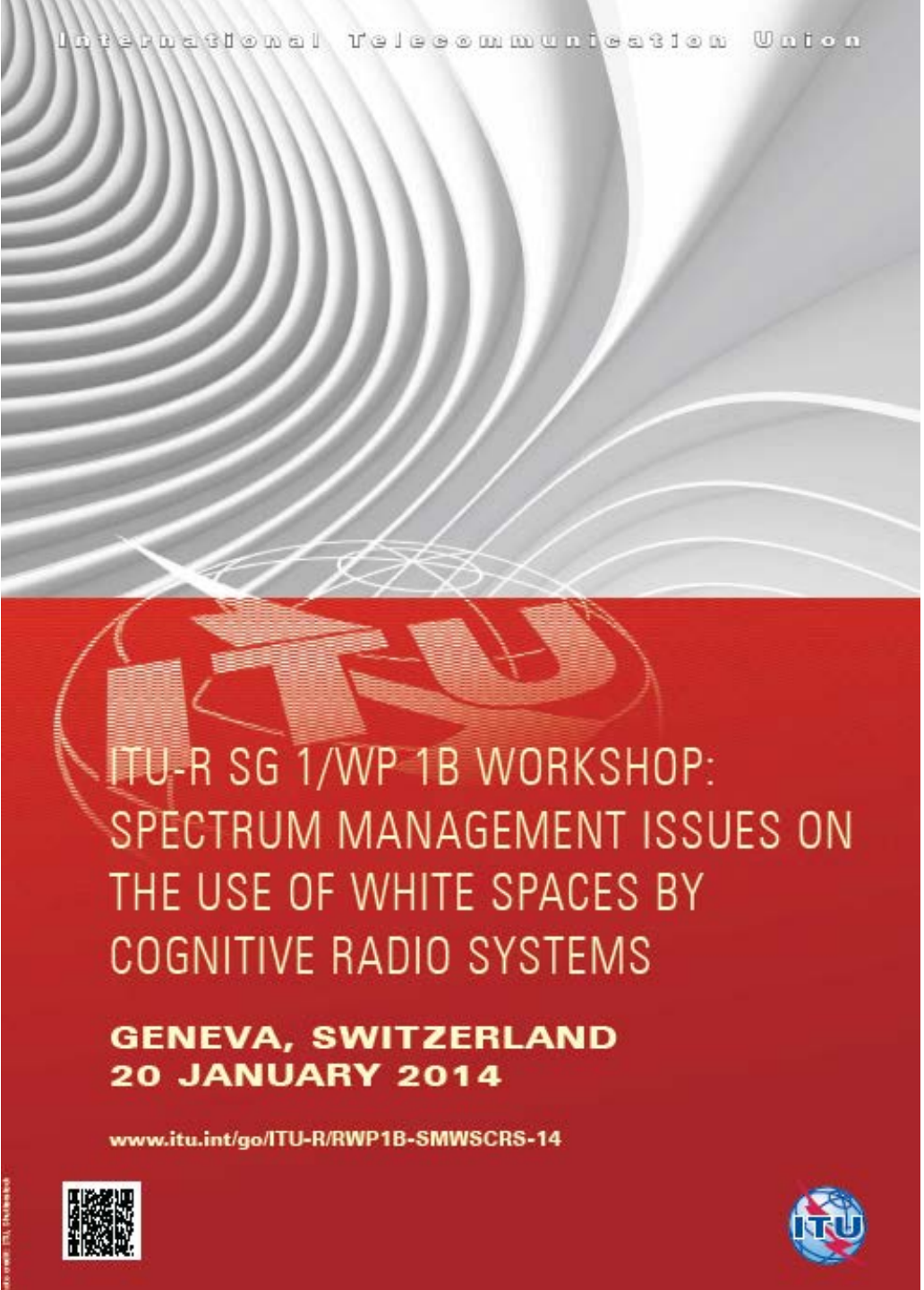


ITU-R SG 1/WP 1B WORKSHOP: SPECTRUM MANAGEMENT ISSUES ON THE USE OF WHITE SPACES BY COGNITIVE RADIO SYSTEMS (Geneva, 20 January 2014)

