

Implementations of T2

A review of GatesAir DVBT2

Deployments and considerations

A night-time photograph of the Dubai Marina skyline. The image shows several illuminated skyscrapers, including the Burj Khalifa, and a marina filled with yachts. The lights from the buildings and the water create a vibrant, colorful scene.

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GatesAir

History of GatesAir



- **1922** - Henry C. and Cora B. Gates founded the Gates Radio & Supply Company in Quincy, Ill., to create a job for their son, Parker S. Gates, who was only 15 years old at the time.
- **1950** - Gates Radio had become a major Radio equipment supplier in USA
- **1957** – Harris Corporation acquires Gates Radio
- **2013** – Gores group acquires Harris Broadcast Division
- **2014** – Harris Broadcast splits into two companies – Imagine Communications and GatesAir

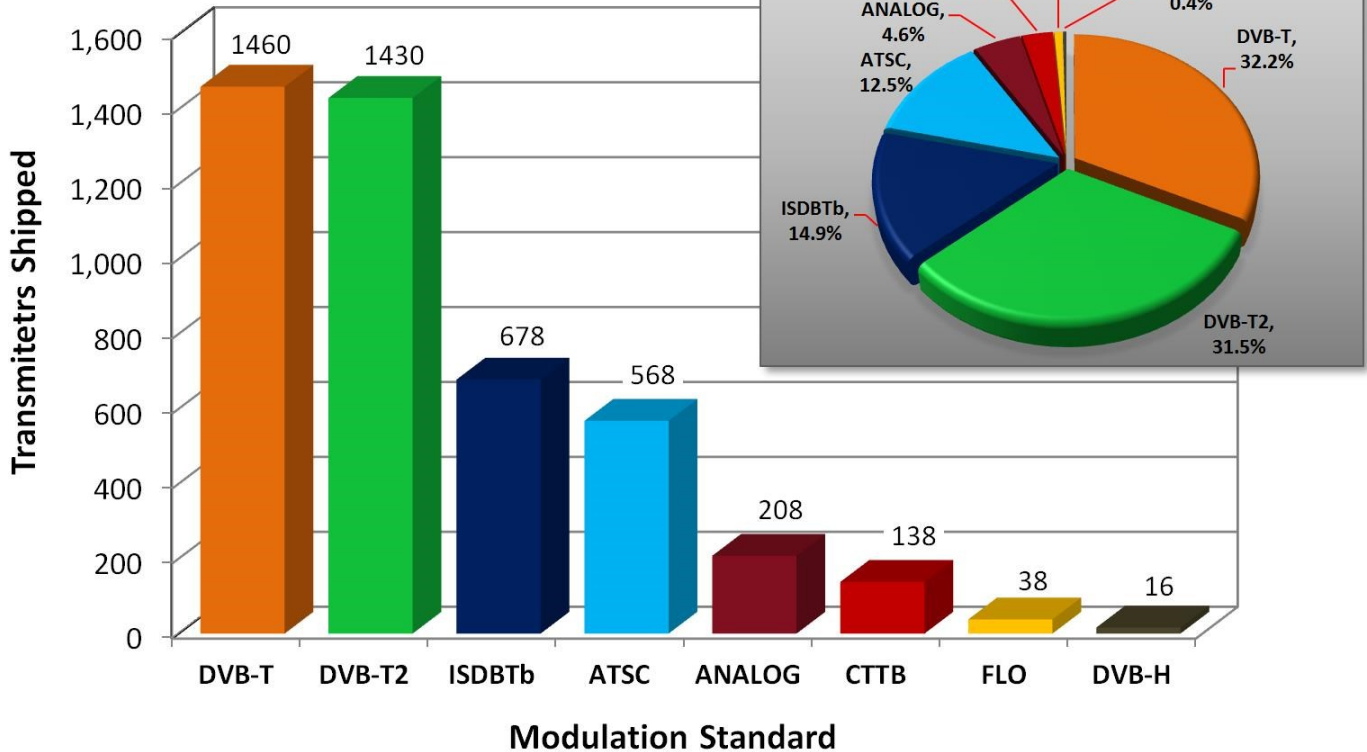


Quincy, Illinois, USA

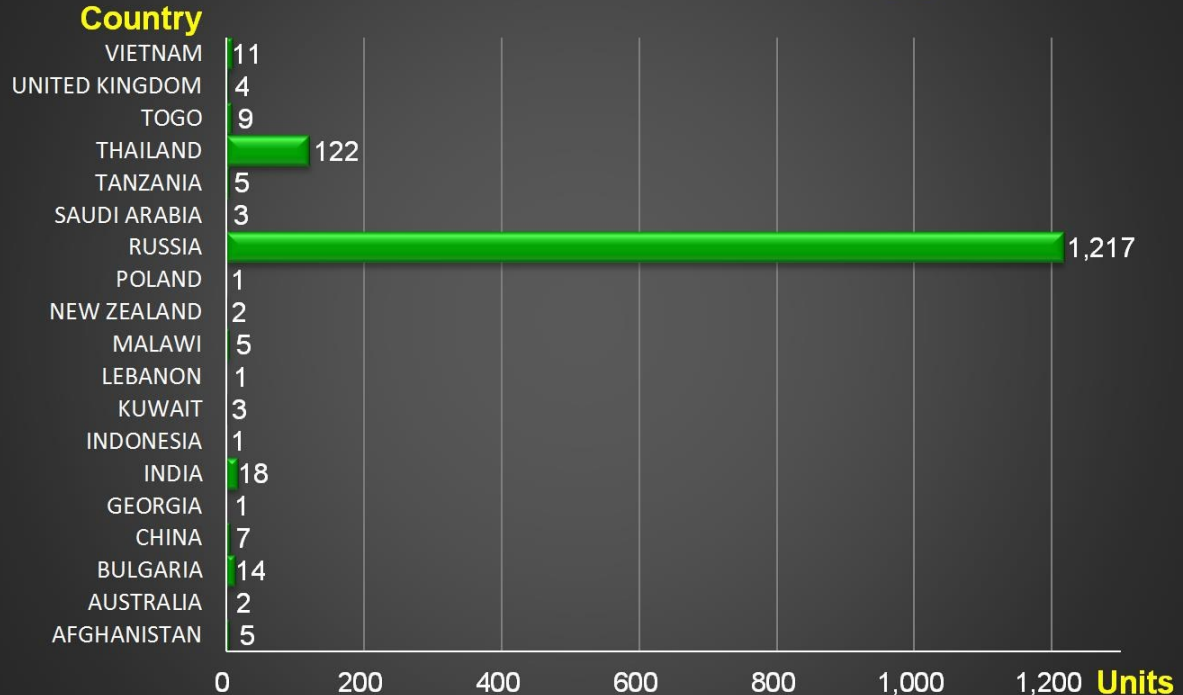


DTV Modulations Delivered...

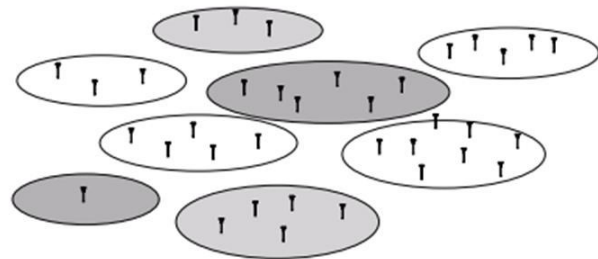
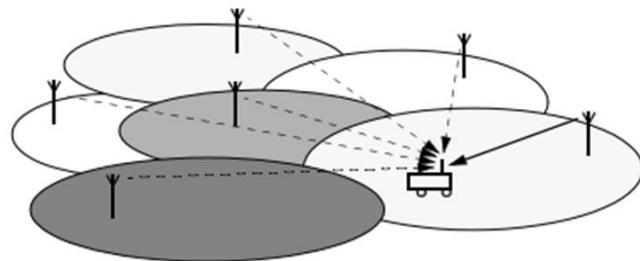
Shipments by Modulation Type (2009 - 2014)



DVB-T2 Transmitters Shipped



- Network Scenarios for national and regional transmission is specific to each country's requirements.
- The three possible network scenarios:
 - Multi Frequency networks (MFN)
 - Single Frequency networks (SFN)
 - And a combination of Multi Frequency networks and Single Frequency networks
- DVB-T2 Network parameters offers a much wider choice of parameters than DVB-T did.
- The choice is so large that it is not possible to consider all of their possible combinations.

