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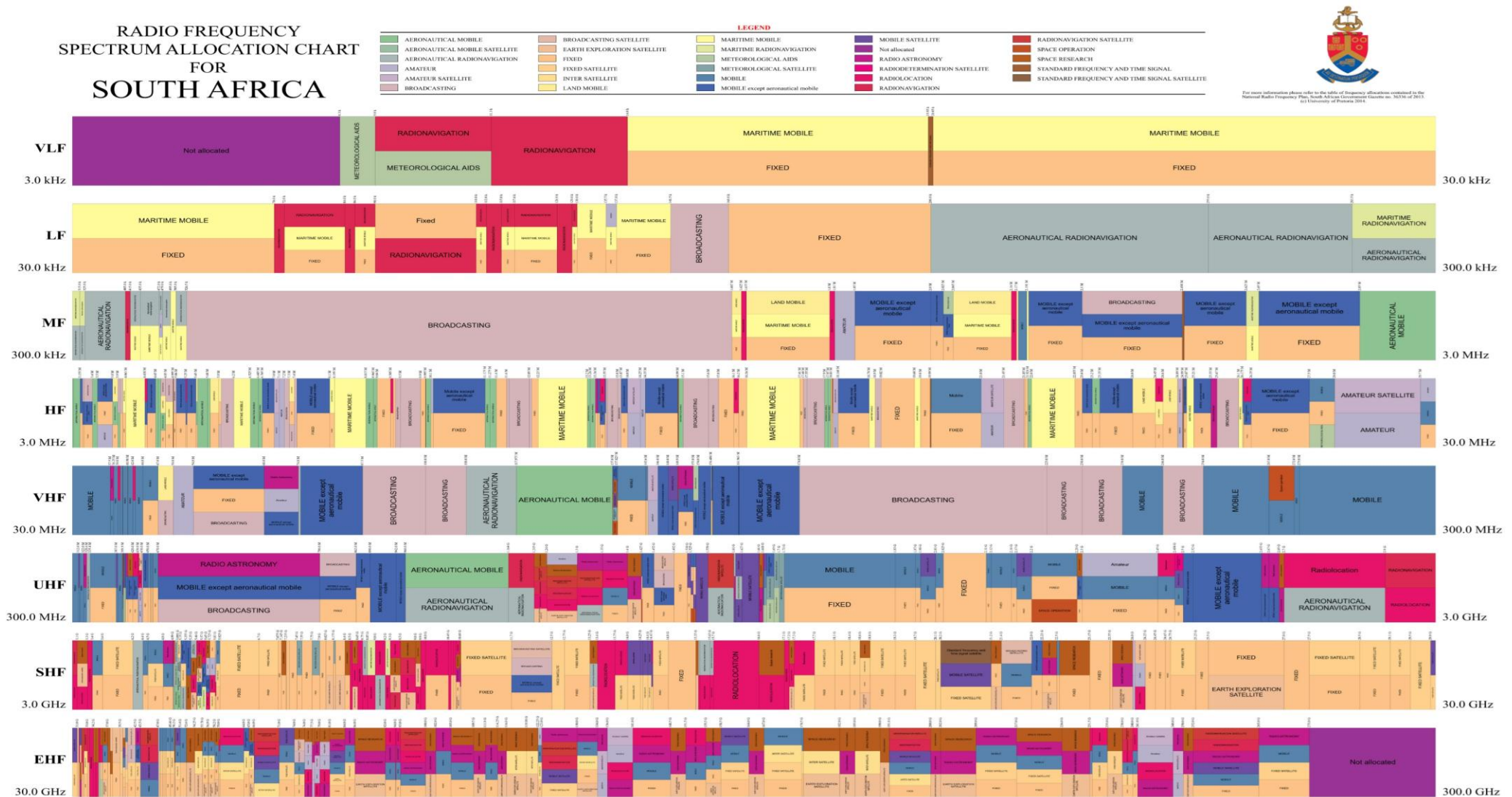
Dynamic Spectrum Assignment in South Africa From TVWS to DSA Sandboxing

DSA Global Summit
November 2025

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The views expressed in this
presentation do not necessarily
reflect the official positions of ICASA

