Presentation to
Parliamentary Portfolio Committee on Communications

21 September 2011

CSIR represented by Dr Ntsibane Ntlatlapa
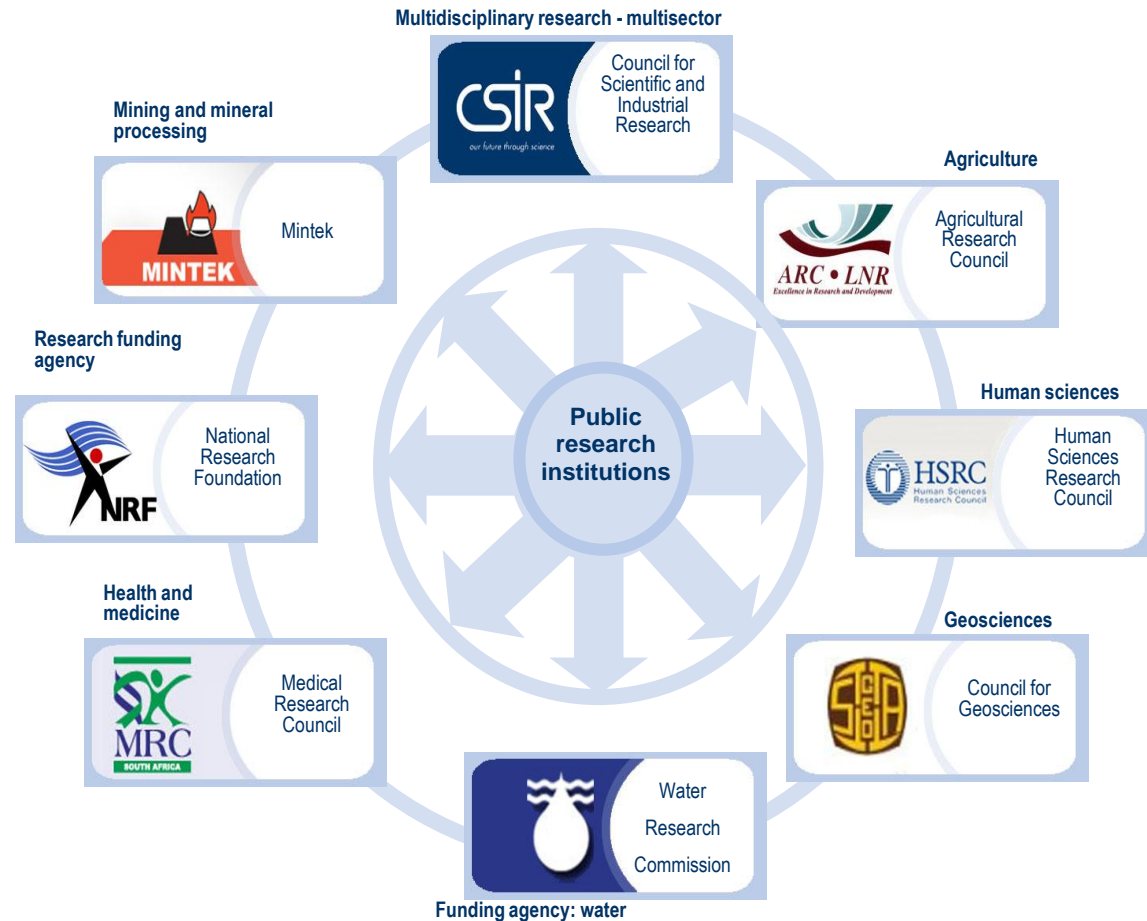NAMEC lead by Keith Thabo

Contents

- About CSIR – what it is its interest in digital migration
- NAMEC partnership with CSIR Meraka Institute – joint vision
- The Set top box specification
- Some extra material (not for this presentation)

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our future through science

About CSIR

It undertakes directed research for increased market competitiveness and for public good –

Shaping a better future through science

The Meraka Institute is an operating unit of the CSIR focussed on information and communication technology

Established in April 2005 – now the largest concentration of ICT Researchers in South Africa

Multidisciplinary research - multisector

Council for Scientific and Industrial Research

Mining and mineral processing

Mintek

Agriculture

Agricultural Research Council

Research funding agency

National Research Foundation

Public research institutions

Human sciences

Human Sciences Research Council

Health and medicine

Medical Research Council

Geosciences

Council for Geosciences

Funding agency: water

Water Research Commission

CSIR strategic priorities

Building and transforming human capital

Strengthening the science engineering and technology base and performing relevant R&D

Transferring technology and skilled human capital

} Addressing priority issues that contribute to the national programme of development for the benefit of all South Africans

Maintaining financial sustainability and good governance

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Why is CSIR Meraka Institute interested in Digital Migration

- Exploitation of previously government funded research for societal benefit:
  - Community wireless mesh networking (funding by the department of Science and Technology)
  - Internet low rate adaptive streaming of live video (funding by Technology Innovation Agency's Innovation fund) - http://www.yworld.co.za/ytv/
- Opportunity to conduct further relevant research (fine-tuning the optimal solution)
- Financially interested for CSIR w.r.t. potential revenues of exploiting existing IP via royalties for export market (100 Million boxes estimated in Africa).