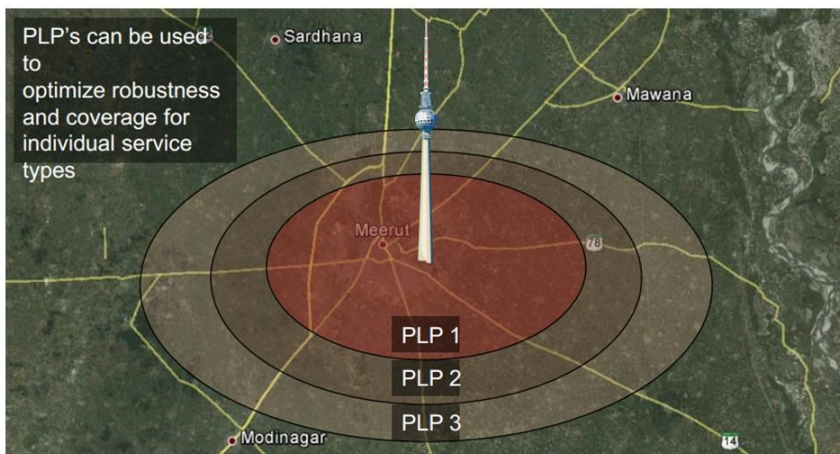


- When considering parameters for DVB-T2 networks the scenarios also need to be considered as well as the type of **coverage**.
 - MFN Rooftop Fixed Coverage
 - SFN Rooftop Fixed Coverage
 - MFN Indoor Fixed Coverage
 - SFN Indoor Fixed Coverage
 - MFN Portable Coverage
 - SFN Portable Coverage
 - MFN Mobile Coverage
 - SFN Mobile Coverage

Implementation	Fixed rooftop reception MFN (UK mode)	Fixed rooftop reception (maximum coverage area extension)	Fixed rooftop reception Limited area SFN (GE06 Allotment)	Fixed rooftop reception Large area SFN
Scenario	1	2	3a	3b
Bandwidth	8 MHz	8 MHz	8 MHz	8 MHz
FFT mode	32K	32K	32K	32K
Carrier mode	Extended	Extended	Extended	Extended
Scattered Pilot Pattern	PP7	PP2	PP4	PP2
Guard interval	1/128 (28 μs)	1/8 (448 μs)	1/16 (224 μs)	1/8 (448 μs)
Modulation	256 QAM	16QAM	256 QAM	256 QAM
Code rate	2/3	2/3	2/3	2/3
C/N	18.9 dB	11.0 dB	19.6 dB	20.0 dB
Data rate	40.2 Mbit/s	16.7 Mbit/s	37 Mbit/s	33.4 Mbit/s



- In a lot of cases you may look at more than one type of coverage in the same area or network, Multi PLPs within DVB-T2 then becomes a consideration



Selected Countries For Discussion



DVB-T2 in Vietnam



- AVG (Audio Visual Global / An Viên TV)
 - AVG was officially launched on 11 November 2011
 - Subscription DTT service
 - Direct to DVB-T2 (no analog)
 - 22 regions in operation across Vietnam
 - 3 MUX's per site, currently adding a 4th mux from this year onward to all the 22 sites
 - A total of 67 programs on 3 MUX:
 - SD is at about 1.5Mb/s per program
 - HD unknown
 - 64QAM, other parameters unknown
 - Indoor reception was planned
 - Claim to have their own T2 encoder
 - Da Nang and Nha Trang have GA transmitters



AVG - DTT Program Packages



North Region 67 Channels

67 KÊNH	GÓI A	GÓI KÊNH DTT MIỀN BẮC
KÊNH TIN TỨC		
ANTV VVI VTC1 X1 VV4 BTV		
TTXVN VTC2 QPVN NTV VP HANAM		
NHK WORLD FBNG RT BTV1 THP		
KÊNH VĂN HÓA - GIẢI TRÍ		
AnViênHD VN3 ON TV VIET VTV6 today		
HTV2 HTV7 3 VTC HD VN9 KBS WORLD DW		
TVSMONDE X2 arirang HTV9 Rientay HTV12		
HTV11 1 P12		
KÊNH PHIM TRUYỀN		
MOV PHIM HAY 2 VTC HD		
KÊNH CA NHẠC		
VTV6 Nhạc CÁCH MẠNG Nhạc TRÚ TÌNH Nhạc DAN TỘC FB-RC TRÚ		
Nhạc Cổ Điển Nhạc nhẹ Nhạc trẻ Nhạc Nam Bv		
KÊNH KHOA HỌC GIÁO DỤC		
VN2 VTC3 BTV2 HTV4 ĐỨC SẠCH		
KÊNH THỂ THAO		
BTV10 VTC4		
KÊNH THIẾU NHI		
SAM BTV11 HTV3		