Spectrum Allocation Band Plan – South Africa



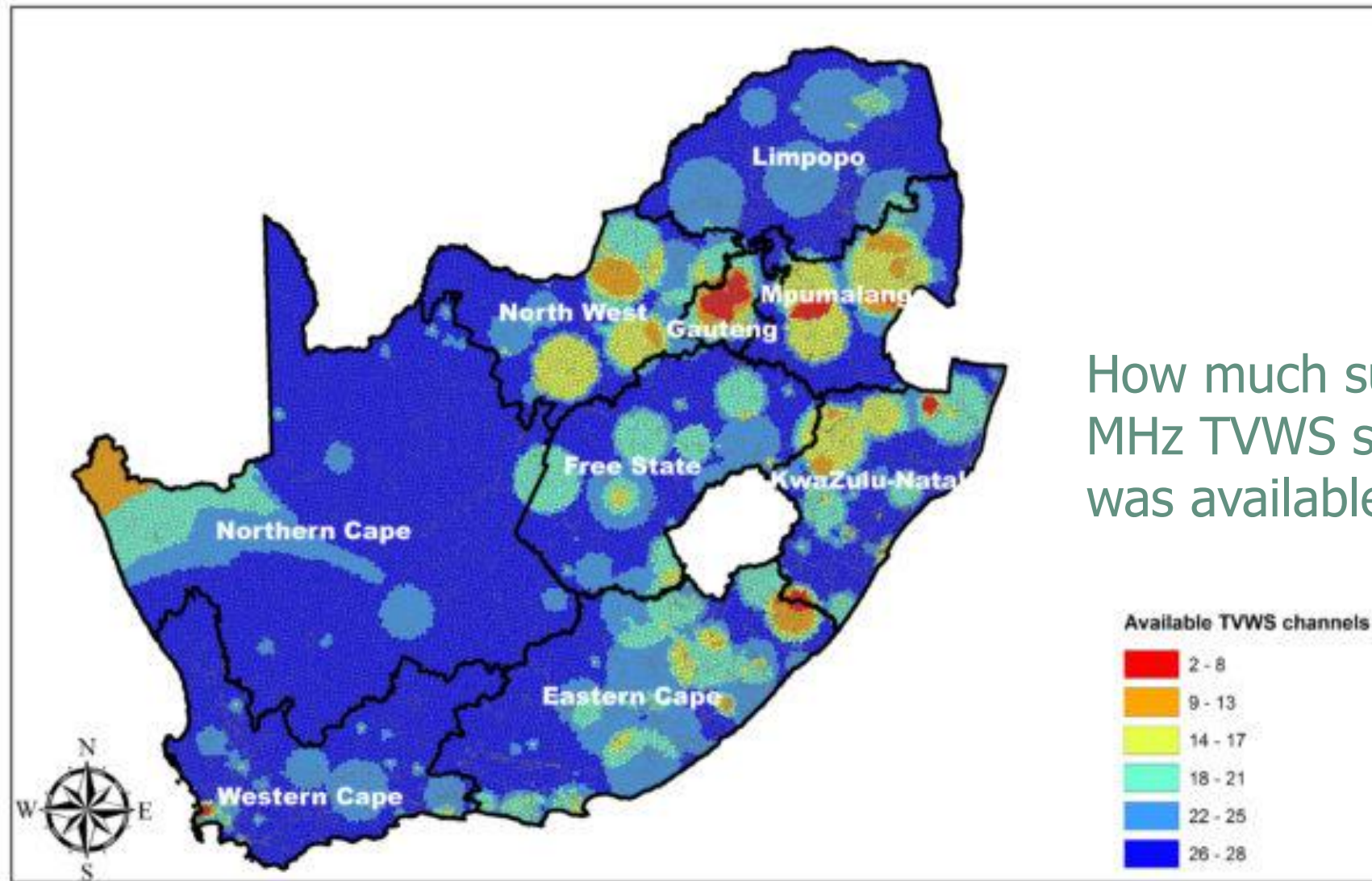
Spectrum Allocation Framework - South Africa

- National Radio Frequency Plan (NRFP, currently 2021)
 - Spectrum allocation in SA aligned to WRC19 outcomes (WRC23 in progress)

ITU Region 1 allocations and footnotes	South African allocations and footnotes	Typical Applications	Notes and Comments
3 600-4 200 MHz FIXED FIXED-SATELLITE (space-to-Earth) Mobile	3 600-4 200 MHz FIXED FIXED-SATELLITE (space-to-Earth) NF14	Fixed links (4 GHz) (3600 – 4200 MHz) C-band downlink (VSAT/SNG/PTP links)(3600 – 4200 MHz) BFWA (3600 – 3800 MHz)	The sub-band 3 600-3 800 MHz could be used for BFWA where frequency sharing with FS PTP and/or FSS is feasible. The channelling arrangement for PTP links in this band is based on ITU-R Recommendation F.635 latest version Annex 1. The sub-band 3 600-4 200 MHz is used for medium and high capacity PTP links and FSS.

