Telkom South Africa –

Broadband Wireless Access Experiences

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Telkom South Africa: Wireless Strategist

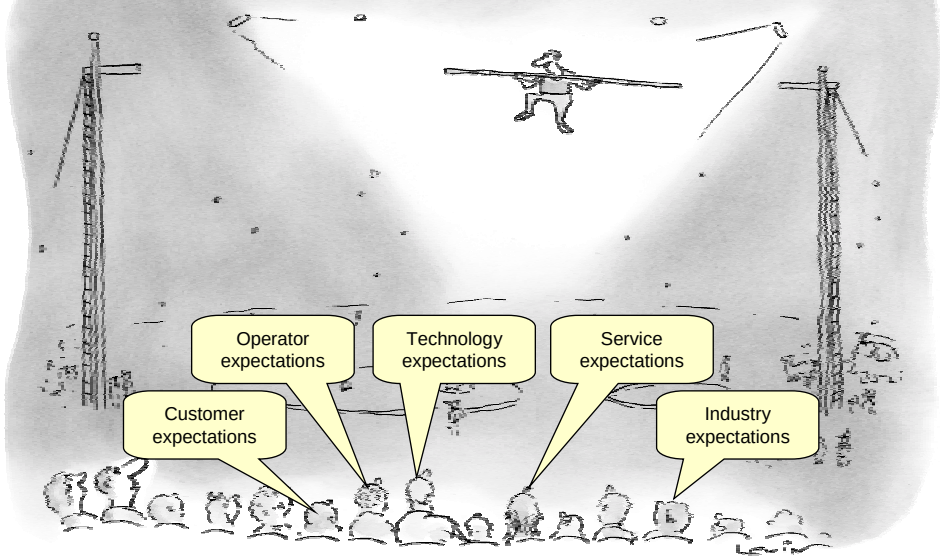
Who we are

- Telkom SA Limited is one of the largest companies registered in the Republic of South Africa and is the largest telecommunications services provider on the African continent based on operating revenue and assets
- Listed on the JSE Securities Exchange South Africa and the New York Stock Exchange
- An integrated communications group, Telkom offers fixed-line and mobile services through **a 50% shareholding in a mobile operator Vodacom**, while also leveraging the synergies between the two

Overview

- Broadband – The South African Challenge
  - → Cost, Timeline, Market Opportunity
- Broadband capable NGN
- Wireless Broadband Market Segmentation
- Present Broadband Wireless Offerings
- Network Evolution
  - → FMC, WiMAX, CDMA 2000
- WiMAX Trial
- Network Management
- Final Comments

… is this your current BWA scenario?



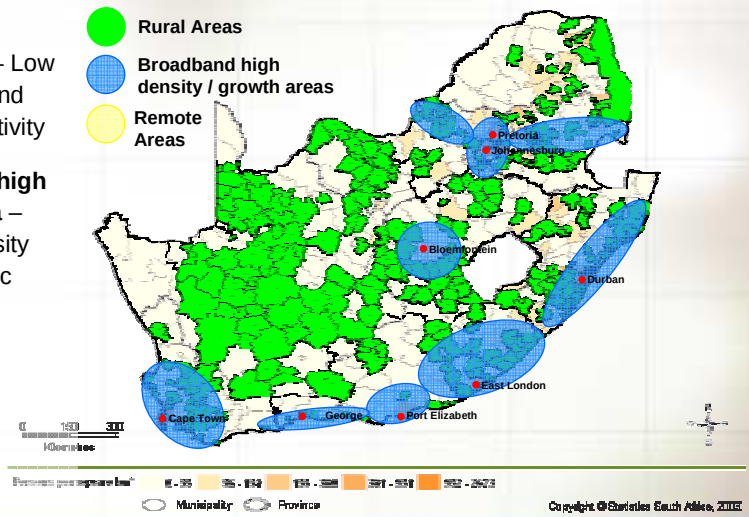
"It appears to be some kind of wireless technology."