South Region 66 Channels

66 KÊNH	GÓI A	GÓI KÊNH DTT MIỀN NAM
KÊNH TIN TỨC		
ANTV VVI HD VTC HD NHK WORLD NEWS CNN VV4 TTXVN		
VTC HD QPVN BTV1 FBNG RT X1		
NHK WORLD LA34 THGT THGT NHK DW TVSMONDE		
KÊNH VĂN HÓA - GIẢI TRÍ		
AnViênHD ON TV VIET VTV6 today		
today VTV CANTHO HTV HD HTV2 VN9 HTV7 arirang		
X2 P12 HTV HD HTV12 HTV11 ĐỨC SẠCH		
KÊNH PHIM TRUYỀN		
MOV PHIM HAY HD PHIM HAY HD		
KÊNH CA NHẠC		
VTV6 Nhạc CÁCH MẠNG Nhạc TRÚ TÌNH FB-RC TRÚ Nhạc Cổ Điển Nhạc nhẹ		
Nhạc trẻ Nhạc DAN TỘC Nhạc Nam Bv		
KÊNH KHOA HỌC GIÁO DỤC		
VN2 HTV4 ĐỨC SẠCH BTV2		
KÊNH THỂ THAO		
BTV10 VTC HD		
KÊNH THIẾU NHI		
SAM BTV11 HTV3		



- They provide a large number of programs via DTT in order to compete with cable operators
- AVG have about 500,000 subscribers (estimated)
- AVG has researched and set up a Network Operation Center (NOC) and Network Control Center (NCC)
- The NCC is reported to be the most advanced in South East Asia

Issues:

- They expanded very quickly and are facing some budget issues now



AVG's NOC



AVG's NCC



■ VTV (Vietnam Television)

- State-owned free-to-air TV network, HQ in Hanoi
- 5 DVB-T2 tx sites deployed so far
- 7 Programs per MUX:
 - 4 SD programs
 - 3 HD programs
- Total bit rate ~ 30mb/s
- SD bit rate ~ 1.5Mbps, HD unknown
- Analog shut off is planned for 2020
 - All 25 GatesAir analog Tx's will be converted to T2 by 2020



- Encoder/Head-End Suppliers:
 - Ericsson, Tandberg, Harmonic, Thomson
- Tower & Antenna Information
 - 120m
 - Antenna type: Polarization - horizontal, gain 10.8 dB at 600 MHz

VTV Terrestrial Channels

- **VTV1** - News and current affairs, broadcast 24/7 hours. VTV1 initially broadcast on September 6, 1970
- **VTV2** - Science, technology and education, broadcast 24/7 hours. VTV2 initially broadcast on January 1, 1989
- **VTV3** - Sports and entertainment, broadcast 24/7 hours. VTV3 was started on March 30, 1995
- **VTV6** - Youth channel, broadcast 24/24. VTV6 started from 8 locations on April 24, 2006. On September 9, 2011 VTV6 HD started as a high definition version of VTV6



DVB-T2 in Russia



Ostankino Tower

Russia completes transition to DVB-T2

January 23, 2015

DIGITAL TV EUROPE .net



Russia has completed the transition of its digital broadcasting infrastructure to **DVB-T2** and closed down the last of its **DVB-T** transmitters in Moscow, the Moscow region, Kursk and the Kaliningrad region.

Since 2012, Russian state-owned radio and TV broadcasting organisation RTRS has overseen the transition to DVB-T2 in 16 regions where DVB-T services were launched before a decision was taken to migrate to the newer standard.

DVB-T2, while the second multiplex can be seen by 48.1%.

