



Brazilian TV 3.0 Project: Status and Spectrum Requirements



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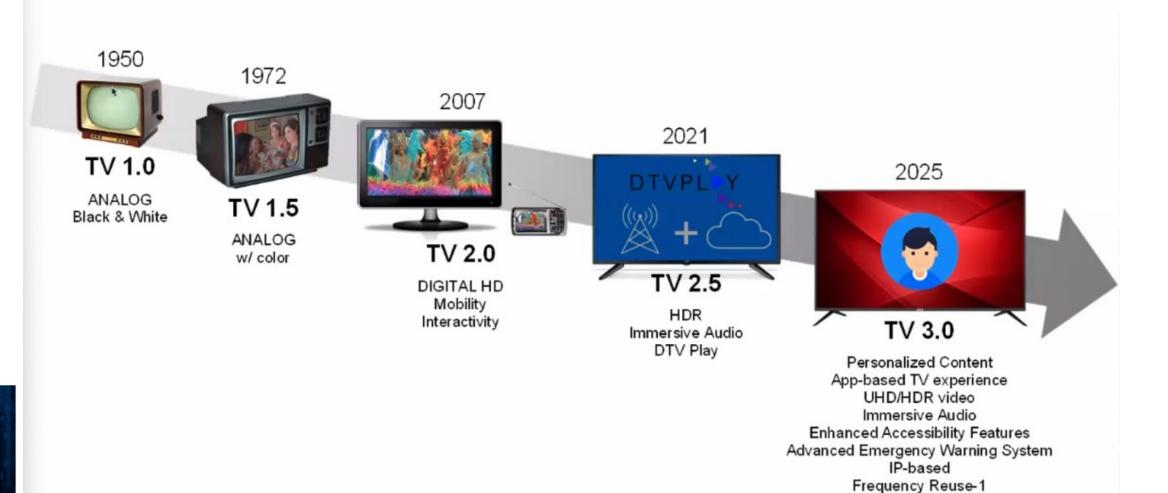
Bogotá, Nov 17, 2023





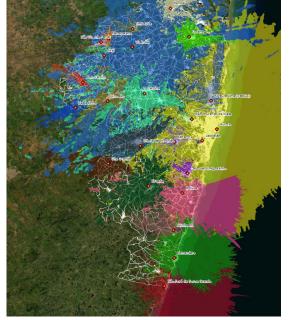
TV 3.0 Project

Terrestrial TV Evolution in Brazil

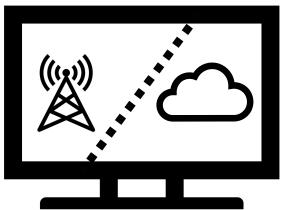




TV 3.0 Key Requirements



Geographic segmentation, with frequency reuse-1



Broadcast-Broadband
Merger and Harmonization
the best of both worlds:
reach and personalization



Immersive and Customizable
Audiovisual Content for consumption
on any device, at any time



The full list of requirements is available at:

https://forumsbtvd.org.br/wp-content/uploads/2020/07/SBTVDTV-3-0-CfP.pdf



TV 3.0 Project - Phases

Phase 1 (2020)

Call for Proposals



Phase 2 (2021)

Testing and Evaluation



Phase 3

(2022-2024)

Complementary Tests
Research & Development
Standardization
Demos





Completed Stages: Phases 1 & 2

March/2020: Work Plan

July/2020: Call for Proposals

December/2020:

Call for Prototypes -Internal MIMO Antennas

November/2020:

36 responses were received from 22 organizations around the world

January-April/2021:

Candidate Technology Presentations

October/2020:

Testing and Evaluation Procedures

Dozens of professionals involved
Hundreds of hours of meetings
Thousands of pages of documentation produced
Reports available on the website: https://forumsbtvd.org.br/tv3 0/

April/2021:

Definition of the audio and video content to be used in the tests

July-December/2021:

Testing and evaluation of candidate technologies, involving nearly 70 researchers from 7 universities, with funding from the MCom through the CNPq. Equipment and infrastructure provided by proponents, universities, Forum members and collaborating companies. Follow-up of the tests through 4 technical groups with weekly meetings.