Existing Rural Coverage and Service Provisioning

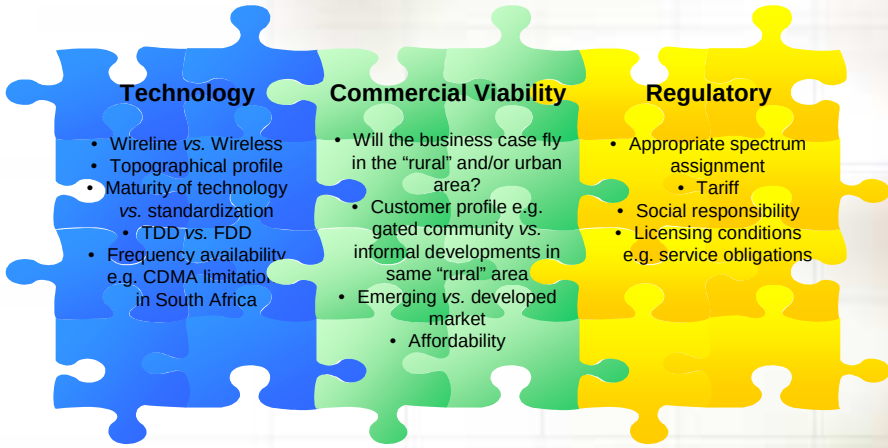
Broadband – The South African Challenge

Definitions:

- **Rural Area** – Low teledensity and economic activity
- **Broadband high density area** – high teledensity and economic activity



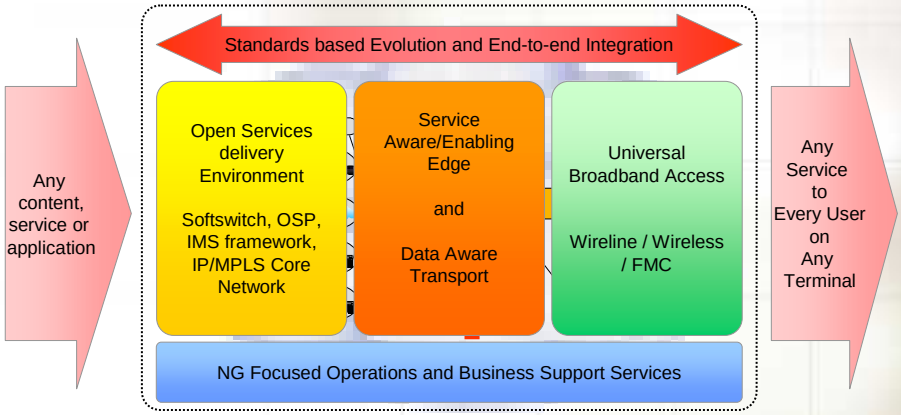
The Rural Puzzle – *challenges in service provisioning*



… Broadband Wireless Access is more than just technology

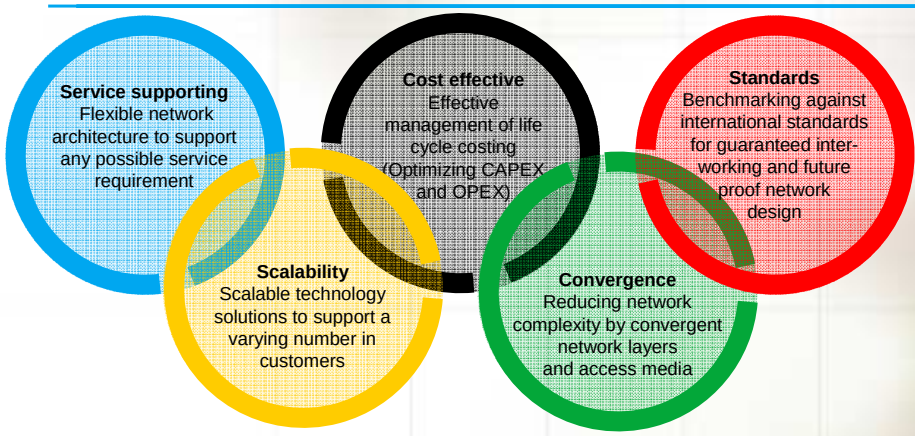
The importance of a broadband capable Next Generation Network...