Dynamic Spectrum Access

(Linking Africa and Scotland)

Jim Beveridge

Microsoft Corporation

Linking Africa and Scotland

- Africa –Video
- Africa and Scotland
  - Global DSA Perspective
- Scotland
  - CWSC
  - Glasgow Ofcom Pilot
- Africa
  - Progress in Africa
    - (Kenya, Tanzania, South Africa)

Linking Africa and Scotland

- Africa –Video
- Link to Video
  - http://research.microsoft.com/apps/video/default.aspx?id=184442

Linking Africa and Scotland

- Global DSA Perspective

TVWS trials and demonstrations…

White Space (DSA) gaining momentum

DSA Members

6Harmonics

ADAPTRUM

Aviacomm

Botswana Innovation Hub

Canadian Spectrum Policy Research

臺灣大學電信研究中心
Communication Research Center, NTU

COSTECH

CSIR
our future through science

CARLSON
Broadband and Voice Products

CTVR / the telecommunications research centre

Gigabit Libraries Network

Google

A*STAR Institute for Infocomm Research

財團法人資訊工業策進會
INSTITUTE FOR INFORMATION INDUSTRY

InterDigital

MBC
Mid-Atlantic Broadband Communities Corporation

MediaTek

Microsoft

my digital bridge

neul

NICT
National Institute of Information and Communications Technology

PanaFtel
WIRELESS
Always ON...

RelayServices

sky

SpectraLink Wireless

University of Strathclyde
USA Foundation

SSC

Texas Instruments

uhuruone

University of Colorado
Boulder | Colorado Springs | Denver | Anschutz Medical Campus

The University of York

Wavetek

Support from

iDA SINGAPORE

ITU

Research | Equipment (Chipset) | SI | Geo-location database | Network | Application

Institute for Infocomm Research

neul

ADAPTRUM

ZDW

Power Automation
A Singapore Power/Siemens Joint Venture

Microsoft

SPECTRUM BRIDGE

StarHub

The Singapore Island Country Club

NICT National Institute of Information and Communications Technology

Terrabit Networks

NexWave

ST Electronics (Info-Comm Systems)
A company of ST Electronics

iconectiv

grid Let's Simplify
Islandwide Walkie-Talkie

sentosa
Sentosa Development Corporation

EUROKARS GROUP

Microsoft Spectrum Observatory

CEPT ECC
Electronic Communications Committee

CEPT | ECC | ECO | CERP | Com-ITU

Search GO

ECC | Groups | Deliverables | Tools and Services | Topics | ECC Meeting Documents | ECC Meeting Calendar

ECC > Tools and Services

CEPT Workshop on Spectrum Occupancy Measurements

CEPT Workshop on How Measurement of Spectrum Occupancy Can Help Spectrum Management
Organised by the Working Group Frequency Management (WG FM) of the ECC
15 January 2014, Mainz (Germany)

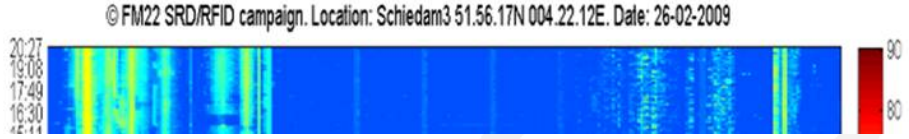
The WGFM Project Team FM 22 discussed in April 2013 the technical aspects of monitoring concepts such as the Microsoft Spectrum Observatory (Microsoft opened in early 2013 a first fixed observatory station in Europe, in Brussels). This was subsequently reported to the WGFM and the ECC.

To manage spectrum more effectively and increase usage efficiency, frequency regulators want to know how the different frequency bands are being used and which are being underused or left vacant. This has always been part of the considerations in frequency management within administrations and has recently been emphasised by the adoption of the Radio Spectrum Policy Programme adopted by the European Parliament and the Council which includes a spectrum inventory process (in Article 9 of the RSPP).

