

WiMAX technology

An opportunity that can lead African Countries to the NET Economy

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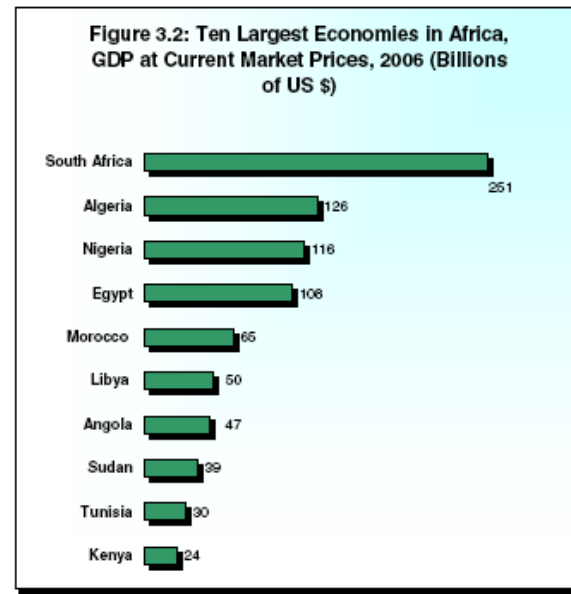
Agenda

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



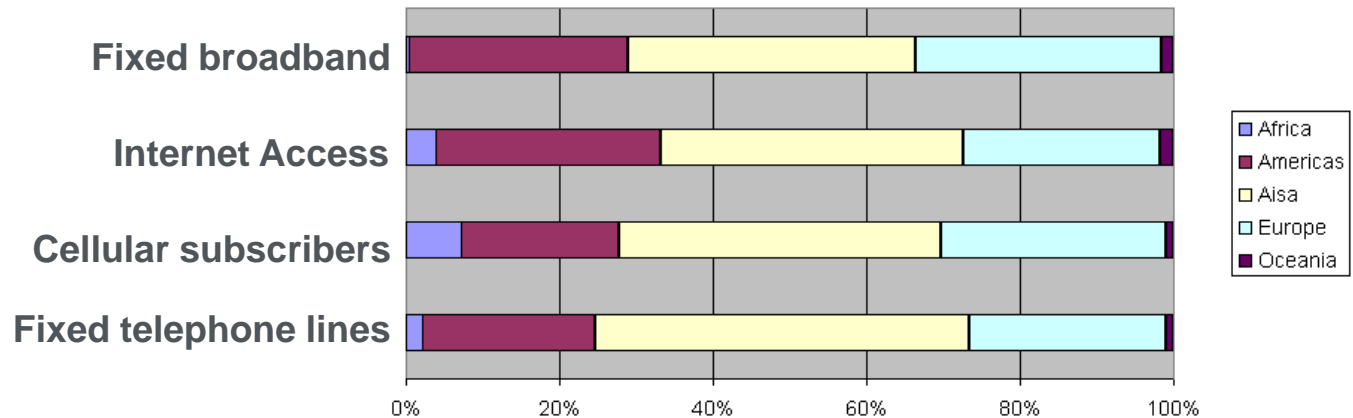
Africa socio economic general picture

- 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

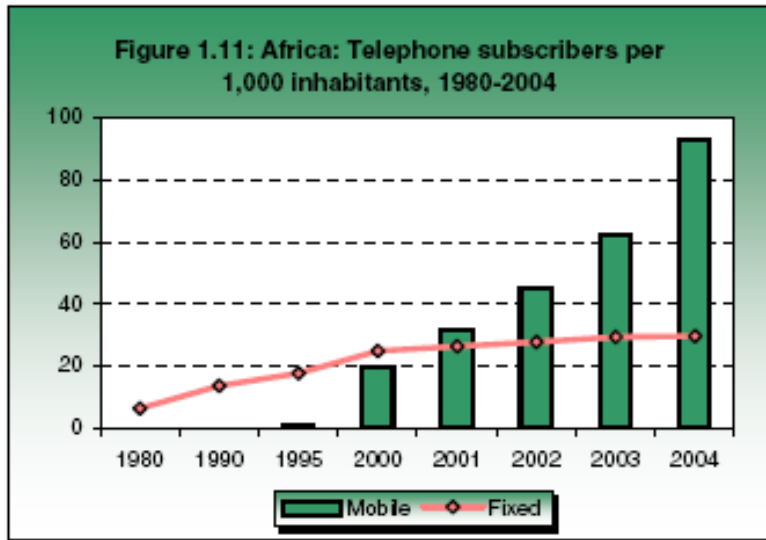


Source: African Development Bank

➤ Low figures in telecom related infrastructures