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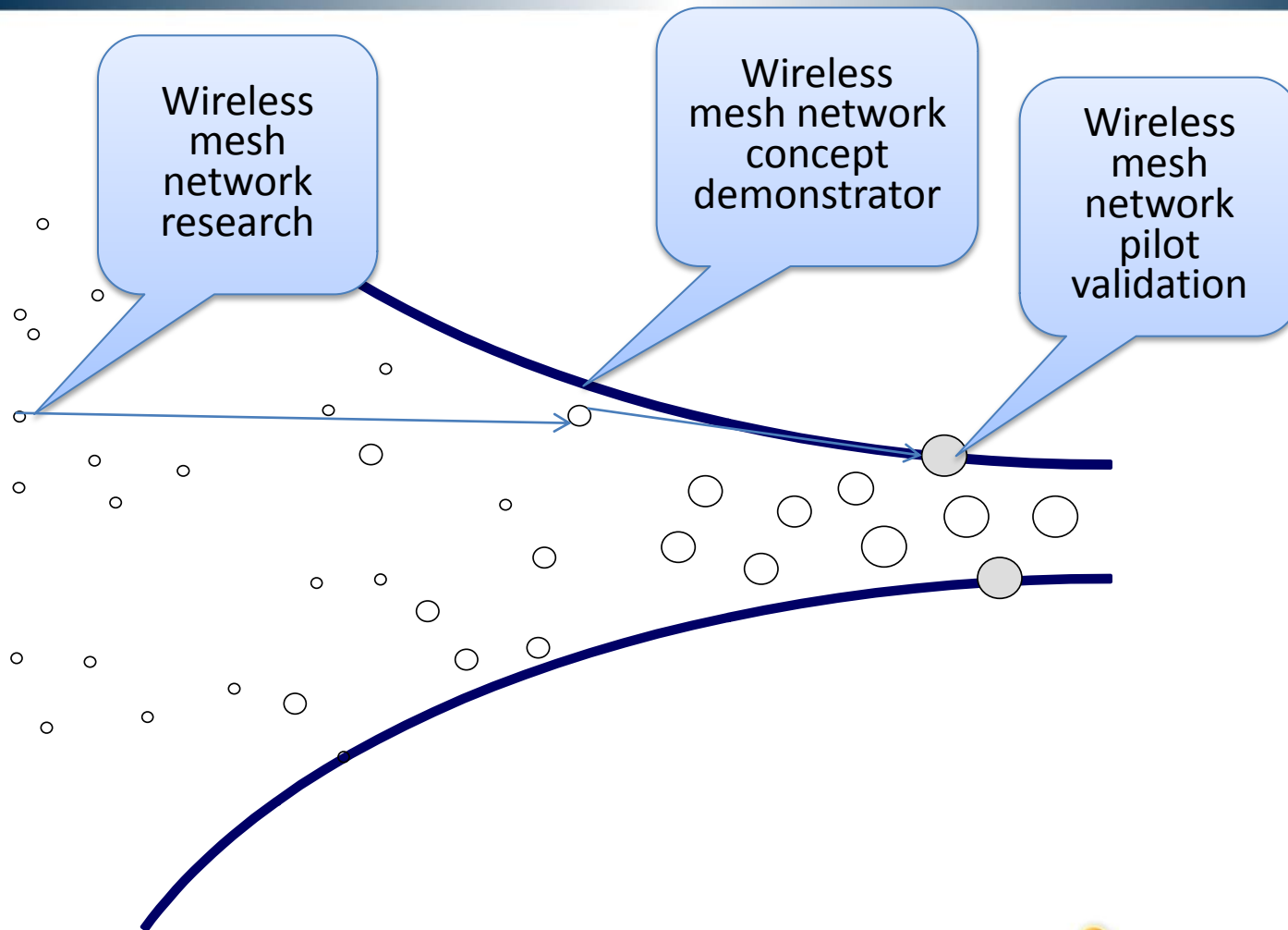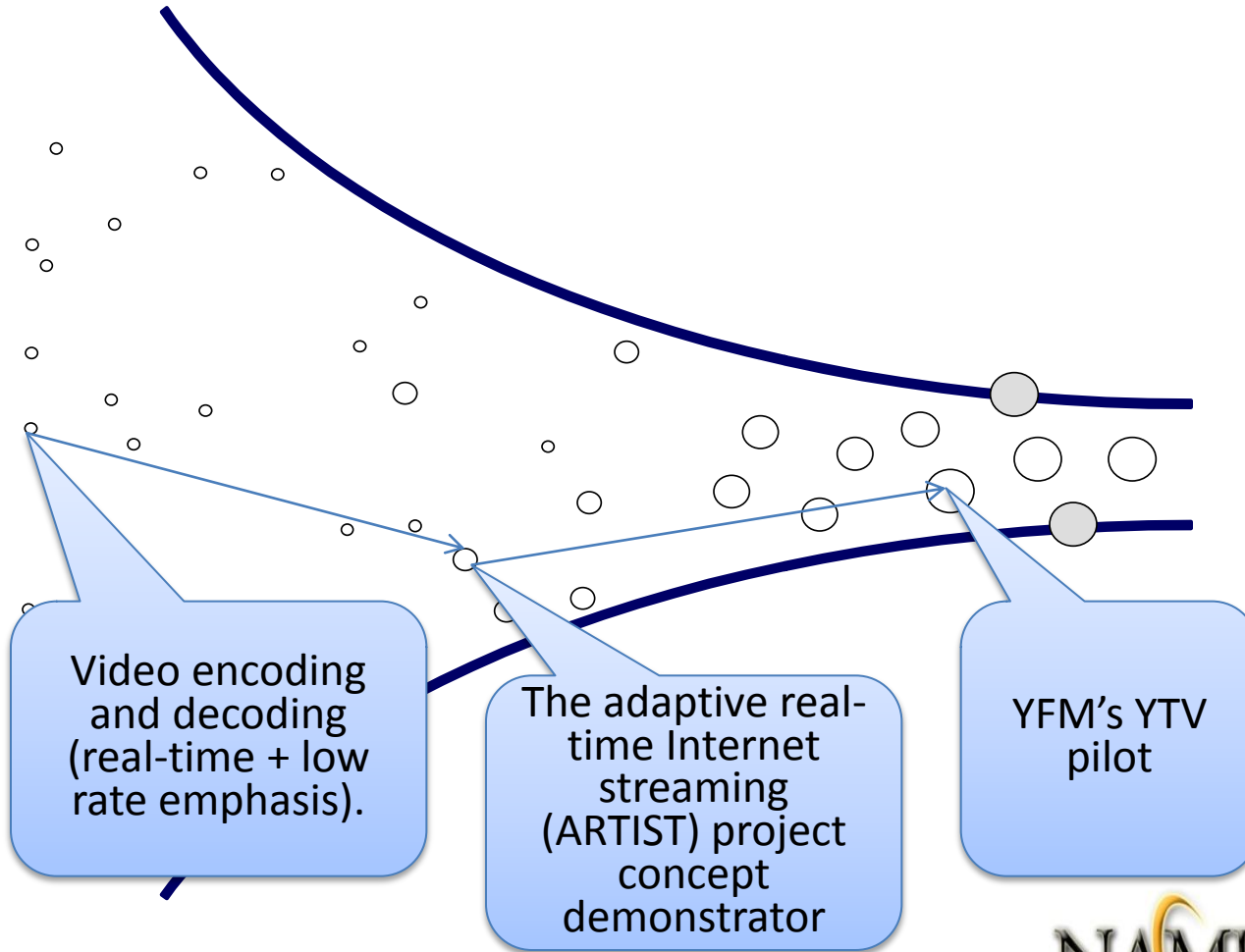our future through science