According to RTRS, the country's first multiplex is now available to 85.3% of the population via

Close to 100% complete

Current Status of T2 in Russia

- MUX 1 - All regions are operating
- MUX 2 - Originally planned complete by end of 2015
 - Update: The commercial start of MUX 2 (except for 118 cities and nearby SFN cells) postponed until 2018-2019 - due to budget constraints of the broadcasters who won the rights to be distributed on MUX2
- Analog Switch Off
 - Planned for July 1st 2018. Actual date will be when > 95% people will receive DVB-T2 OTA
 - For most regions likely to be 2019 – for those near the borders – could be as early as 2015



RTRS MUX-1 Details

■ MUX-1 Details

- SFN, multi-PLP (3 PLPs)
- All PLPs are the same: 64-QAM , 8MHz, Total bit rate 33.817724 Mbps
- 10 TV and 3 Radio programs
- PLP0 – 8 TV and 2 radio, local ad-splicing only
- PLP1 – 1 TV and 1 radio, local ad splicing and live broadcast splicing
- PLP2 – 1 TV, local ad splicing and live broadcast splicing
- All programs are SD, Video Bitrate is about 2.6-3 Mbit/s

РТРС-1



RTRS MUX-2 Details

■ MUX-2 Details

- SFN, Single-PLP, 64-QAM, 8MHz, Total bit rate 33.817724 Mbps
- 10 TV Programs
- All programs are SD
- Data rate per program about 2.6-3 Mbit/s

■ MUX-3

- Under discussion



4,956 TV Transmitter Sites...



Transmitter Site Locations



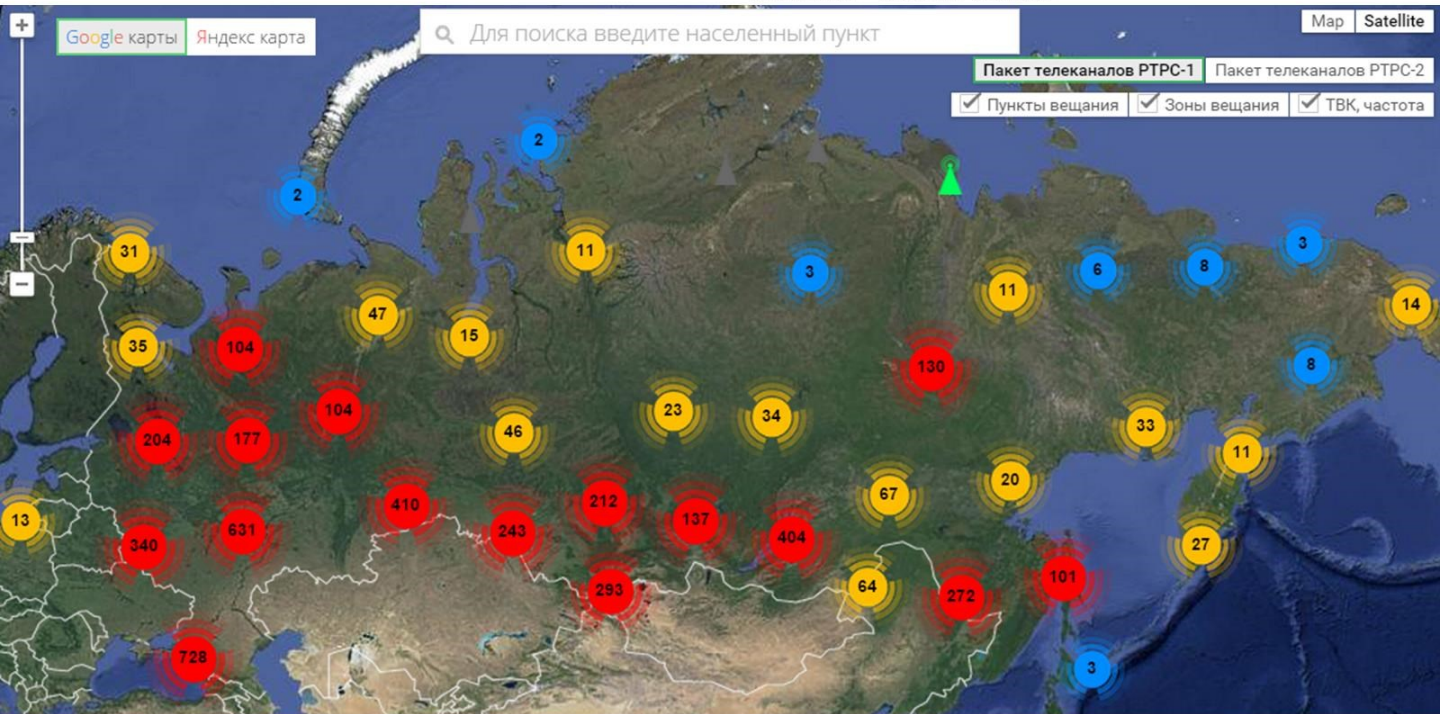
- MUX 1 Sites Shown
- MUX 2 has similar coverage