Source: ITU World Telecommunication Indicators database, 2007

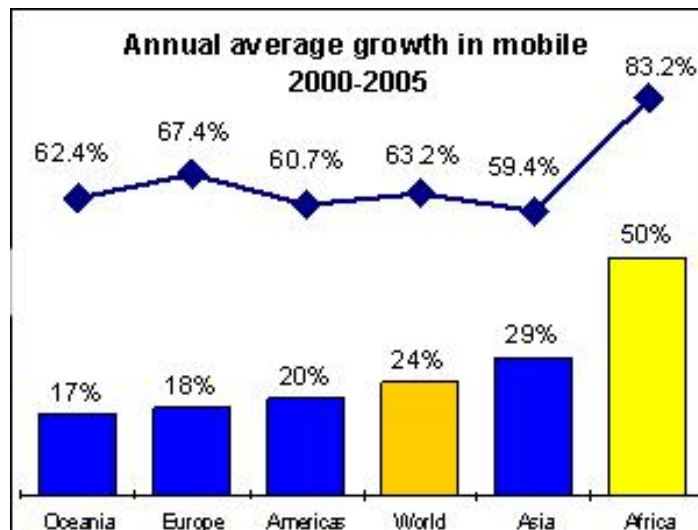
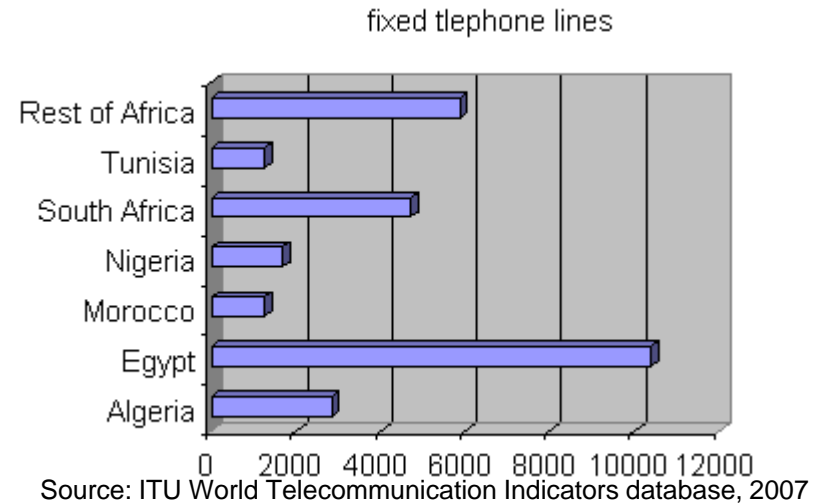


➤ Big growth potential with different evolution trends

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

Telecommunications: fixed & mobile market

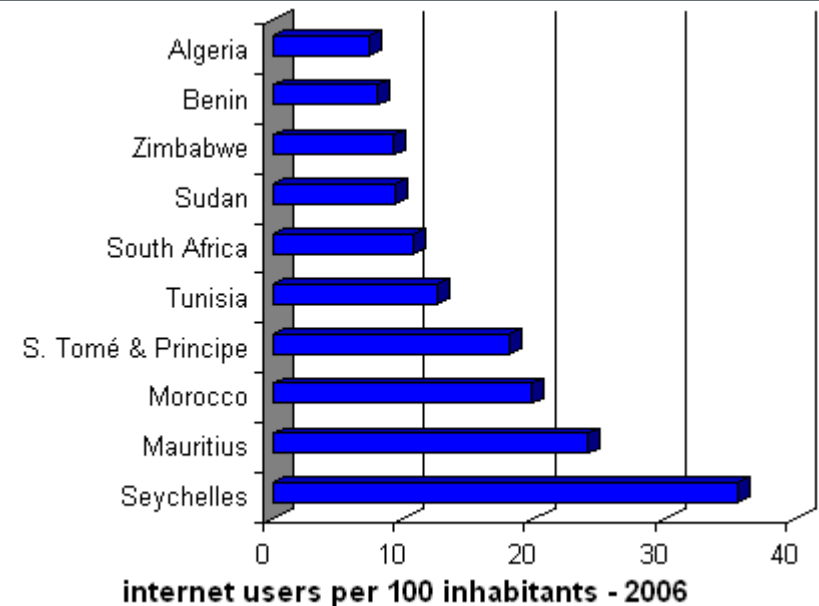
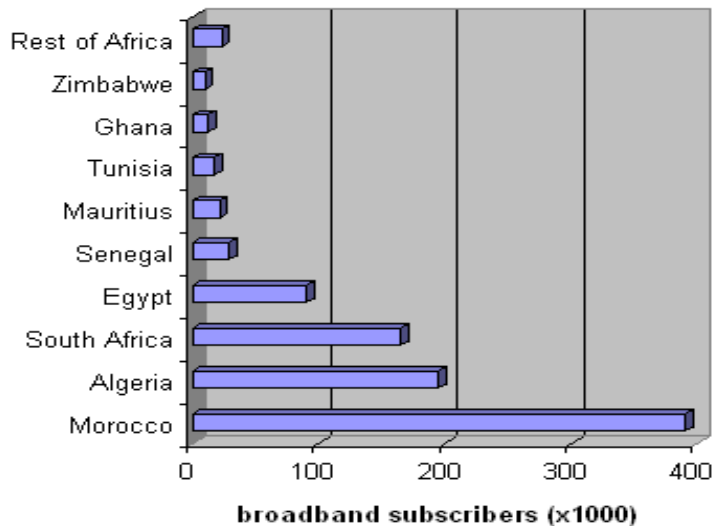
- Most of fixed lines concentrated in few countries
- Fixed telecom lines located mainly in urban areas
- Fixed lines penetration in villages is very poor