Illustration: Community wireless mesh networking

Illustration: Internet low rate adaptive streaming of live video

Video encoding and decoding (real-time + low rate emphasis).

The adaptive real-time Internet streaming (ARTIST) project concept demonstrator

YFM's YTV pilot

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South African STB

Community wireless mesh networking (funding by the department of Science and Technology)

Internet low rate adaptive streaming of live video (funding by Technology Innovation Agency's Innovation fund) - http://www.yworld.co.za/ytv/

Smart Beam-forming antennas

Future enhance communication using TV white spaces

Innovative combination of these for a unique SA STB

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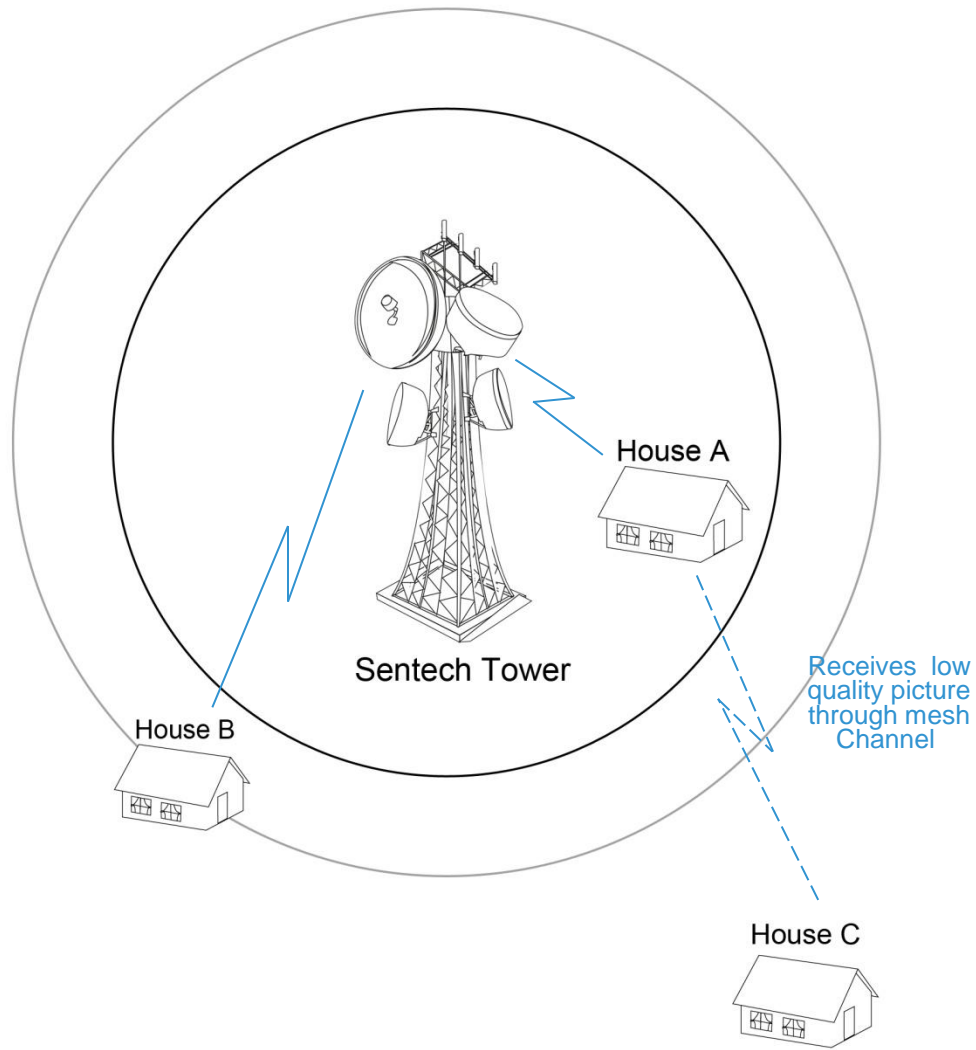# Joint vision for digital migration (Infrastructure)

- The country should leverage on the digital migration process to dramatically **increase broadband penetration** through an integrated and **innovative** design of Digital Terrestrial TV (DTT) network to deliver **both digital TV and broadband services.**


Broadcasting service provider e.g. SABC, E-TV, MNET

Government Service Provider

Signal distributor (e.g. SENTECH)