Source: <http://xn--p1aadc.xn--p1ai/when/>

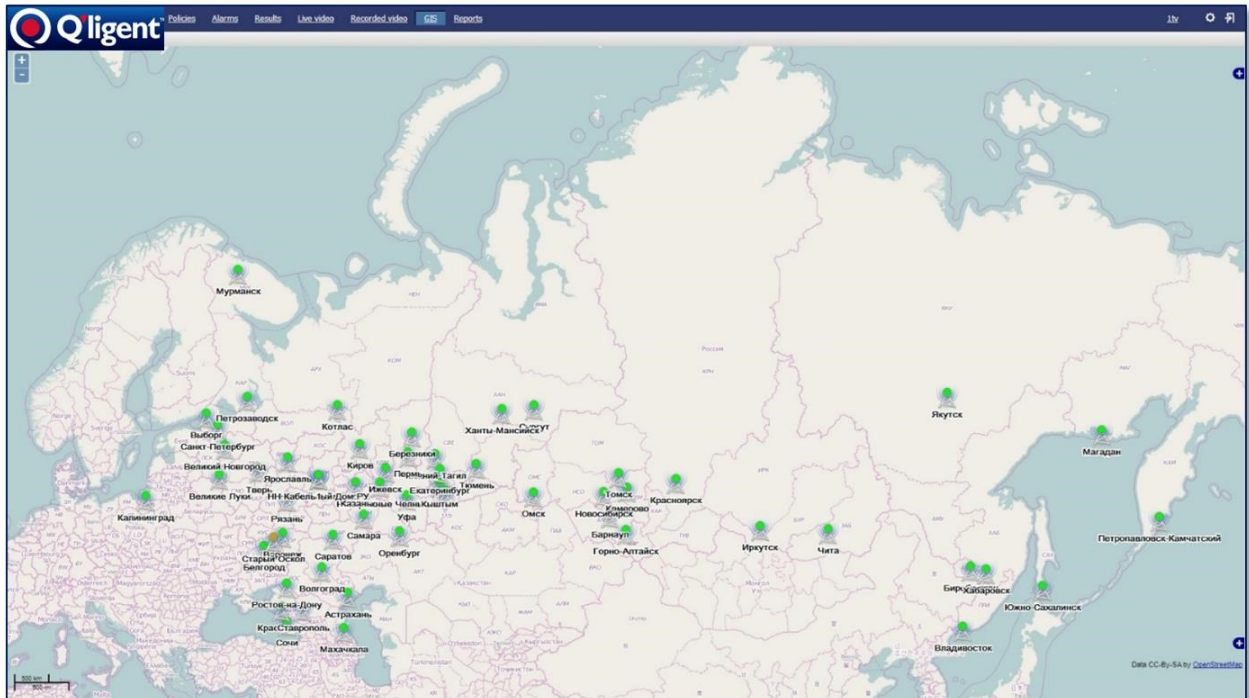
Red dot – more than 100 sites

Yellow dot – between 10 and 100

Blue dot – below 10 sites



- Control & Monitoring System used for Nationwide System



Real Time Tracking



Transmission Equipment

- Transmitters supplied by:
 - GatesAir, Thomson, R&S and local manufacturers (Triada and MART)
- Satellite receivers
 - Harmonic Proview
- Local Head ends are not yet finalized
 - A mix of Harmonic and Thomson
- Local ad-insertion/splicing
 - Qualittech?
- Monitoring, QoS
 - Q'Ligent



- Number of viewers (January 2015):
 - MUX1 121.8 million people (85.3% of population)
 - MUX2 68.6 million people (48.1% of population)
- SFN reference
 - Currently both GPS and GLONASS (Global Navigation Satellite System) used by RTRS
 - Switching to 100% GLONASS reference
- Problems reported (feedback):
 - Signal quality, picture artifacts, problems with TS
 - SFN synchronization issues
 - Splicing within SFN networks for local advertising

