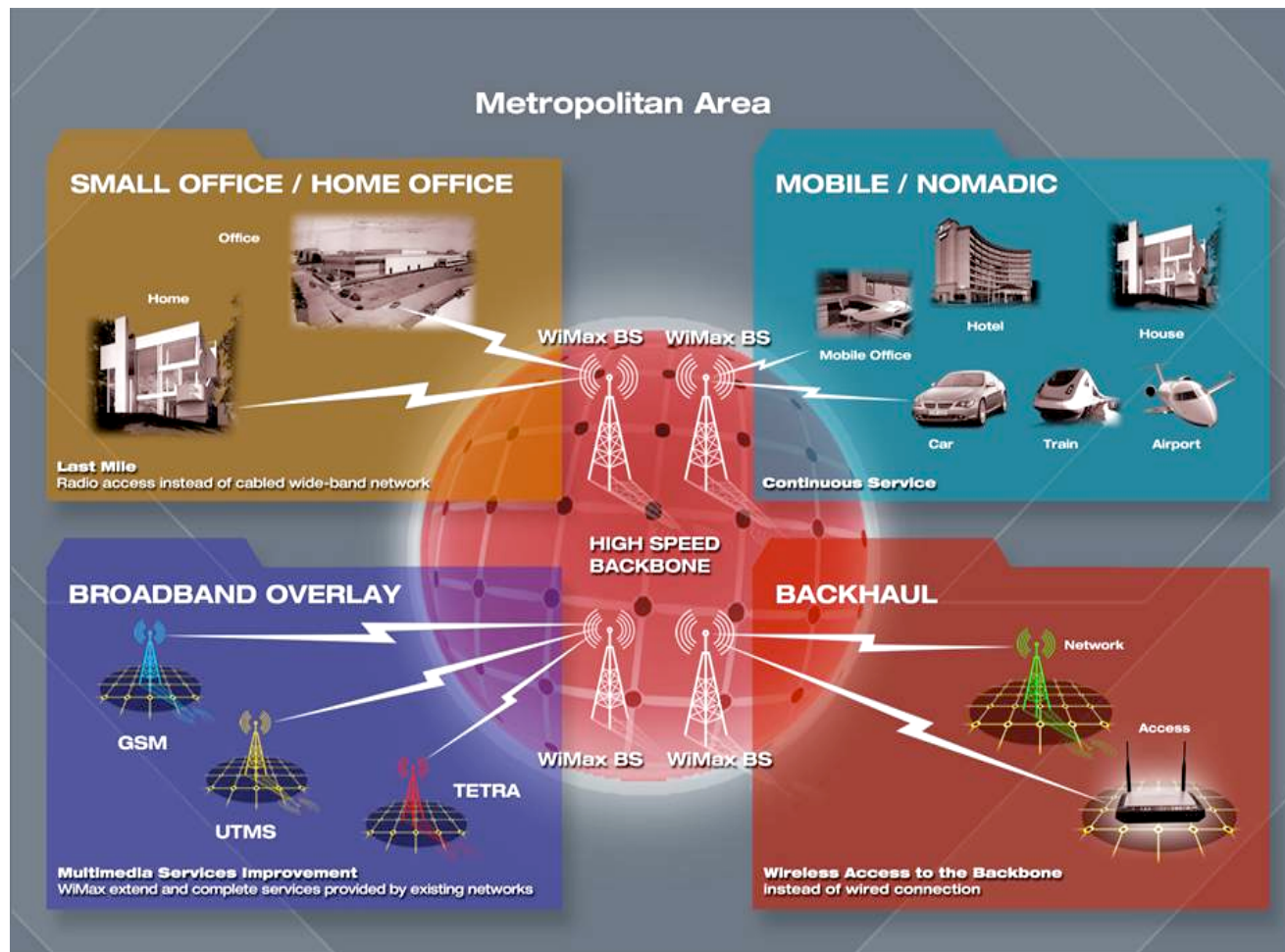
*Taking advantage of cellular diffusion, wireless broadband seems to be the opportunity to reduce infrastructural, social and economic digital divide*

# Agenda



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# WiMAX technology



**WiMAX (Wireless Interoperability for Microwave Access)**  
based on 802.16 standard, providing high-throughput wireless broadband  
connections over long distances.