Therefore, the question on how spectrum occupancy measurements can help the spectrum management and related questions such as a common storage area for spectrum usage data to be collected, analysed, and presented to those interested in understanding wireless spectrum utilisation needs to be addressed more in detail and the ECC therefore decided that a CEPT Workshop should be staged to address those issues.

Another aspect is to which extent spectrum occupancy measurements could also provide some information that could be used to identify unused spectrum at a given location, i.e. frequency usage opportunities for other radio applications. This relates to the developments at this stage towards the future use of sensing approaches for spectrum access mechanisms in many areas.

During the Workshop, presentations about fixed and mobile monitoring approaches will be discussed.



My Profile

JIM BEVERIDGE
Edit profile Log out

- Start Page
- My Groups
- My Meetings (1)
- My Notifications
- My Questionnaires
- My Email groups

Related Links

- Archive - meeting documents before 1 July 2011
- ETSI web site
- ETSI Work Programme
- ECC Deliverables
- ECC Work Programme
- ETSI Workshops

Linking Africa and Scotland

- Scotland
  - CWSC
  - Glasgow Ofcom Pilot

Centre for
White Space
Communications

White Spaces in Glasgow

Briefing Meeting

University of Strathclyde

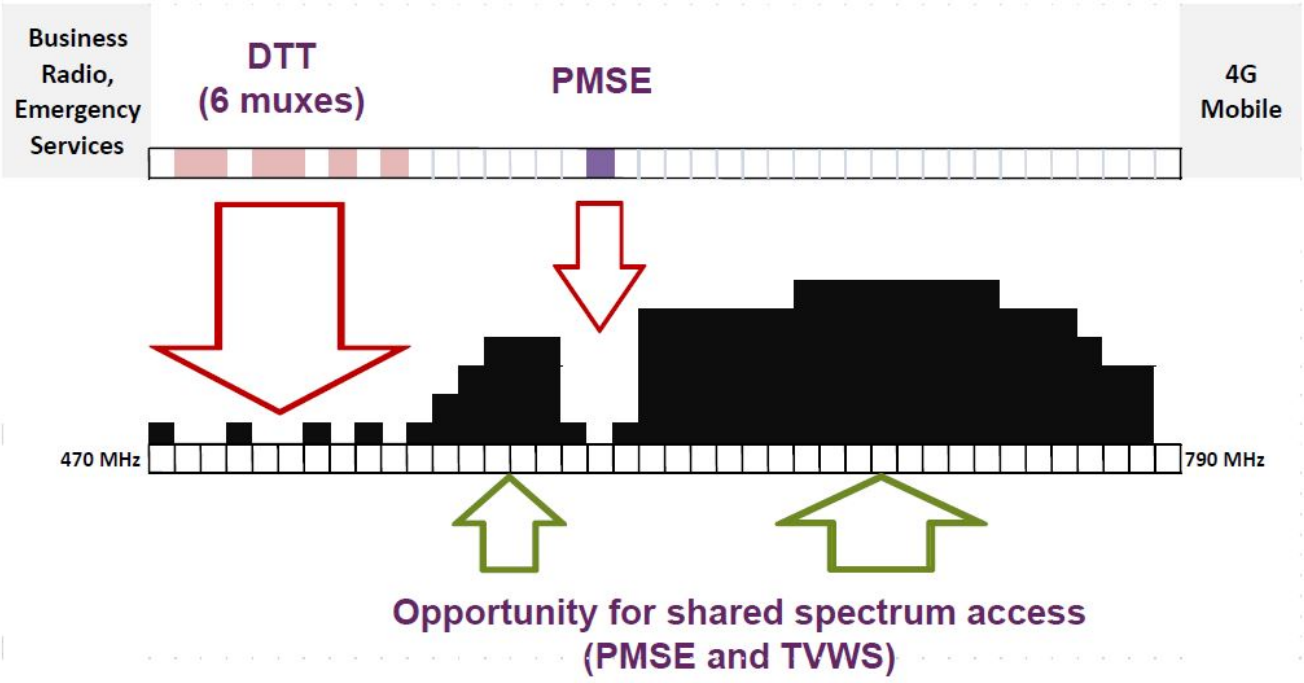
CWSC credentials

- University of Strathclyde has established itself as a technology leader in this area – founding the ***Centre for White Space Communications*** **(CWSC) in 2011**
- Key partner in Bute White Space Trial
  - Eight premises connected – trialists speak very highly of their experiences
    - Video streaming (iPlayer, YouTube)
    - Facebook, Twitter, Videoconferencing
    - DEFRA, Internet Banking, VAT returns, …
- CWSC expertise is in demand from Microsoft to assist in bringing broadband to remote rural areas in its 4Afrika programme*

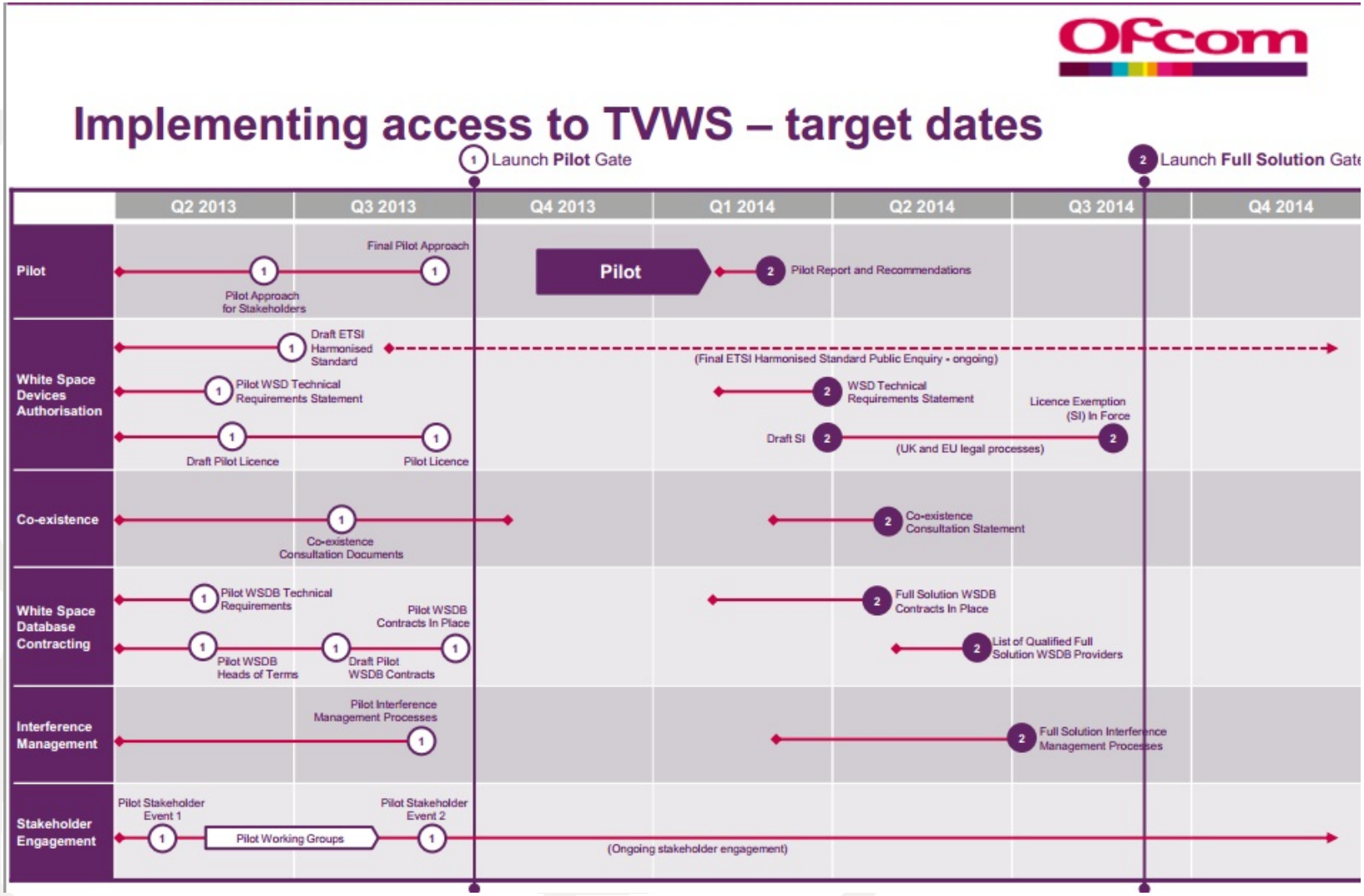
* **University of Strathclyde has its own links with Africa (especially Malawi) dating back to David Livingstone, who was one of its students**