- 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)

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



Telecommunications: needs & analysis



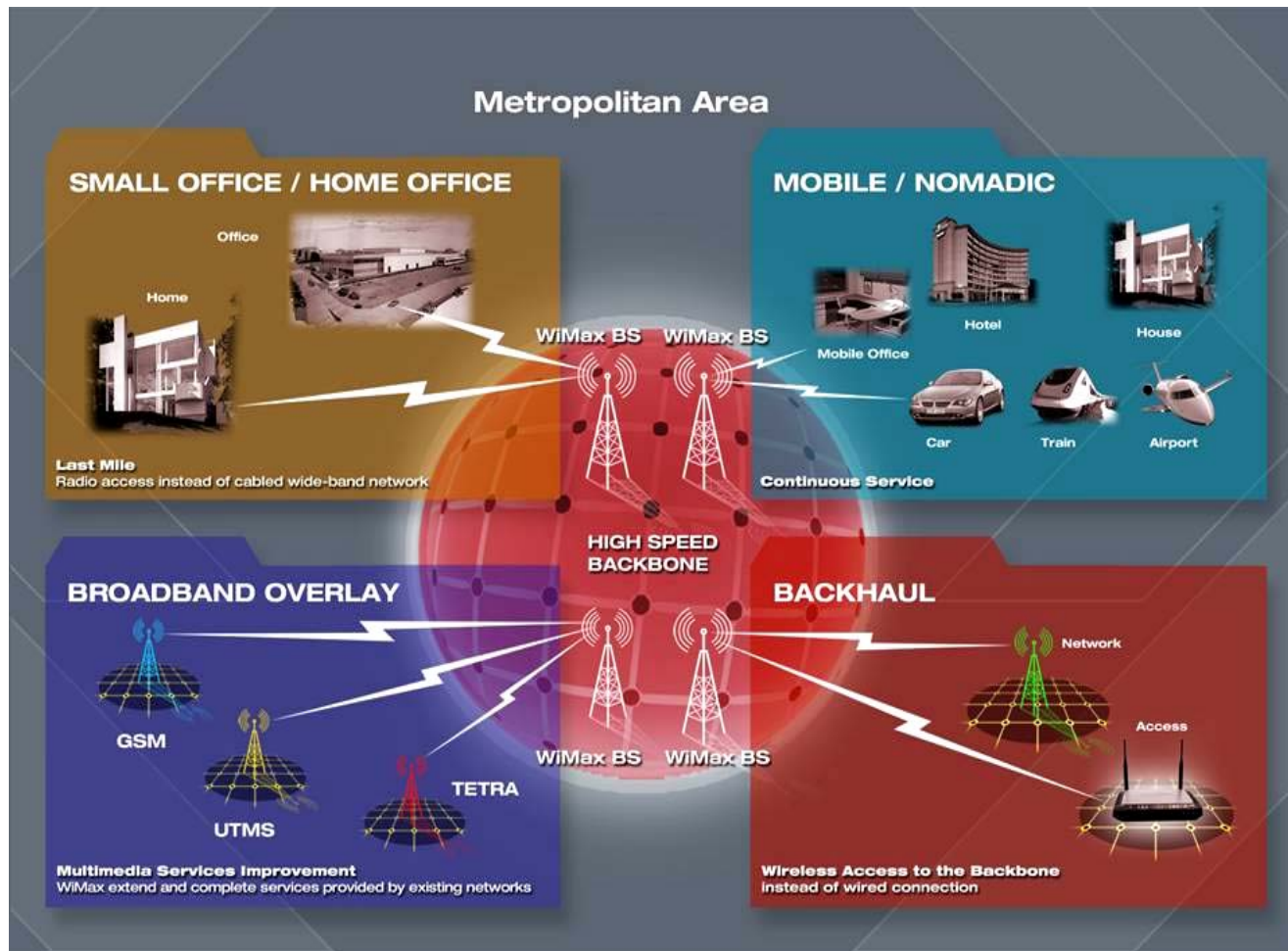
- Better ICT connectivity would improve Africa's economic potential: internet access is recognized as a key issue for personal, social and economical growth
- States' administrations are increasingly interested to Internet for diffusion of e-government, plans are undertaken to promote internet knowledge 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