…the model



Evolutionary approach tailored to operator uniqueness is key

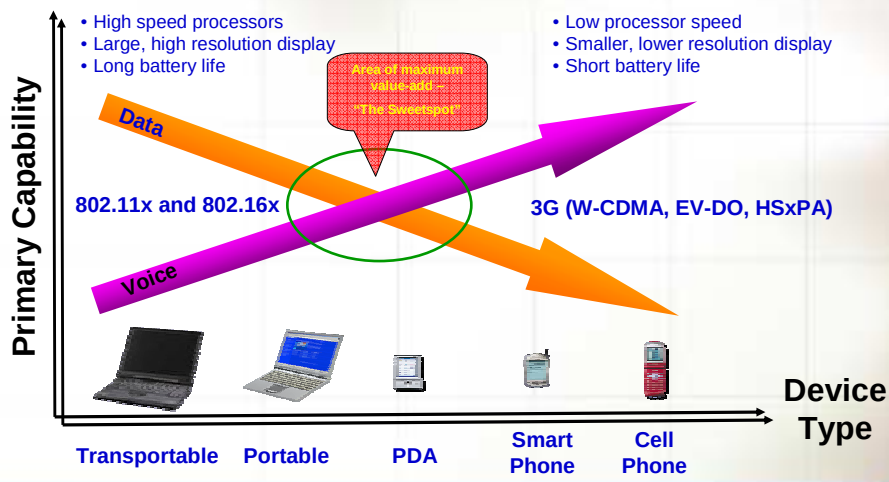
… 5 critical focus areas of technology strategy



"Going for Gold" - Move to all IP Network

Wireless Broadband Market Segmentation

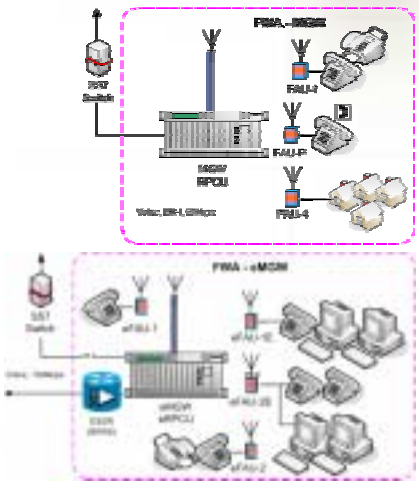
Wireless Platform Capability



What Do Customers Ultimately Want?

- Personal Broadband
- Knowledge workers
- Portable and mobility demand on the increase
- Services evolution
  - → Content
  - → Quad play
  - → Always Best Connected
- Goal – Enhancement to Telkom's Value Proposition
  - → Backward and forward integration with key business and solution partners
  - → Integrating value-added services into the product mix
  - → Technology selection determined by access to appropriate spectrum

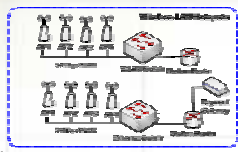
Present PTMP FWA Systems

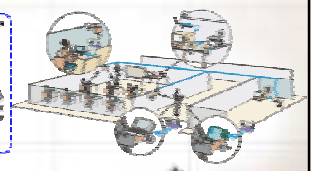


- Applications
  - → Always-On Fast Internet / Corporate access (<512kbps)
    - eMGW
  - → Toll quality telephony
  - → Voice band data (56kbps)
    - MGW
- Market Position
  - → Residential
  - → Small business

WLAN - WiFi

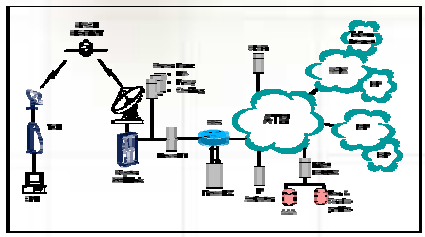
- Targeting enterprise, business traveler, knowledge worker
  - → Convention Centers, Business parks
  - → Hotel chains, Franchises
- Products must be WiFi Alliance certified
  - → IEEE 802.11b – 11Mbps
  - → IEEE 802.11g – 54 Mbps
- Technology development being monitored
  - → MIMO (802.11n)
  - → Security (802.11i)
  - → QoS (802.11e)
  - → WiFi Alliance WMM™ (WMM – WiFi Multimedia)
  - → WMM Power Save ™
  - → WPA2 Enterprise and WPA2 Personal
  - → IETF CAPWAP (Control and Provisioning of Access Points)
  - → IEEE 802.11r – Fast Inter AP Roaming
  - → IEEE 802.11u – Inter-working with external networks
  - → Enterprise mobility
- ***Not suitable as an WAN technology***
- Enterprise Mobility
  - → Need for WLAN switches