# Advanced Performance Features



## CAPACITY

- High ratio between radio bandwidth and transmitted data (spectral efficiency)
- Dynamically selected transmission scheme (adaptive modulation) in order to optimize the trade-off between throughput and coverage

## RANGE

- Providing multipath robustness
- 3 km coverage in dense urban areas
- Up to 30 km coverage in rural settings
- Longer distances in Point-to-Point connections

## RELIABILITY

- QoS (Quality of Service) management supports both non-real-time and real-time applications
- Adaptive power control
- Advanced communications security based on terminal authentication and robust air link encryption

## VERSATILITY

- Point-to-Point (PTP) and Point-to-Multipoint (PMP) modes
- IP native but compatible with other traffic types
- Applicable to a range of licensed and unlicensed bands

# Applications



- ψ Last mile broadband connections (Residential and SOHO, Small and Medium Enterprises) for basic telephony services
- ψ Cost-effective building-to-building connectivity for enterprise applications, including transparent LANs and VoIP
- ψ Broadband access extension to suburban, rural, off-shore and other areas not currently serviced by DSL, cable or fibre
- ψ Backhaul for WiFi hot spots and cellular base stations
- ψ Video conferencing and video surveillance

802.16-2004

- 
- ψ Mobile telephony services using VoIP
  - ψ Mobile multimedia services based on IP
  - ψ Overlay of 2/3G mobile networks, for low cost data downloads through HOT ZONES in networks
  - ψ Mobile broadband in private networks applications for military and security.

802.16-2005

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# WiMAX: the enabling technology for Africa



*Taking advantage of cellular diffusion, wireless broadband seems to be the opportunity to reduce infrastructural, social and economic digital divide*

- WiMAX seems to be the technology capable to lead African Countries into the net economy
- If properly supported WiMAX development could reply mobile communication explosive diffusion
- Because of inherently complexity of data communication the trend is expected to be slower than mobile voice communications.
- The relative simplicity of WiMAX deployment could open the market to new players increasing competition
- Mobile Telcos should however have significant advantages because they already own infrastructures.

## Some issues to solve to ensure success

### *Strategic*

- Diffusion plans capable to identify and prioritize high potential areas whose revenues allow to sustain BB deployment in poorer zones.
- Educational programs are needed in order to ease Internet access and raise the level of ICT literacy

### *Cultural*

- Contents in local language need to be available or the use of some applications to translate the written in sounds

### *Technical*

- Fiber optic backbones shall be empowered in order to reduce satellite backbone based services (this will reduce prices)
- IXPs (Internet Exchange Points) have to be empowered
- Capacity of International Internet bandwidth have to be improved.

## **Business model is crucial for the success of a telco initiative in Africa**

- Business Models usually applied in Europe or Asia do not fit Africa.
- Business Models for Wireless Broadband Access in Africa have to consider that medium GDP per head do not allow a monthly subscription fee. They have to consider:
  - Usage of pre-paid cards
  - Promote public access points and group access to the internet
  - Support services related to municipality and social services networks
  - Focus on essential services and adoption of technology able to reduce prices (i.e. VoIP)