Sentech Tower

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Receives DTT signal

House A

Sentech Tower
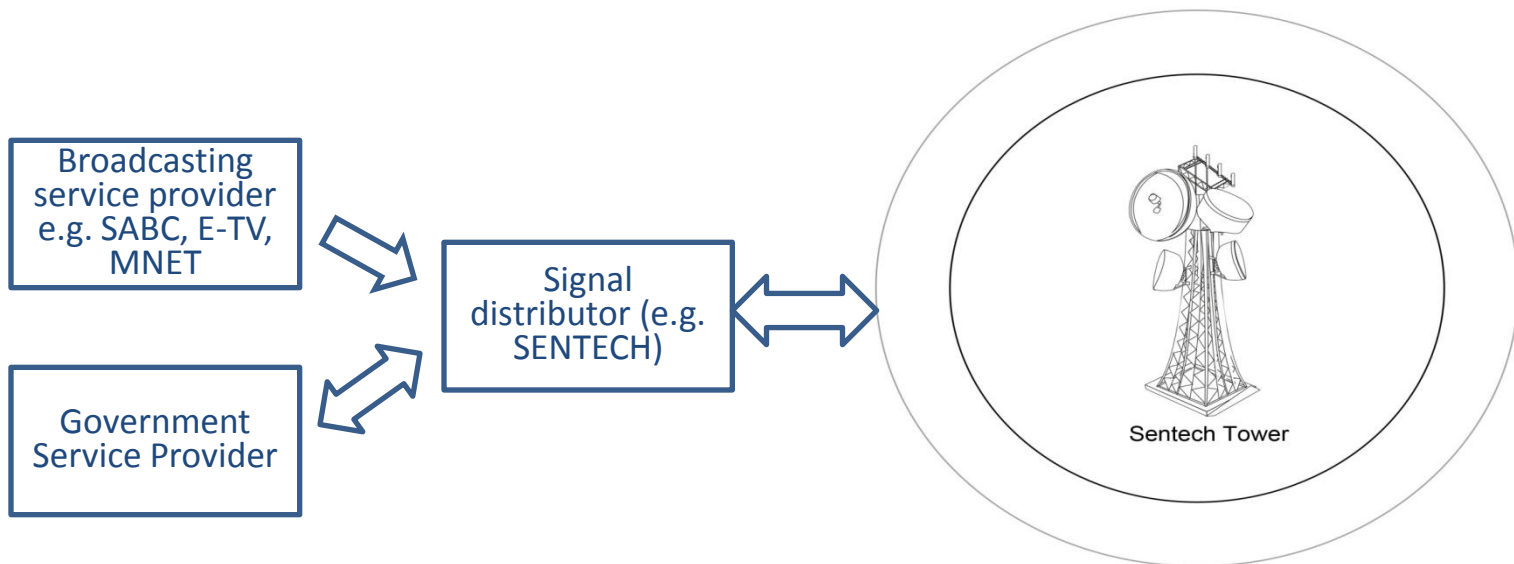