Satellite (VSAT)

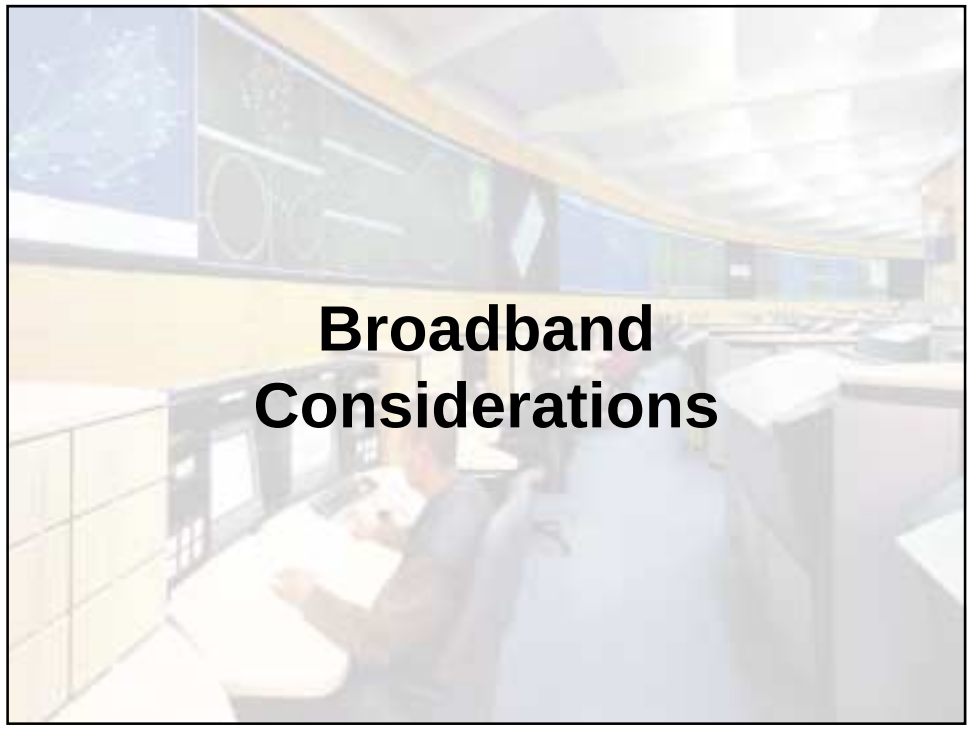
Telkom's Satellite Offerings



- SSO, SSE, 5 User packages
  - → Intended for periodic use of e-mail, newsgroups, file transfers, Internet chat, instant messaging, and Web-browsing. Also has plain old telephone service in the case of SSO
  - → It is not suited for extensive Virtual Private Network (VPN) usage, video and voice over IP, remote access, gaming, hosting web or ftp servers, or applications with heavy upload traffic

Satellite

- VSAT (GEO)
  - → Stagnant growth, new products need to be developed (broadcasting e.g. IPTV)
  - → Better suited for niche market applications
  - → Deployments in Ku (South Africa) and C (Africa) bands
  - → Move to "meshed" PTP space segment from Point-to-Multipoint space segment – single hop required, thereby reducing latency
- Present satellite challenges and future demand
  - → Real-time applications
  - → Service management
  - → QoS
  - → Prioritisation
  - → Dynamic bandwidth on demand
  - → Future Ka developments (small VSAT terminals)
  - → Higher bandwidth



Broadband Wireless Access and Satellite Considerations

- Use standards based technologies
  - → Economies of scale
  - → Support and Integration
  - → Interoperability
  - → Reduced learning curve effects
  - → Reduced technology dissonance (you need harmony)
- Fixed WiMAX
  - → Outdoor and indoor antennas for fixed deployment
  - → IAD/CPG based communications for voice and data
  - → Services – Voice, Fax, WiFi, Internet…
- Mobile WiMAX
  - → Fixed, Nomadic, Portability, Mobility
- WLAN Hotspots
  - → Present focus on single AP hotspots, hotels to full Enterprise solutions
  - → New opportunities in Corporate and Enterprise mobility
    - Roaming with enterprises and branch offices
    - IP PBX, Enterprise WLAN Switches, GSM roaming