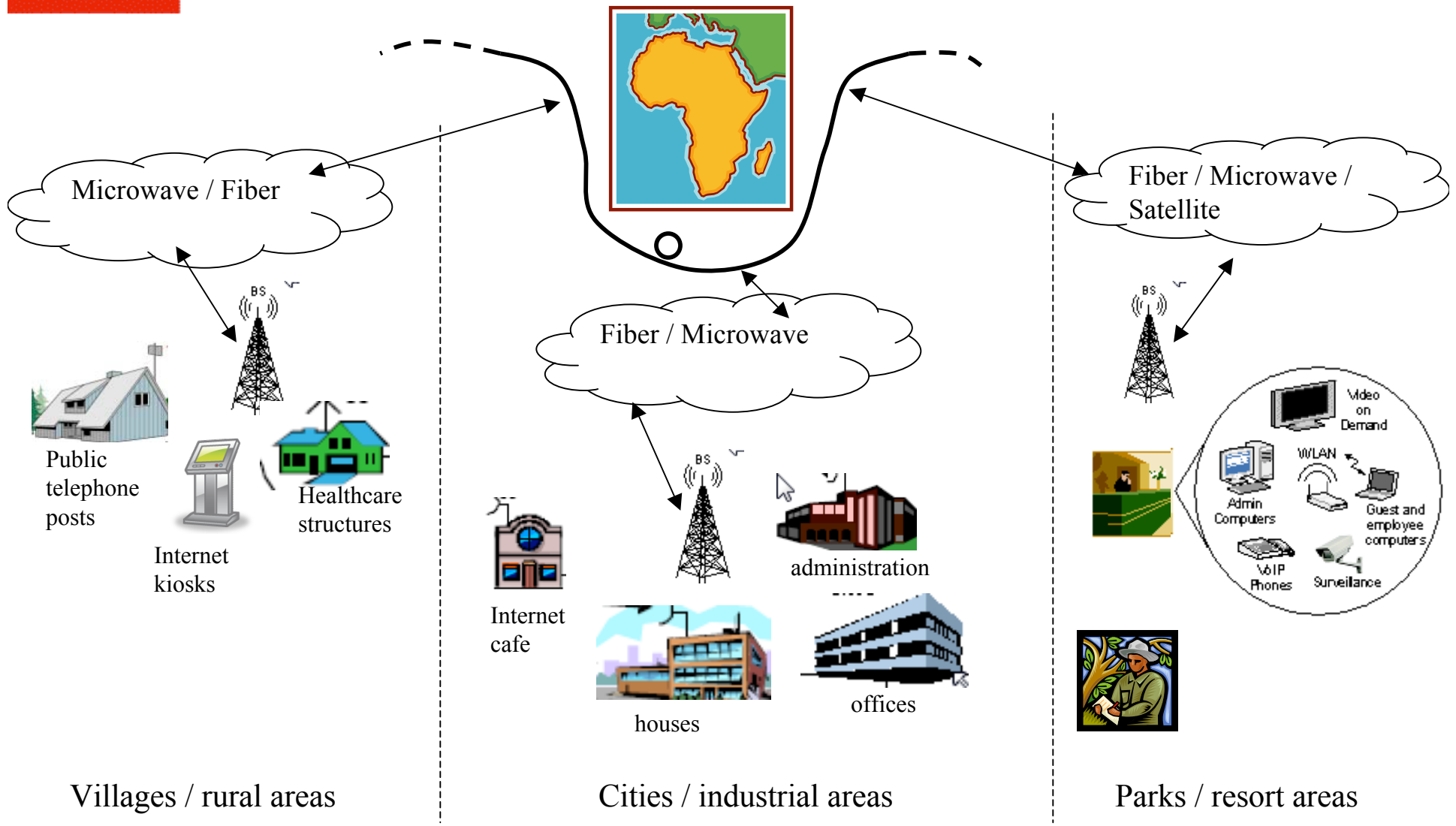
## Additional issues

- Power autonomy should be enforced due to electricity unreliability
- Rugged equipments for harsh environments
- Solution designed for remote maintenance
- Cheap and essential CPEs

## Example applications

- Solar energy powered VoIP telephone cabs
- Public Internet Kiosks
- School connections, public posts, missions
- Parks and resorts telco infrastructure
- Government application
  - Infrastructure sharing for security related services (e.g. TETRA)

# WiMAX deployment examples



## Additional issues

- Same as commercial applications

## Example applications

- Environmental monitoring and control of critical areas
- National park security
- Border control
- Urban security
- Fire monitoring

# WiMAX in the extended network