Ofcom Pilot

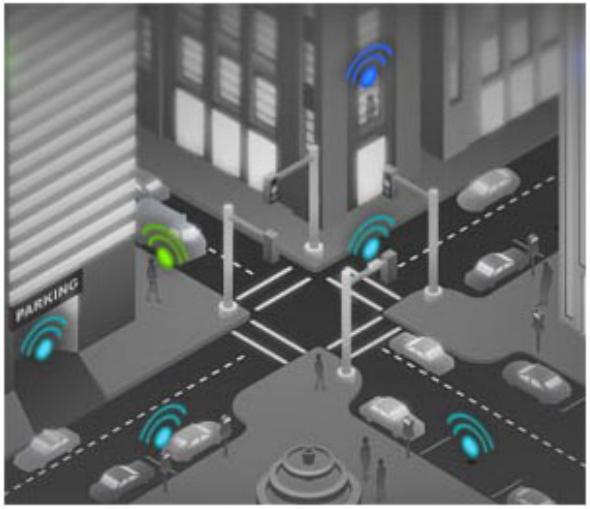
TVWS – The opportunity



Ofcom Pilot


Ofcom
Implementing access to TVWS – target dates
1 Launch Pilot Gate
2 Launch Full Solution Gate
Q2 2013
Q3 2013
Q4 2013
Q1 2014
Q2 2014
Q3 2014
Q4 2014
Pilot
Final Pilot Approach
Pilot Approach for Stakeholders
Pilot
Pilot Report and Recommendations
White Space Devices Authorisation
Draft ETSI Harmonised Standard
(Final ETSI Harmonised Standard Public Enquiry - ongoing)
Pilot WSD Technical Requirements Statement
WSD Technical Requirements Statement
Licence Exemption (SI) In Force
Draft SI
(UK and EU legal processes)
Draft Pilot Licence
Pilot Licence
Co-existence
Co-existence Consultation Documents
Co-existence Consultation Statement
White Space Database Contracting
Pilot WSDB Technical Requirements
Pilot WSDB Contracts In Place
Full Solution WSDB Contracts In Place
Pilot WSDB Heads of Terms
Draft Pilot WSDB Contracts
List of Qualified Full Solution WSDB Providers
Interference Management
Pilot Interference Management Processes
Full Solution Interference Management Processes
Stakeholder Engagement
Pilot Stakeholder Event 1
Pilot Stakeholder Event 2
Pilot Working Groups
(Ongoing stakeholder engagement)

Glasgow White Space Pilot - aims



- Build demonstrations showcasing how white spaces technology can be used to:
  - Fill broadband coverage gaps in urban and suburban areas
  - Enable a whole new world of machine to machine applications
- Provide support and access for Ofcom's tests and coexistence measurements

Powerful backing

- Microsoft, together with other major industry partners, is backing the CWSC proposal for a pilot TVWS network in Glasgow
  - Building on successful trials in Bute and Cambridge, which helped pave the way for Ofcom to make the enabling regulations
  - The Pilot will allow Ofcom to make final checks on and adjustments to its draft regulation
  - First IEEE 802.11af prototype radios have been promised for use in the Glasgow pilot

Three phases

Design and Build the Network

- Define applications
- Plan and design network
- Secure sites and procure equipment
- Build & test network