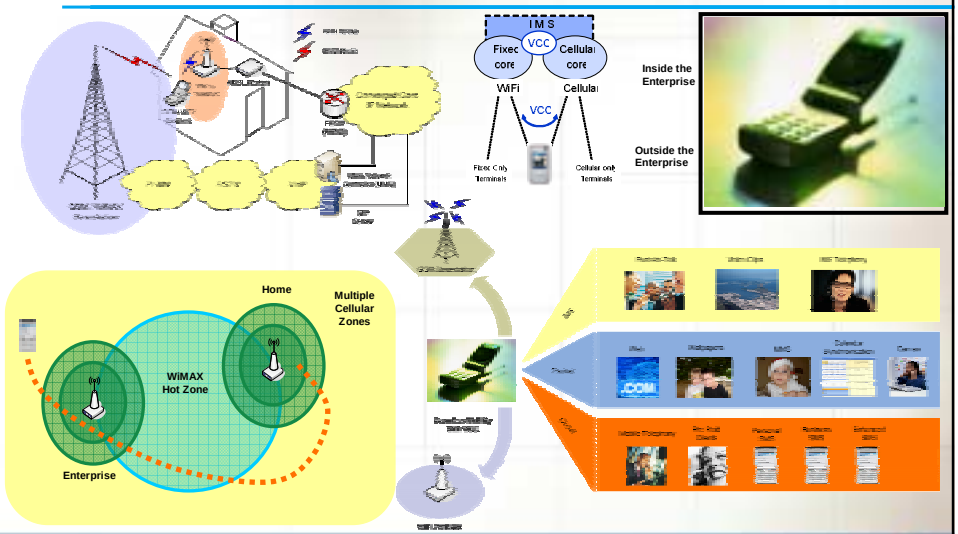
Broadband Wireless Access and Satellite Considerations (2)

- Technology Convergence
  - → Reduction in the points of failure
- All access infrastructure is supported by
  - → Backhauling technologies
  - → Must be included in business case consideration
- Synchronization
- Core and services infrastructure
  - → Move to IP centric technologies such as IMS and VCC
  - → Softswitch (VoIP and PSTN interconnectivity)
  - → Standards (e.g. SOAP, XML, AAA)
  - → Economies of scale
  - → Outsourcing service development e.g. Billing, payment gateways, AAA, RADIUS

Drivers for Telkom's Involvement in FMC

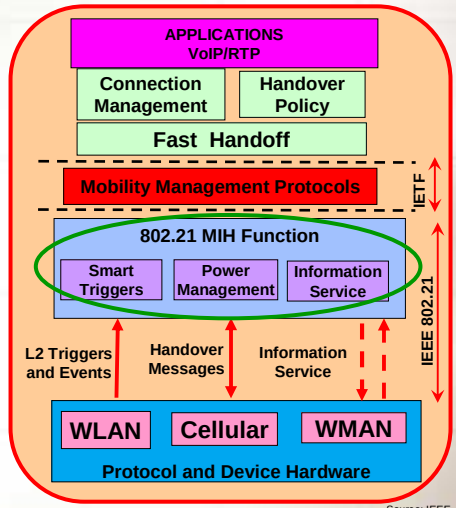
- Defensive strategy
  - → Revenue protection
- Offensive Strategy
  - → Improved value proposition for all customers
  - → Cost reduction
- Enable the delivery of customer-centric ubiquitous services
- Increase customer loyalty
- Exploit new revenue streams
- Tighter integration with next generation IP and SIP based communications
- Closer alignment with corporate/enterprise requirements
- Convergence of voice and high speed data capabilities over IP
- Ensure capital expenditure (CAPEX) and operating expenditure (OPEX) cost reduction through a migration to IP