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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



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

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

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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

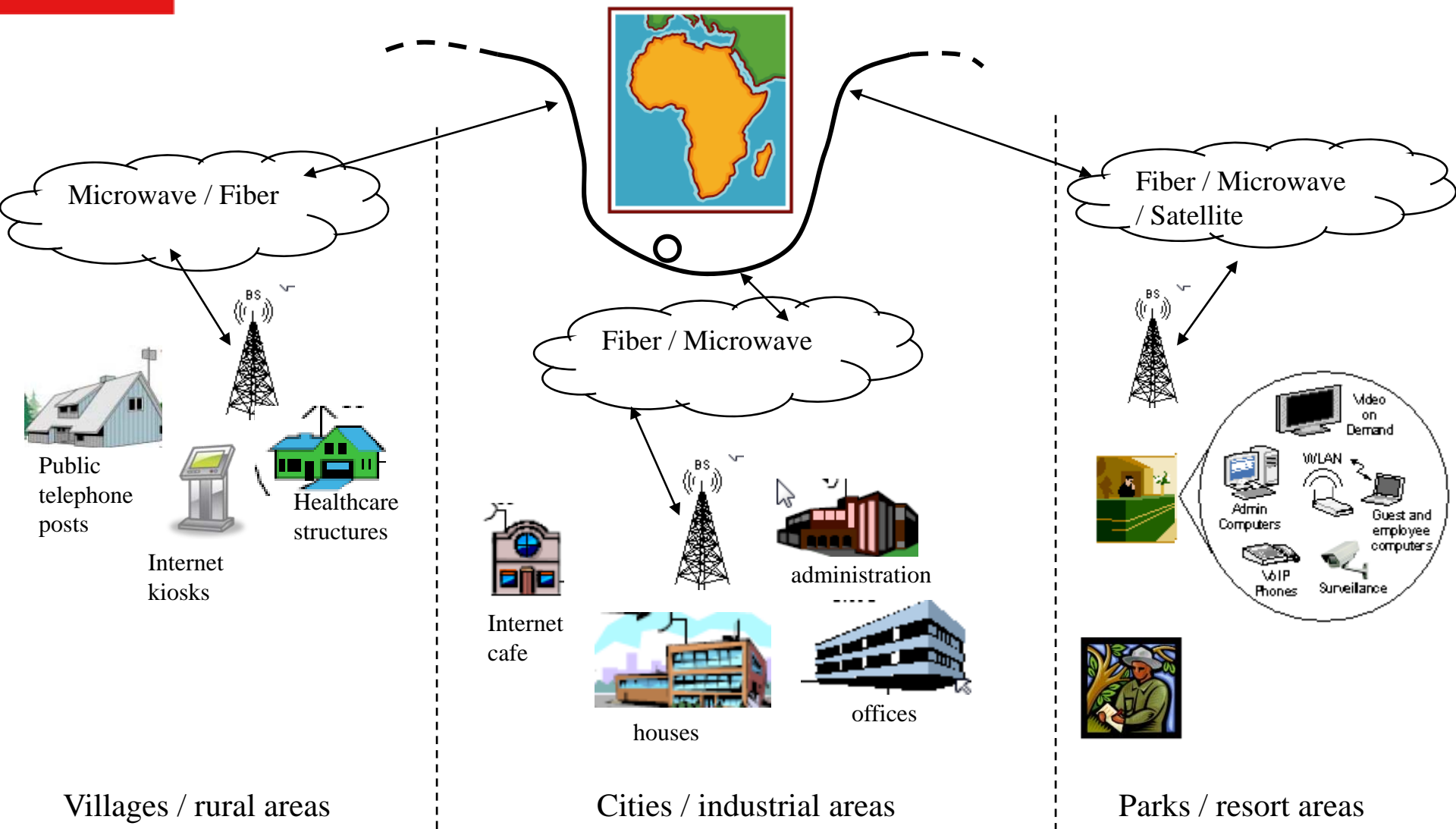
- Power autonomy should be enforced due to electricity unreliability
- Rugged equipments for harsh environments
- Solution designed for remote maintenance
- Cheap and essential CPEs

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