Selected Technologies

APPLICATION CODING

DTV Play with adaptations and extensions

VIDEO BASE LAYER

VVC (OTA/OTT) **H.264/H.265** (OTT)

VIDEO ENHANCEMENT

DRE + LCEVC
(OTA/OTT)

HDR

HDR10 with optional dynamic metadata (Dolby Vision, HDR10+ e SL-HDR2) (OTA/OTT) HLG/SL-HDR1 (OTT, optional)

VR CODEC

V3C (V-PCC / MIV) (OTT, optional)

EWS

ATSC 3.0 AEA

AUDIO

MPEG-H Audio
(OTA/OTT)
AAC (OTT)
E-AC-3 / AC-4
(OTT, optional)

CAPTIONS

IMSC1
(OTA/OTT)
WebVTT
(OTT, optional)

TRANSPORT LAYER

based on ROUTE/DASH (with adaptations and extensions) (OTA/OTT)
optional HLS (OTT) streaming support

OTA PHYSICAL LAYER

More testing is needed

Technology Not Selected

Selected Technology

BROADBAND INTERFACE

Any technology available in the receiver

Selected base technology, with extensions under development

Core Technology

Complementary technology



Phase 3 (2022-2024) and Project Completion

2025
2025
TV 3.0 on air



Physical Layer Technologies Selected for Field Testing



Decision on Sep 25, 2023

These candidate technologies proved to be better suited to the specific requirements of the TV 3.0 Project

Technology	Proponents
Advanced ISDB-T	Digital Broadcasting Experts Group
ATSC 3.0	Electronics and Telecommunications Research Institute
	ATSC



Video Coding Quality Assessment

• Subjective evaluation of the quality of real-time video encoding using the technologies selected for TV 3.0, to determine the minimum bitrate needed to ensure higher quality than the maximum quality possible with TV 2.5.





International Pissemination TV 3.0

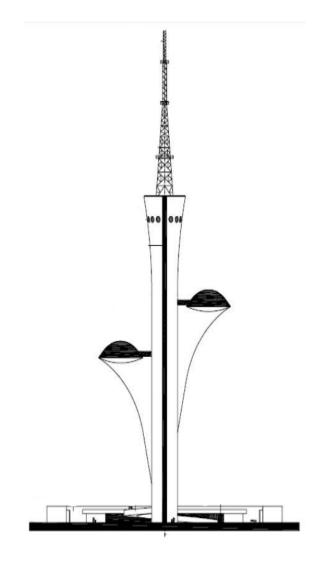
Brazilian next-generation Digital Terrestrial Television

- ITU-R SG6 Broadcasting service
 - R19-SG06-C-0050 2S/2020 Call for Proposals Phase 1
 - R19-SG06-C-0095 1S/2021 Testing and Evaluation / Call for Prototypes Phase 2
 - R19-SG06-C-0159 2S/2021 Phase 1 and 2 Responses
 - R19-SG06-C-0210 1S/2022 Phase 2 Results / Phase 3 launch
 - R19-SG06-C-0249 2S/2022 Phase 3 follow-up
 - R19-SG06-C-0297 1S/2023 TV 3.0 trials on the FIFA World Cup 2022
 - R19-SG06-C-0352 2S/2023 Presidential Decree No. 11,484 / Phase 3 follow-up
- CITEL and Mercosul





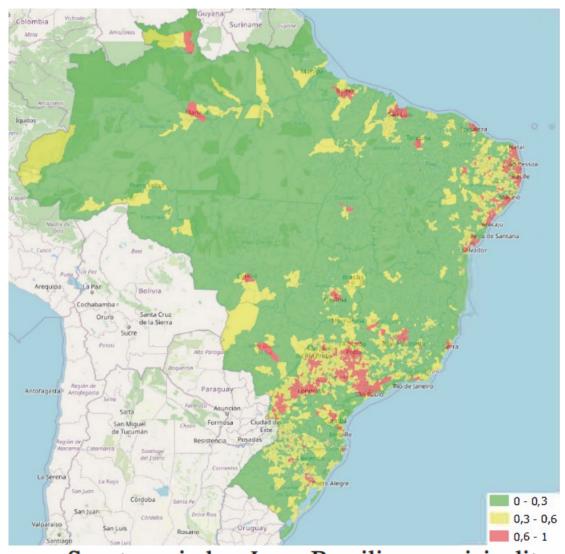
Broadcasting in Brazil



42.595 CHANNELS (14/11/2023)

Service	Channels	Granted
TVD	20.876	16.642
TV (analog)	9.875	9.274
FM	8.087	4.597
RTRFM	975	205
ОМ	2.088	928
ОТ	624	65
ОС	70	56
Low Power FM	5.570	5.107





Spectrum index I per Brazilian municipality.

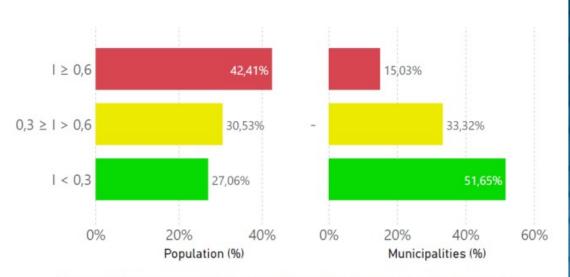


Figure 4.8: Spectrum index I in terms of percentual population and municipalities.