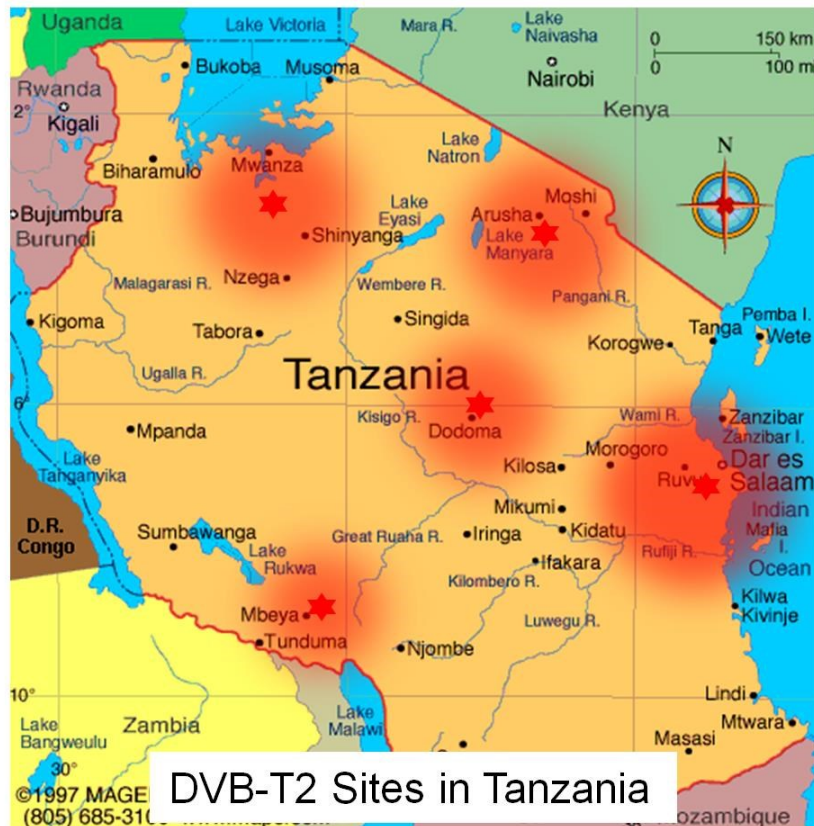


DVB-T2 in Tanzania



Brief Status for Tanzania

- Only 15% of the country received analog TV
- Analog switched off in Dar es Salaam Dec 31, 2012
- Free-to-air (FTA) currently
- Plan to launch pay TV before the end of the second quarter 2015
- When the pay TV platform is ready, a mix of Free-to-View (FTV) and pay TV channels will be offered



- Operated by Sahara Media Group - So far, 5 Sites for T2 in service
 - Site data:

Site	Target Service Area	Facilities Details			Transmission Site Geographical Details		
		Transmitter Power	Antenna Configuration Gain & Beam Tilt	Tower Height	Latitude	Longitude	Altitude
1	Mwanza	2kW	JUHD 4x4 - 12.0 dBd Tilt 0°	76m	032° 54' 54.02" East	02° 30' 39.50" South	1291m
2	Dar es Salaam	3.4kW	JUHD 8x4 - 15.0 dBd Tilt 0°	81m	039° 04' 46.89" East	06° 54' 14.12" South	308m
3	Arusha	2kW	JUHD 4x4 - 12.0 dBd Tilt 0°	70m	036° 43' 58.78" East	03° 20' 50.75" South	1956m
4	Dodoma	1kW	JUHD 4x4 - 12.0 dBd Tilt 0°	72m	035° 44' 48.70" East	06° 12' 38.62" South	1345m
5	Mbeya	1kW	JUHD 4x4 - 12.0 dBd Tilt 0°	72m	033° 25' 13.50" East	08° 51' 17.62" South	2651m



Some good References are:

- Recommendation ITU-R BT.1368 Planning criteria for digital terrestrial television services in the VHF/UHF bands
- Report ITU-R BT.2035 Guidelines and techniques for the evaluation of digital terrestrial television broadcasting systems
- Report ITU-R BT.2140 Transition from analogue to digital terrestrial broadcasting
- Report ITU-R BT.2254 Frequency Planning and Network Planning aspects of DVB-T2





Connecting What's Next

Thank You!

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GatesAir www.gatesair.com