Fixed Mobile Convergence



FMC Network Challenges

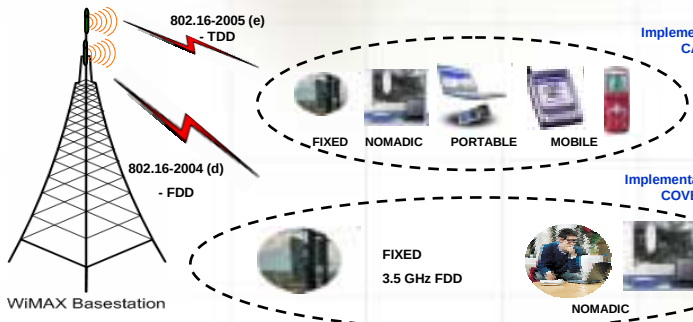
- IEEE 802.21
  - → Media Independent Handover
- **The fundamental point to remember is that 802.21 and IMS are key enablers for VCC and data session continuity**
- Value Proposition of IEEE 802.21 (MIH)
  - → Maintain connectivity
  - → Lower power
  - → Anytime, Always, Best Connected
- Optimize Handovers (WiFi – WiMax - Cellular)
  - → Network Discovery & Selection
  - → Session and Service continuity
  - → Device to Network co-operation
- Key work items for FMC
  - → Link layer triggers
  - → Information Service
  - → Handover Commands
  - → Media Independent Handover Function



Source: IEEE

Wireless Access Technologies – *enhancing access capability*

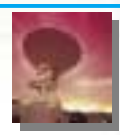
WiMAX 802.16-2004 and 802.16-2005



Telkom SA WiMAX trial – *overview*

Telkom SA WiMAX trial objectives...

Air Interface Prioritization
Voice
BBoD with QoS/SLA
Ethernet



Wireless Backhaul
Between WiMAX Towers
Hotspot Backhaul

Network Management and Planning
Network management
Performance management
RF Planning tool functionality

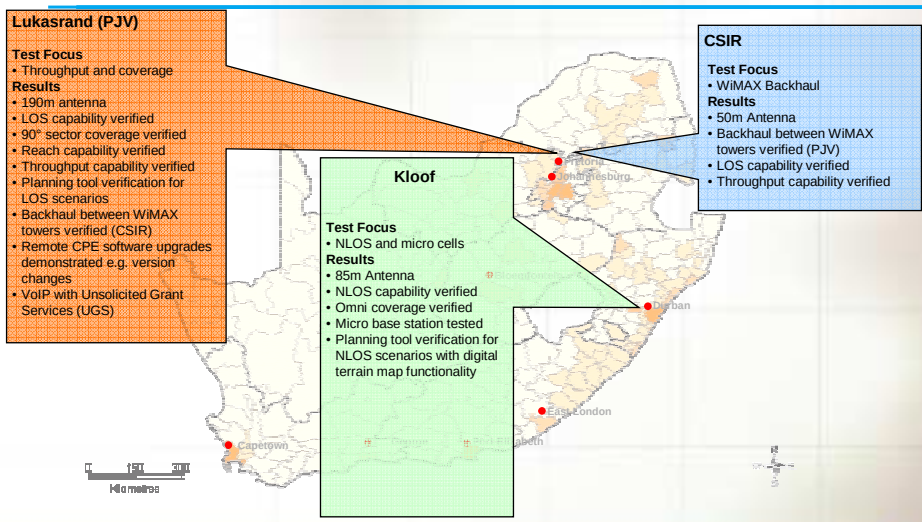
Telkom SA WIMAX Trial

Gateway
Customer premise gateway
with integrated voice
WiFi Access gateway

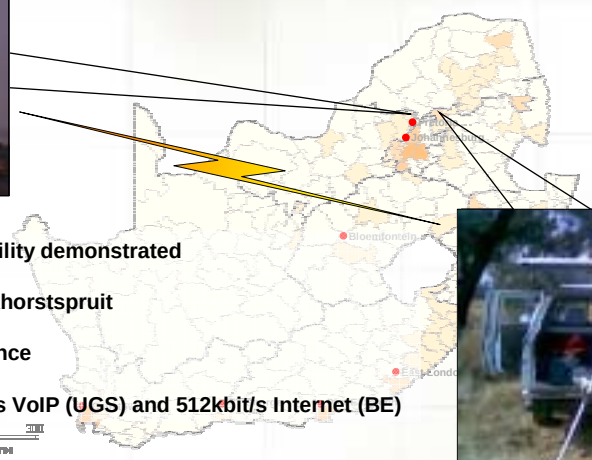
Technology Capabilities
LOS/NLOS capabilities
Distance/Bandwidth/Speed

Integration Issues
Voice/PSTN/VOIP integration
ATM interworking
IP interworking

Telkom SA WiMAX trial – setup and results...