Implement & Test the Application

- Install applications
- Test functionality and performance
- Perform co-existence measurements
- Obtain user feedback
- Report findings

Run Showcase Events

- Use the occasion of the Glasgow 2014 Commonwealth Games to celebrate growing wireless broadband connectivity, and cooperation across the Commonwealth – highlighting Glasgow's leading role

Glasgow 2014 – a unique opportunity

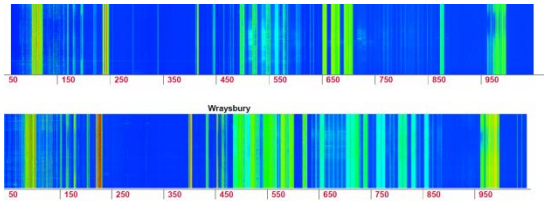
- Glasgow 2014 will be a great international celebration of sporting achievement
- It provides an excellent opportunity to celebrate advances in wireless technology which are helping to create opportunities for ordinary citizens to realise their dreams - across the Commonwealth

White Spaces at Glasgow 2014

- There is increasing international focus on spectrum efficiency as a means of boosting economies
- Glasgow (CWSC)'s leading role in exploiting white space technology is worthy of celebration
- Other Commonwealth members are starting to embrace the benefits, with CWSC's help

- **White spaces are enabling affordable broadband coverage in previously excluded rural areas**
- **Creating education and entrepreneurial opportunities**

Summary of Glasgow Pilot



- White spaces:
  - A new way of managing spectrum
  - Significant economic and social potential
- Ofcom leading the way in Europe:
  - Aiming for UK regulations to be in place by Q4 of 2014
  - TVWS* Pilot commencing in October 2013, running for 6 r
- Opportunity for Glasgow to take leading role:
  - Showcase demonstration(s)
    - **Future Cities Demonstrator** (£25m recently awarded to Glasgow City Council)
    - **Commonwealth Games – Glasgow 2014**
  - Centre for White Space Communications at University of Strathclyde already established as a technology leader in this area
- The Vision:
  - Demonstrate how white space technology can be used to fill broadband coverage gaps in urban and suburban areas, and to enable a new world of M2M applications
  - Assist Ofcom with its Pilot as it finalises the enabling regulations for TVWS
  - Provide opportunities for high-profile showcase demonstrations in Glasgow
- Strong backing for Glasgow:
  - Microsoft, together with other industry partners, is backing the Centre's proposal for a white space pilot network in Glasgow – building on previous successful trials in Bute and Cambridge

Enabling regulations

- **Regulators around the world are recognizing the importance of white space and have been progressing towards the creation of regulatory frameworks**

- US regulator (FCC) was first to legalise licence-exempt access to the TV white spaces in the US, in 2008*
- UK regulator (Ofcom) has proposed a more ambitious and flexible approach, which should increase the efficiency with which this spectrum can be harnessed
- Urban WiFi is ready to go, but needs a minimum commitment of spectrum or an allocation from regulators in order to give industry the confidence to go to fab…
- Many other regulators (Asia, EU, Africa) are following closely and progressing towards regulation

