

BHUTAN current status

for the Transition from Analogue to Digital Terrestrial Television Broadcasting

25 May 2015 Pre summit workshop Asia Media Summit Malaysia

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Presentation Overview

- **1.** Country Overview
- 2. Organisation of administration
- 3. **Current situation & objectives**
- 4. Roadmap
- 5. **Top-5 most critical issues & choices**
- 6. **Recommendations**

1. Country Overview



FACTS of BHUTAN



- Country : BHUTAN
- Capital : Thimphu
- Location: 880° 45' & 920° 10' E Longitude
- 260° 40' & 280° 15' N Latitude
- (North Tibet, East, West and South India)
- Area : About 48,000 sq. km
- Population : 764,611 (National Housing & Population Census)
- Literacy Rate : 63 % (National statistics Bureau)
- Religion: Vajrayana stream of Mahayana Buddhism
- Currency: Ngultrum Nu. (At par with Indian Rupee)
- National Language : Dzongkha
- (Also known as Tantric Buddhism

Images of Bhutan





3. Current situation & objectives

1. Market Structure



1. Bhutan population = 745k ~ 165k HH (av. HH size ~ 4.5) and ~ 88 k TVHH (= 53% TV set penetration)

1. Analogue TV networks



- Band III & B/PAL
- 29 TX stations
- Two services: BBS 1 & 2
- Using either channels
 5/7 or 9/11
- ERPs between 70 to 1,500 W
- Noise limited coverage is 15.6% of the territory

1. DSO/ASO objectives (1/2)

No	Objective	2015 - 2018	> 2018
1	Smooth transition from analogue to digital	 All analogue services areas (BBS 1 & 2) covered with digital first (=29 sites) Simulcasting in all areas DTTB in the UHF Band 	
2	End of analogue transmission	 A set ASO date National switch-off Target date = mid 2018 	
3	New entrants/services	 1 MUX carrying approximately 20 SD services of which 2 are 'must carry' FTA BBS services (BBS1 & BBS2) The remaining capacity is for pay- tv services, grouped together and offered by a single SP 	 For the next 2 MUX, capacity will be reserved for converting BBS1/2 into HD and a 3rd BBS HD service - 1 commercial new HD service Rest of capacity is for the existing pay-tv SP End state will be (at least) 5 MUX for DTTB of which 1 PLP will be reserved for MTV
4	Extended population coverage	 Matching current analogue coverage areas (see objective 1) 10 additional sites 	Near national coverage (+65 sites
5	Better picture quality	Picture ratio (4 x 3)SD	Additional HD services

1. DSO/ASO objectives (2/2)

No	Objective	2015 - 2018	> 2018
6	Compensation for viewers	 Minimize viewer migration costs (financial aid for STB & RX antenna) – if possible (partly) financed from pay-tv revenues For terrestrial dependents only 	
7	Compensation for analogue broadcasters	 BBS gets double OPEX compensated 	
8	Digital Dividend	 No formal decisions (yet) – as for now follow ITU-RR/WRC'15 	

4. Roadmap

2. Roadmap overview

By	Layer	Phases of the roadmap		
Reg	Polio regul	1. DTTB policy development		
ulator (I	cy & ation	3.Licensing policy & 5. License administration		
VRT)	ASO	2. ASO planning		
Common MUX operator	Market & business development	Establish MUX operator 4. Implementation & operations DTTB network		
	DTTB network	Preparation (first deployment stage) MUX operator Issue of SP licensed and Issue of SP established Issue of SP		
Timeline				

2. Selected FFBs per Phase



2. Detailed maps per Phase (Phase 2)



4. Top-5 most critical issues & choices

4. Licensing framework

(selected items)

•Conditional Access: Free-to-Air (FTA) ≠ not encrypted
•Open Network Provisioning (ONP) rules: Reference Offer and LRIC



4. Customer proposition



4. Financing and business model

No	ASO Activity	Relative costs
1	Migrating viewers to digital	+(++)
2	Transmitter network migration efforts	++(++)
3	Re-farming of spectrum and compensations	0
4	Simulcast period for analogue terrestrial services	+
5	Managing the ASO process	+
6	Setting mandatory certification and labelling	+
7	Cost for resolving any DTTB interference	0

- Public Private Partnership most promising to finance the DSO/ASO costs
- Investments/obligations, rights and incentives need to be balanced

3. Frequency Plan (1/2)

• Frequency planning needed for three situations

Stages	174 – 230 MHz (Band III)	470 – 862 MHz (Band IV/V)
Existing	• 174 – 230 MHz: ATV	 470 – 610 MHz: no ATV assignments > 610 MHz: Mobile
During transition	• 174 – 230 MHz: ATV	 470 – 610 MHz: DTTB replacing ATV and additional DTTB > 610 MHz: Mobile
After ASO	• 174 – 230 MHz: DTAB/MTV?	 470 – 610 MHz: DTTB replacing ATV and additional DTTB > 610 MHz: Re-allocation of parts of the band to broadcasting?

Recommended initial set of system parameters

Characteristics	Initially recommended value
FFT size	32k, extended carriers
Pilot pattern	PP4
Guard interval	1/32 (112 μs)
Modulation and code rate	64-QAM 2/3
Payload	28.5 Mbit/s
C/N (Fixed reception)	16.0 dB
C/N (Portable reception)	17.9 dB
Polarisation	Vertical
Network configuration	MFN

4. Frequency Plan (2/2)

• System parameters provide enough capacity for approx. 20 SD services



• and good indoor coverage



4. Network architecture









5. Recommendations

5. Recommendations

- 1. Get the Roadmap report endorsed
- 2. After endorsement, acquire a mandate to plan and manage the DSO/ASO process in accordance to the Phases of the Roadmap
- 3. After being mandated, prepare and take the following decisions first as they determine the scope:
 - Finalize and agree the DSO/ASO objectives
 - Define & Agree DSO/ASO costs
 - Negotiate the public-private partnership
- 4. Finalize the licensing model:
 - ONP/Reference Offer
 - Assign license to pay-tv service provider
- 5. Appoint full time project manager & form PMO
- 6. Start preparations for separating the network provisioning activities

THANK YOU ALL

Special thanks to NBTC (Thailand) ITU Regional Office for Asia and the Pacific Mr. Peter Walop, ITU consultant for assistance with the RoadMap Development