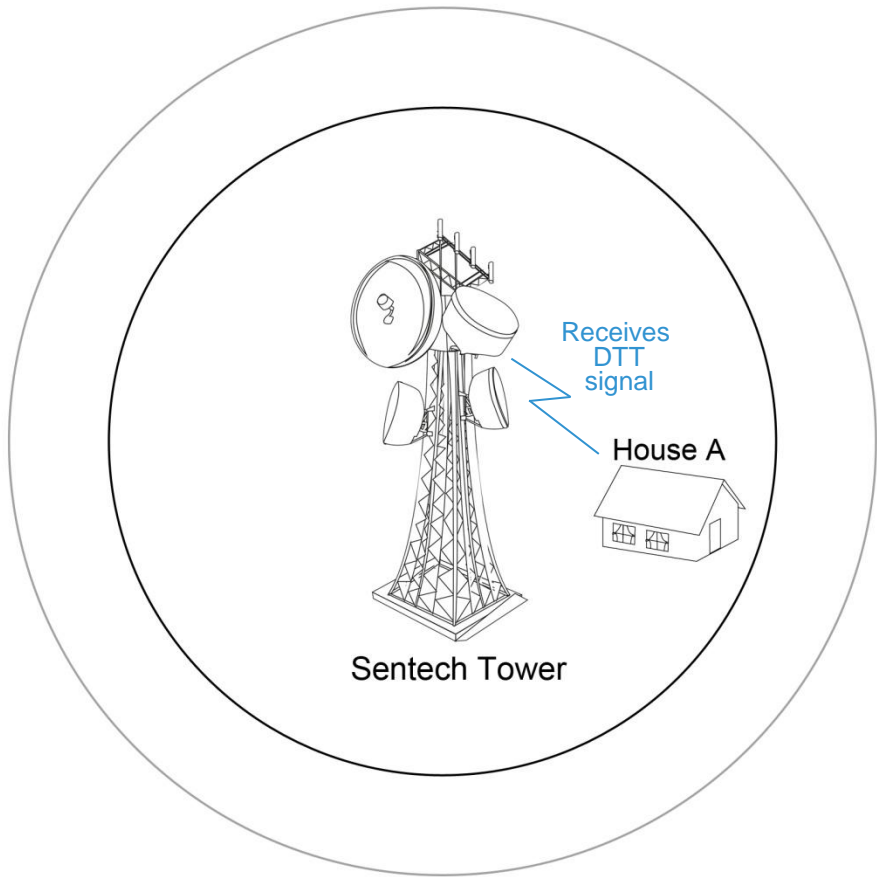
Picture quality – House A
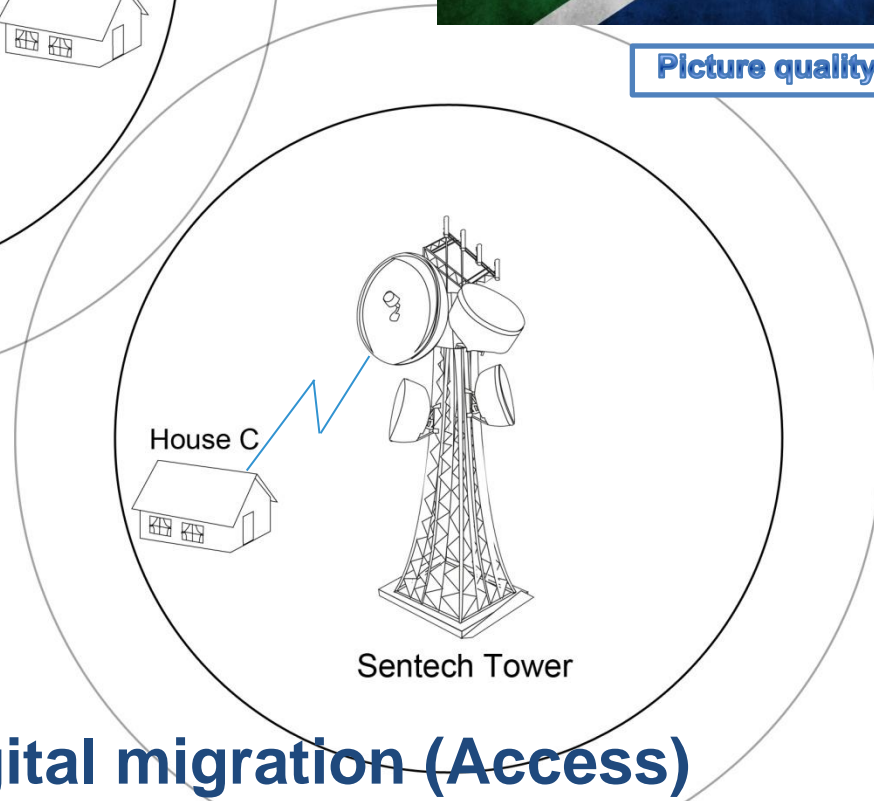
Joint vision for digital migration (Access)