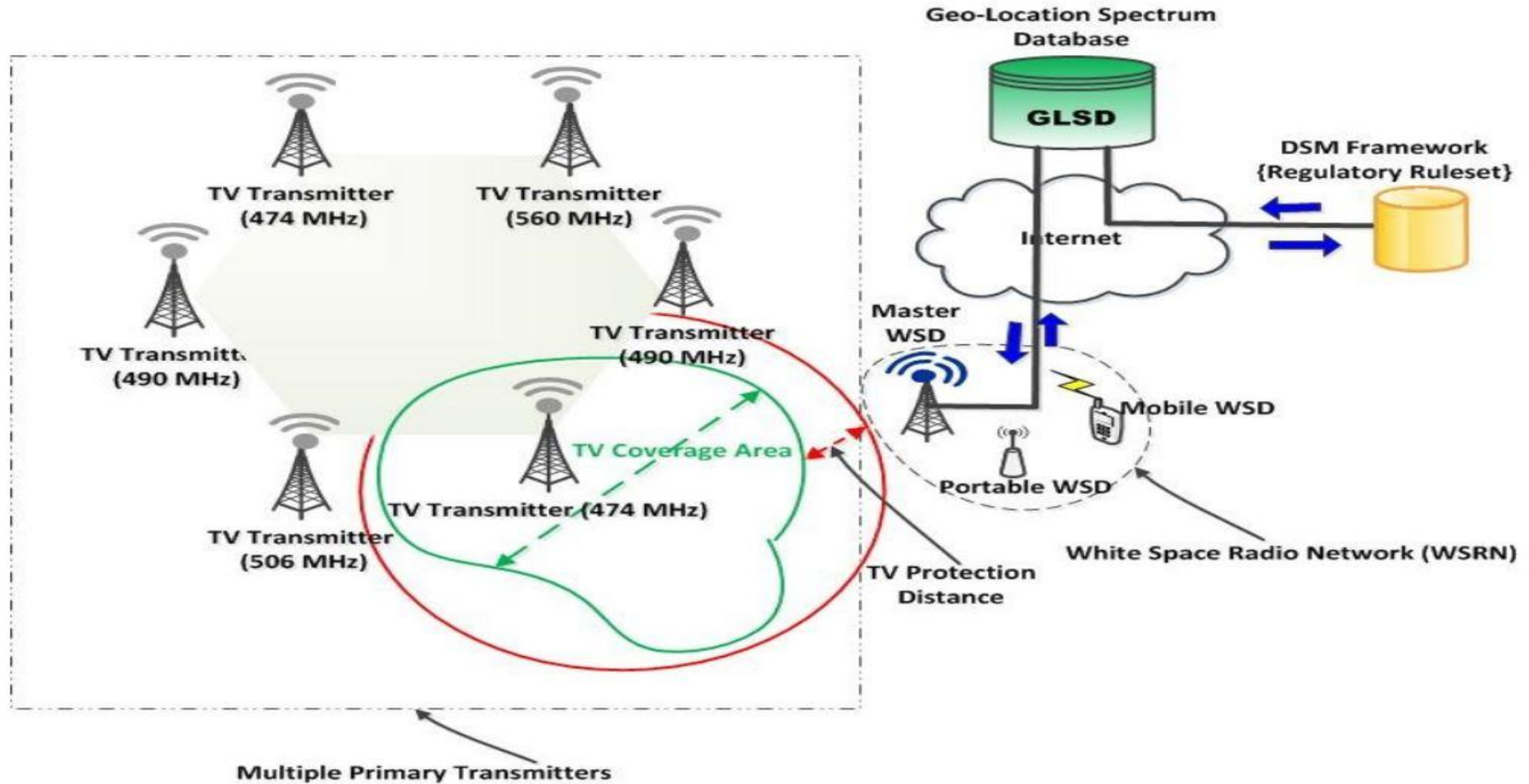
- IMT Roadmap & Frequency Migration Plan
 - Together lay out implementation future for IMT & non-IMT bands
- Radio Frequency Assignment Plans (RFSAPs) per band
 - Specify parameters per band (eg TDD) & assignment methodology (eg auction)
- Sharing permitted (subject to approval), trading illegal
- Regulatory process governed by 'Notice and Comment' procedure