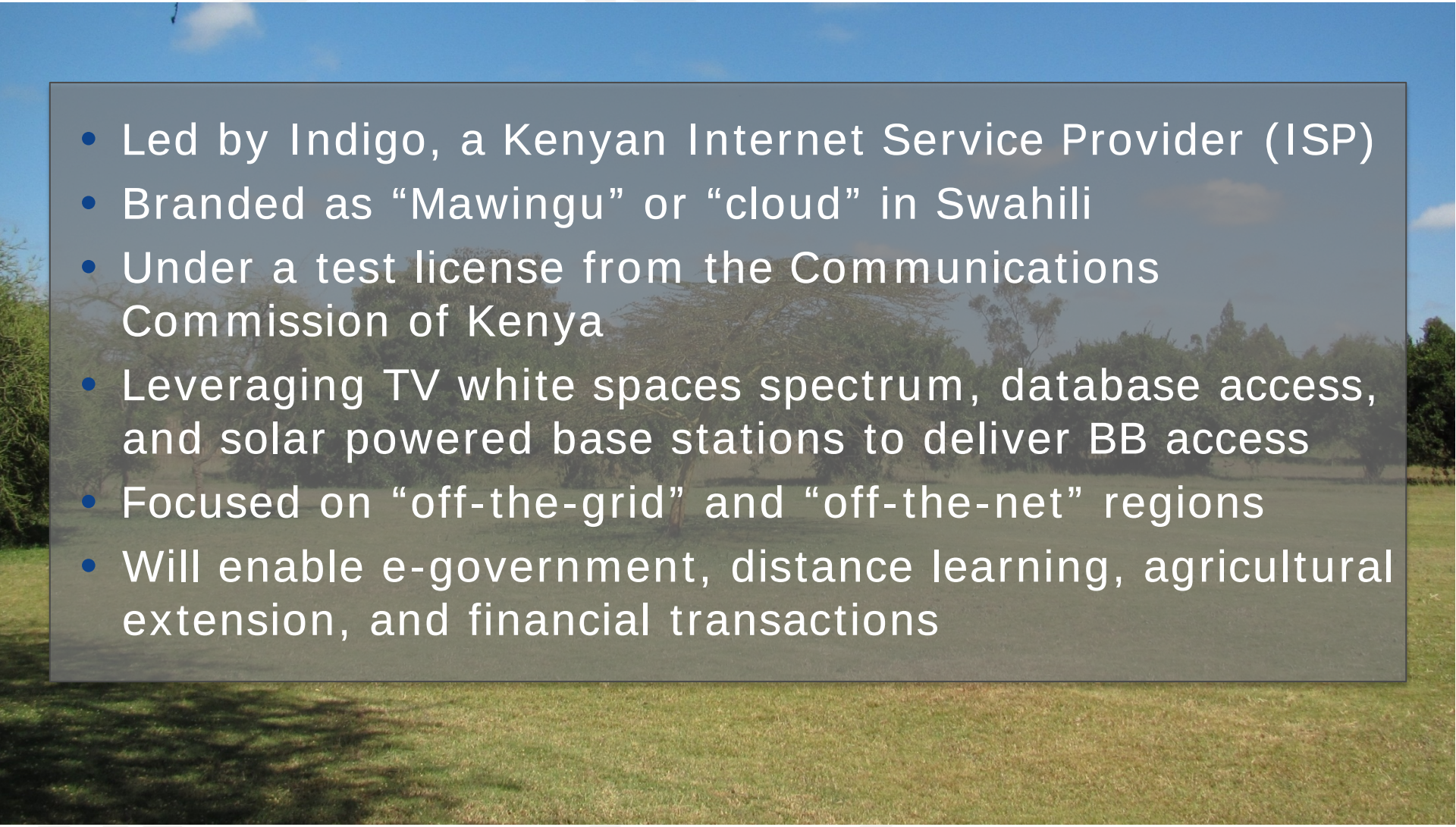
Linking Africa and Scotland

- Africa
  - Progress in Africa
    - (Kenya, Tanzania, South Africa)

Tanzania network

University Name	Student Population	Concurrent Users
IFM	12000	800
DIT	15000	1600
CBE	15000	1600
OUT	32000	2200
Total	**74000**	**6200**

Mawingu project in Kenya



- Led by Indigo, a Kenyan Internet Service Provider (ISP)
- Branded as “Mawingu” or “cloud” in Swahili
- Under a test license from the Communications Commission of Kenya
- Leveraging TV white spaces spectrum, database access, and solar powered base stations to deliver BB access
- Focused on “off-the-grid” and “off-the-net” regions
- Will enable e-government, distance learning, agricultural extension, and financial transactions

Ofcom plans…

TVWS, just the beginning…?

- Dynamic spectrum access in other bands?
- Dynamic coordination between white space devices?
- Device-based sensing and reporting?
- Dynamic optimisation?
- Widespread adoption for spectrum sharing?
- Future standard model for universal spectrum access?!?!
  - ❖As transformational as Internet Protocol (IP)?!?!