Picture quality – House C
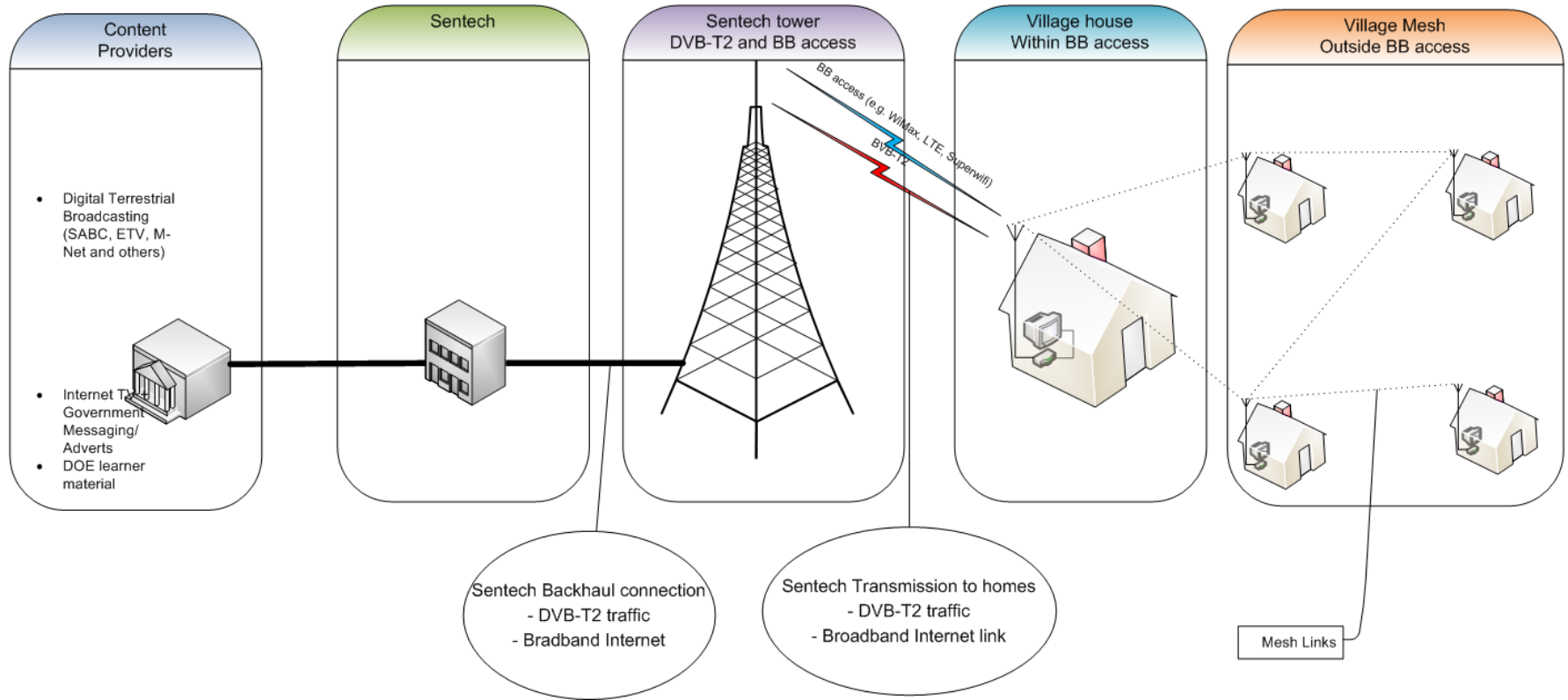
Joint vision for digital migration (Access)
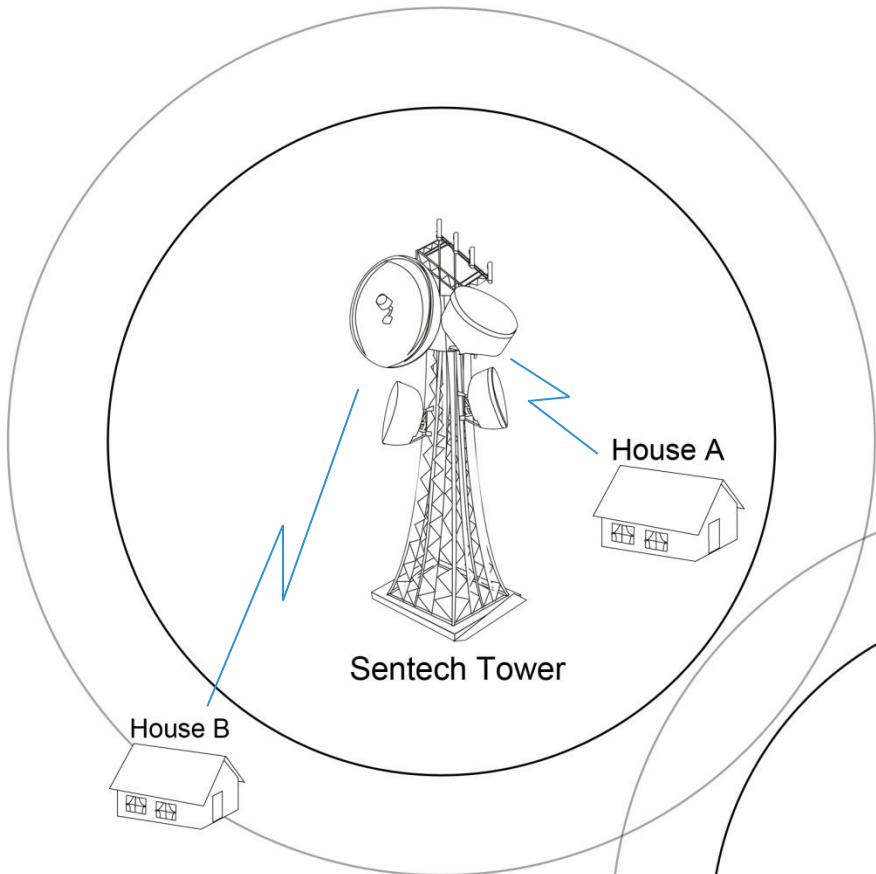
Picture quality – House A and C