Telkom SA WiMAX trial – results ...

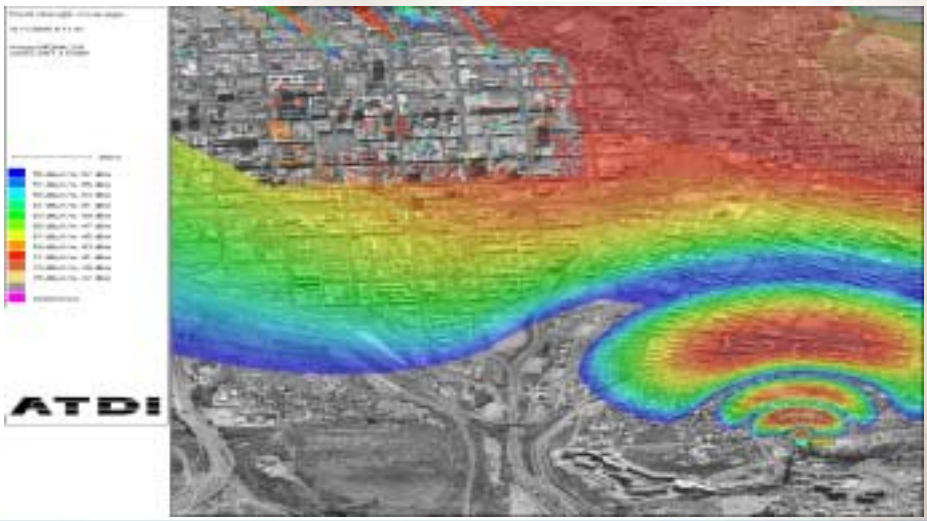


- Reach capability demonstrated
-
- PJV to Bronkhorstspruit
- 54.7km distance
- Simultaneous VoIP (UGS) and 512kbit/s Internet (BE)

… effective radio planning is critical …

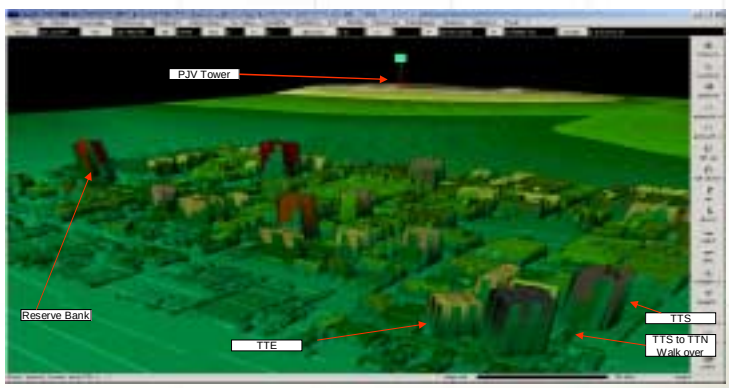
… effectiveness is dependent on availability of accurate terrain information

Pretoria Coverage from PJV (1)

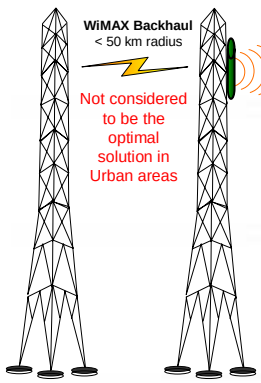


Pretoria Coverage from PJV (2)

- Fully understanding the implications of portability and mobility
  - → Marketing requirements
  - → Technical requirements
  - → Network and frequency planning