Soares, T. A.; Cardoso, P. E. R; Dias, U. S.; 2022. Spectrum Availability for the Deployment of TV 3.0. SET INTERNATIONAL JOURNAL OF BROADCAST ENGINEERING http://dx.doi.org/10.18580/setijbe.2022.2



Strategies

- Reserve High-VHF Band (Channels 7 to 13) for the transition to TV 3.0
- Re-plan current DTT channels in some areas to free continuous spectrum portions
- Update regulation to allow multi-programming
- Promote installation of shared infrastructure
- Promote the production of TV sets with ISDB-Tb and TV 3.0 receiving capability as soon as the system technology has been defined

Soares, T. A.; Cardoso, P. E. R; Dias, U. S.; 2022. Spectrum Availability for the Deployment of TV 3.0. SET INTERNATIONAL JOURNAL OF BROADCAST ENGINEERING http://dx.doi.org/10.18580/setijbe.2022.2



Strategies

- Reserve High-VHF Band (Channels 7 to 13) for the transition to TV 3.0
 - 7 "national" channels for TV 3.0
- Ministerial Ordinance n° 10.693 Oct 05, 2023: New band for TV 3.0
 - estimate 10 more channels -> "national"
- N "national" UHF channels

7 (174 MHz) (216 MHz) **13**

10 new "national" channels

7 "national" VHF channels

14 (470 MHz)

 $14 + X \quad 51 - N$

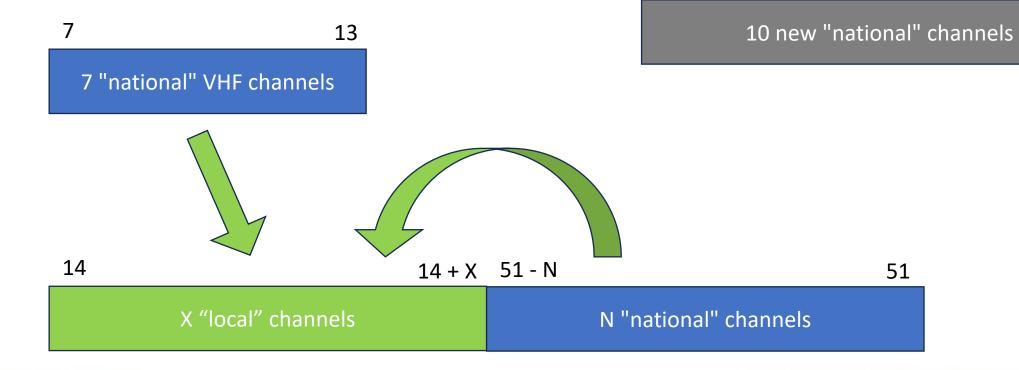
(698 MHz) **51**

X "local" channels

N "national" channels

Strategies

• Re-plan current DTT channels in some areas to free up continuum portions



Strategies

Connecting What's Next

Update regulation to allow multi-programming

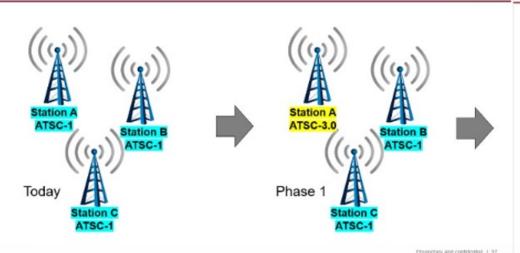
14 X "local" channels

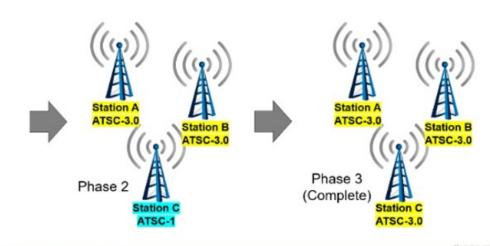
3.0 "Lighthouse" Concept



3.0 "Lighthouse" Concept



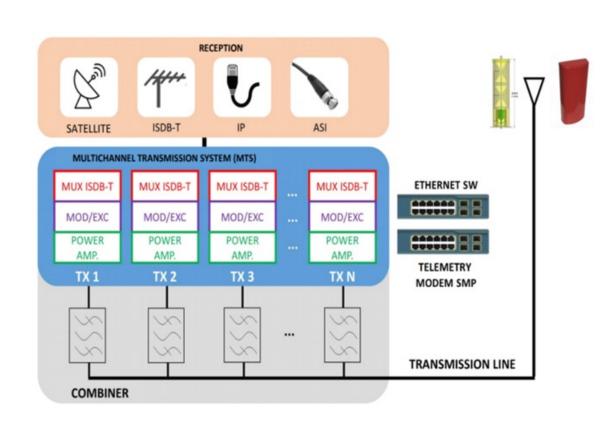




Connecting What's Next

Strategies

Promote installation of shared infrastructure



14 X "local" channels

Crowded spectrum

Less individual flexibility