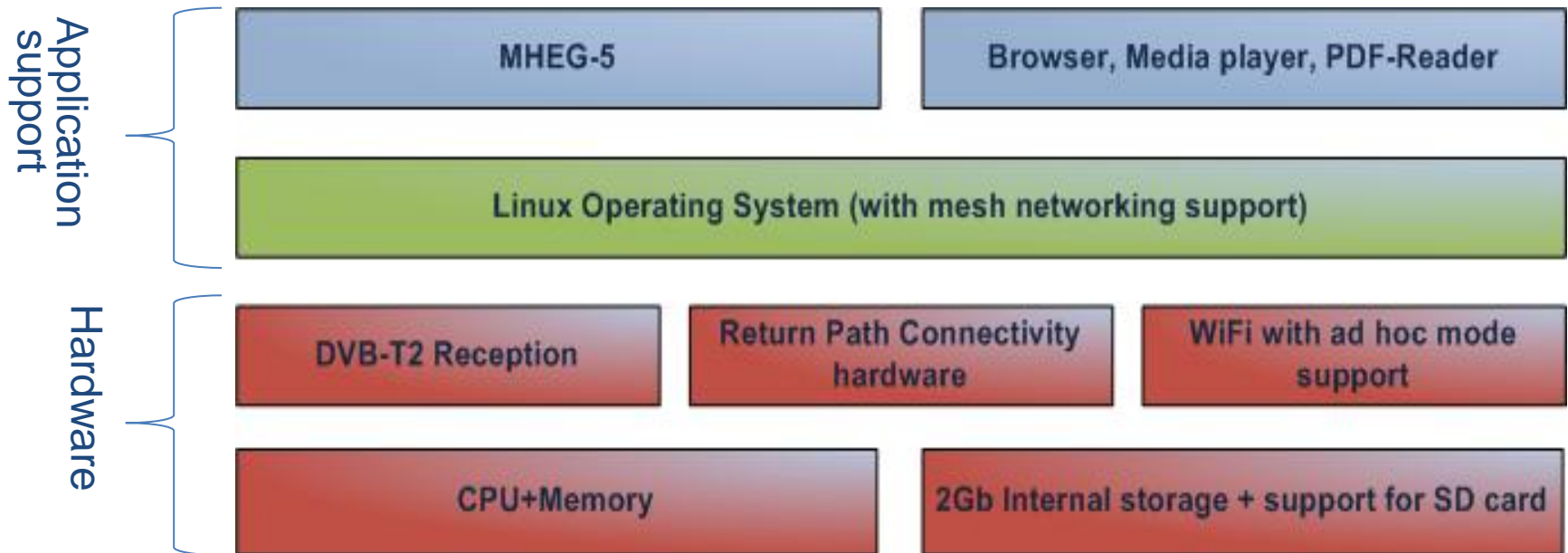**Joint vision for digital migration (Access)**