WiMAX Network Deployment Guidelines



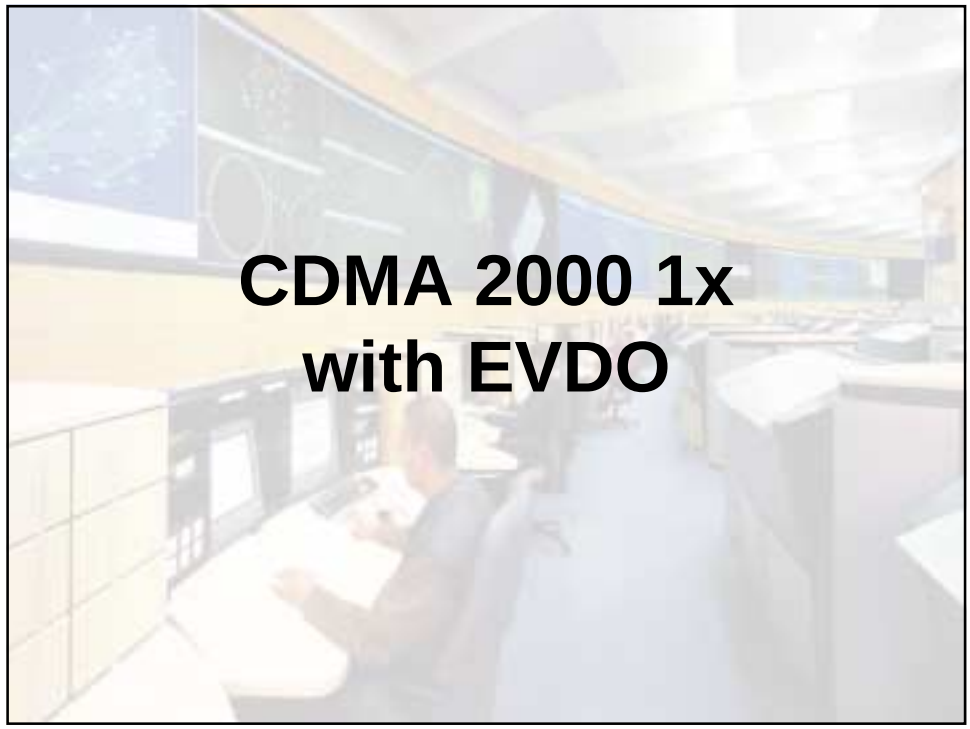
Rural areas
Cell sizes < 30 km radius
Voice centric deployment
Outdoor fixed CPE with higher antenna gain preferred
FDD systems preferred
Voice and data services offered (WLL)

Urban and peri-urban areas
Cell sizes < 10km radius
Deployment is data centric
Indoor, fixed outdoor and nomadic CPE
Self-install CPE

Dense urban areas
Cell sizes < 3km radius
Based on data centric usage
Indoor, fixed outdoor and nomadic CPE Self install CPE

WiMAX Implementation Considerations

- Need for extended planned coverage prior to deployment
- Consider
  - → Certification and technology delays
  - → Physical layer certification not enough… QoS recommended for deployment
  - → First Office Application recommended to aid in Product Development / Engineering / Operational Readiness
  - → Core network and backbone roll-out
  - → OSS / BSS availability
  - → Network management
- Mobile WiMAX can be used for fixed installations
- Fixed, nomadic, portable and mobile deployments could be considered using 802.16-2005
- MIMO and AAS should be supported directly by the vendor



CDMA 2000 1x and CDMA 2000 1x EVDO

- Proof of Concept done with two major Chinese vendors
- Lower frequencies – major competitive advantage
- Language, not technology proved to be the major challenge
- PoC conducted at Thabazimbi (Rural)
  - → Mixture of CPE (hand-held, data cards, fixed)
  - → Single base station
- Recommend wait for IP centric releases
- Very competitive technology
- Inhibitors
  - → Spectrum availability
  - → Lack of handsets in 450 MHz sub-bands other than A and C

Generic Management Requirements

- Vendor and operators – need to negotiate / develop joint requirements
- Standard MIBs
- Operations and Support and Business Systems (OSS, BSS)
  - → Service/Device Provisioning
- Monitoring Events, Statistics
  - → Notification, Triggers, Logging
- Managing Connections
  - → Admission control and QoS Mapping, Managing Device States & Resources
  - → Managing Broadcast and Multicast Services
- Managing AAA and Security Functions
  - → AAA Guidelines, Security Context and Key Management
- Mobility and Handover Management and Procedures
- Physical Layer Management
  - → Radio Measurement and Reporting & Power Control Management

Final Comments

- Achieve a service focused evolution
  - → Focus on convergence on all layers (Application, Network, Service)
- A cautionary approach towards technology choices and implementation is advised – be sure of:
  - → Spectrum availability
  - → Regulatory environment
  - → Understanding the service requirement
  - → Technology Maturity
  - → Technology partners
- Monitor Sub-1GHz developments
- Make your business model work
  - → Scenario planning is crucial to determine successful network deployment

Thank You… See You in 2010