SA's DSA journey began with TV White Spaces



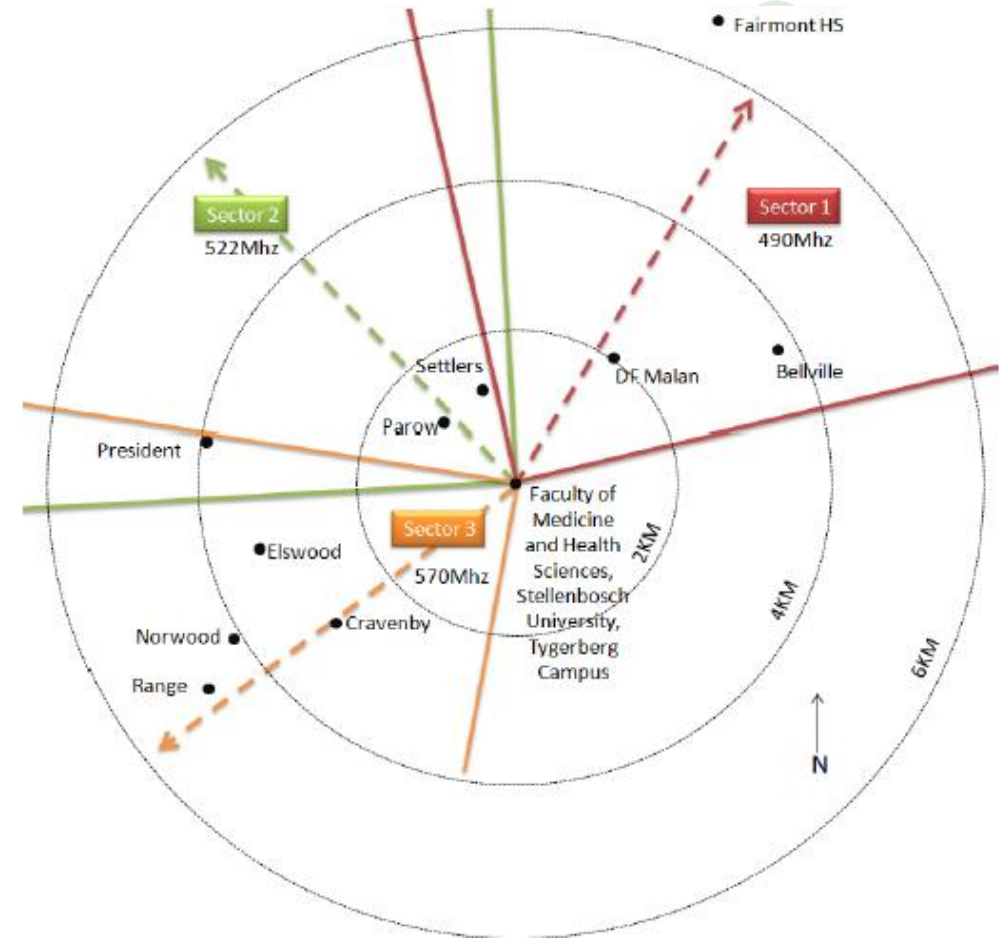
How much sub-694 MHz TVWS spectrum was available in SA

How does TVWS work?



TV White Space - Cape Town Trial

- Aims
 - Demonstrate TVWS can provide affordable broadband without interfering with TV reception
 - Assist ICASA & (then) DoC to develop policy & regulatory framework
- Cape Town – highest broadcast spectrum usage in SA (few TVWS)
- Results
 - Fast, reliable broadband access – up to 12 mbps, up to 6,5 km
 - Geo-location database – no complaints, no interference detected
- Recommendations
 - TVWS can deliver broadband & can co-exist with TV
 - Internationally harmonised TVWS approach
 - Develop TVWS framework with interference protection parameters
 - Type-approvals for White Space Devices (WSDs)



Television White Space Spectrum Assignment in SA

- 2013 - First TVWS Trials (CSIR, ICASA, WAPA et al)
- 2015 - Discussion Paper on the Draft Framework for Dynamic & Opportunistic Spectrum Management
 - Motivated by Digital Divide / Universal Access & Service - broadband for all
 - Focus on DTT / broadcast bands (470 - 694 MHz) due to planned BDM
 - TVWS seen as first implementation of DSA
 - FWA with local Wi-Fi offload (also IoT, M2M)
- 2017 - Position Paper on Dynamic & Opportunistic Spectrum Management
- 2018 - Regulations on Use of TVWS
- 2018 - RFP for development, implementation, hosting & management of the Reference Geo-Location Spectrum Database (R-GLSD)
 - Developed by CSIR, later handed over to ICASA
- 2020 - Framework to Qualify to Operate a Secondary TVWS Database (S-GLSD)