Overall architecture

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Overview of STB specification

More on connectivity hardware

- DVB-T2 reception
- Return path connectivity hardware
  - Provided Ethernet and USB ports to plug to existing internet connectivity solution, e.g:
    - Connect to ADSL modem/router via Ethernet port
    - Connect to 3G via USB modem
    - Connect to WiMax via USB modem
- WiFi with ad hoc mode support
  - Ad hoc mode required to support mesh connectivity
  - Enabling mesh networking over WiFi through software

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Linux operating system

Why?

- Open-source, no licensing required
- Fosters innovation
  - Many groups including CSIR use Linux to turn WiFi devices into mesh devices
  - More and more new mobile devices are now running on Linux based system (Android)
  - Other relevant open-source project; Linux-TV

Do we have required skills?

- Skills are plenty in the country on creating customized Linux distributions
- Examples:
  - Meraka digital doorway uses customized firmware
  - Meraka wireless mesh lab uses customized firmware based on Linux
  - Redline communications market devices running on in-house firmware based on Linux

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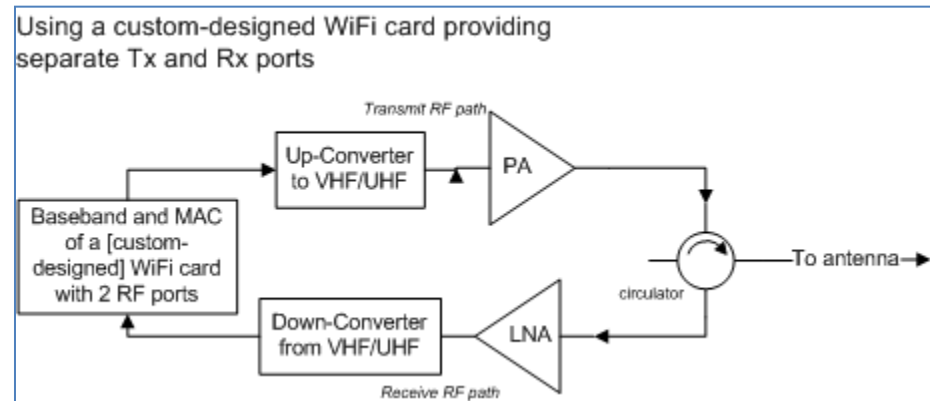# What is needed to achieve this (Infrastructure)

- Policy (DOC):
    - provide high-capacity backbone connectivity (preferably fibre) to all TV transmitters as part of upgrading to DVB broadcasting system
    - Offer return path capability alongside the TV transmission to enable interactive services
    - Citizens use televisions connected with appropriate set-top boxes to request government services in their homes

What is needed to achieve this (Use)

- Develop government services for delivery over DTT interactive network
- Government services in MHEG-5 (Multimedia and Hypermedia information coding Expert Group) and deliver via interactive TV
  - SABC has developed MHEG-5 profile for South Africa, need to amend to include interactivity
- Broadcasters provide content through DVB standard as well as through IPTV using CSIR low rate adaptive streaming of live video platform
- Community television broadcasters deliver content through CSIR low rate adaptive streaming of live video platform
- User access content on their STB through open source media players (VLC)
- Users access government services content through Browser and/or PDF readers
- Users access other Internet (paid) content through Browser and/or PDF-book readers

Future connectivity hardware

- Return path for rural connectivity
  - WiMax or LTE on TV frequencies
  - Technology based on cognitive radio standard, IEEE802.22
- Mesh networking on TV white spaces
  - Depend on regulation being in place
  - Technology can be built-in to the set-top box
  - Enable operation via software when regulation allows it

Using a custom-designed WiFi card providing separate Tx and Rx ports

Transmit RF path
Up-Converter to VHF/UHF
PA
Baseband and MAC of a [custom-designed] WiFi card with 2 RF ports
Down-Converter from VHF/UHF
LNA
circulator
To antenna
Receive RF path

Television White Spaces

- Refers to unused radio spectrum between used radio bands or channels, these are usually not assigned to avoid interference
- There is also unused radio spectrum which has either never been used, or is becoming free as a result of technical changes
- In particular, the switchover to digital television will free up even more spectrum
    - This is sometime also referred to as digital dividends

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