TVWS Framework Development (as per CSIR)



Outcomes of TVWS Implementation in SA

- TVWS spectrum – diminishing availability sub 694 MHz
 - Digital migration & band restacking
 - Reassignment of digital dividend to mobile services
- TVWS uptake less than expected
 - Very few licences awarded - Mthinthe Comms, Morai Solutions, Levin Global / AABA (2020, Covid) AdNotes (2021), Indigo (2022)
 - High cost of White Space Devices (WSDs) - only 8 type approvals
- Focus shift from TVWS to broader dynamic spectrum access
 - Dynamic Coordination Databases – Citizens Broadband Radio (CBRS, USA)
 - Shared Access Licences (SALs) & Local Access Licences (LALs) (Ofcom UK)
 - AI-enabled millisecond-level DSA research in US
 - Sub 3,6 GHz IMT band DSA proposal in SA

Availability of IMT Spectrum

No.	Band	Amount of spectrum <u>assigned</u> for IMT usage	Amount of spectrum <u>in actual use</u> by IMT systems
1	450 - 470 MHz	20 MHz	0 MHz
2	694 - 790 MHz	96 MHz	60 MHz
3	790 - 960 MHz	72 MHz	60 MHz
4	1 427 - 1 518 MHz	90 MHz	0 MHz
7	1 710 - 1 885 MHz	75 MHz	75 MHz
8	1 885 - 2 025 MHz	100 MHz	100 MHz
9	2 010 - 2 025 MHz	15 MHz	15 MHz
10	2 110 - 2 200 MHz	90 MHz	90 MHz
11	2 300 - 2 400 MHz	100 MHz	60 MHz
12	2 500 - 2 690 MHz	190 MHz	190 MHz
13	3 300 - 3 400 MHz	100 MHz	0 MHz
14	3 400 - 3 600 MHz	200 MHz	200 MHz
15	4 800 - 4 990 MHz	190 MHz	0 MHz
Total	Low and Mid Bands	1 338 MHz	850 MHz- Approximately 64% Assigned
16	24.25 - 27.5 GHz	3250 MHz	0 MHz
17	37 - 43.5 GHz	6500 MHz	0 MHz
18	45.5 - 47 GHz	1500 MHz	0 MHz
19	47.2 - 48.2 GHz	1000 MHz	0 MHz
20	66 - 71 GHz	5000 MHz	0 MHz

Mostly FDD

TDD

From TVWS to Dynamic Spectrum Assignment

- 2016, June - Findings Document: Framework for Dynamic & Opportunistic Spectrum Management
- 2023, April - Discussion Document on Dynamic Spectrum Access and Opportunistic Spectrum Management (considers bands between 3 100 MHz and 7 450 MHz)
- 2024, March - Findings and Position Paper into the Implementation of Dynamic Spectrum Access and Opportunistic Spectrum Management
- 2025, March - Draft Regulations on Dynamic Spectrum Access and Opportunistic Spectrum Management (3 800 – 4 200 MHz and 5 925 – 6 425 MHz)
- 2025, November - Coexistence Simulation Studies and site visit to field trial locations



DSA Regulatory Framework Consultation

- Discussion Document - focus on implementation of DSA in 3,3 – 7 GHz (C and S bands)

Key Discussion Points

DSA Frequency Band(s) (GHz)	Secondary Market Exchange platform? [Yes/No]	DSA Authorization Approach	Willingness to Lease/Trade [Yes/No] your Spectrum?	DSA Network Operators [Small/Large/All]	Who to Set Price [Regulator/Market]	Which Spectrum for Lease/Trade? [License/Unlicensed/Both/Other]

- 17 written submissions from stakeholders received by ICASA
- Majority of respondents supported DSA proposal
- Majority support for secondary spectrum markets regime
- Majority support for price determination by market forces

Dynamic Spectrum Assignment Proposals

- 3 800 – 4 200 MHz primarily used by Fixed Satellite Services (FSS) downlink & Fixed Services (FS) BFWA Fixed Links
- 5 925 – 6 425 MHz primarily used by Fixed Satellite Services (FSS) uplink & Fixed Services (FS) BFWA Fixed Links & now RLAN (Wi-Fi 6)
- Both a foundation for existing critical satellite services and a frontier for new digital possibilities
- Assignment - via technology-agnostic Dynamic Spectrum Access & Opportunistic Spectrum Management (DSA & OSM) framework.
- Spectrum available at any given location for sharing in these sub-bands is collectively designated as “Innovation Spectrum”



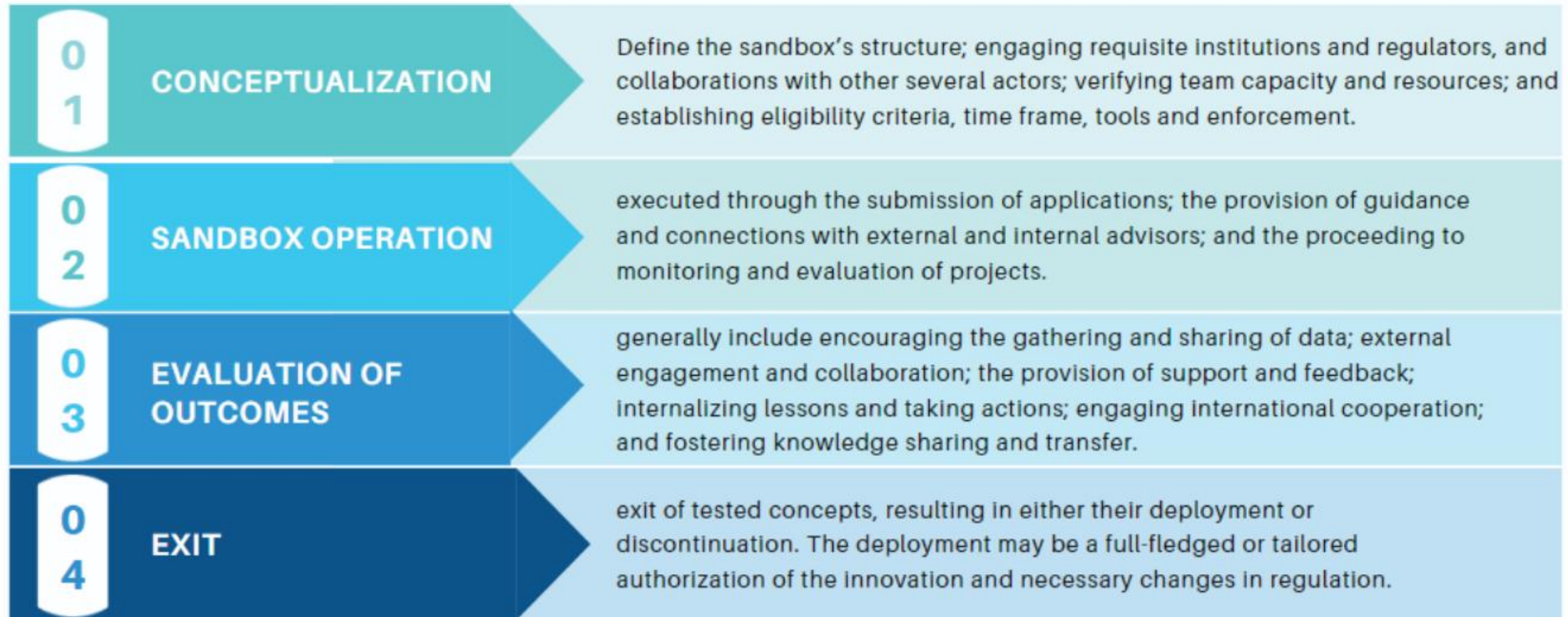
Interference Management

- Based on ITU Recommendations, technical standards, international best practices
- Key technical considerations e g:
 - Location of the proposed broadband wireless access system (indoor/outdoor)
 - Radio propagation characteristics, terrain and clutter
 - Distance checks and coordination with existing incumbent services
 - Exclusion zones to protect Radio Astronomy Services (RAS) - SKA / KCAAA
 - Protection of services in neighbouring countries
 - Protection of services in adjacent bands below above (eg air navigation)
- Protection of incumbent services via geo-location spectrum database - Unified Spectrum Switch (USS)
- Focus on safeguarding FSS operations - automated coordination and revocability in cases of harmful interference



From TVWS to Dynamic Spectrum Assignment

Building blocks and flow of a sandbox^a



DSA Next Steps

- Completion of field trials
- Development of Position Paper
- Development of Reference Geo-Location Spectrum Database (R-GLSD) prototype
- Regulatory framework for DSA



Thank You

**Enkosi
Ngiyabonga
Kea leboga
Dankie**

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