

GOVERNMENT NOTICE NO. 418 published on 9/12/2011

THE ELECTRONIC AND POSTAL COMMUNICATIONS ACT
(CAP.306)

REGULATIONS

(Made under Section 165)

THE ELECTRONIC AND POSTAL COMMUNICATIONS (DIGITAL AND OTHER BROADCASTING NETWORKS) REGULATIONS, 2011

PART I
PRELIMINARY PROVISIONS

- Citation
1. These Regulations shall be cited as the Electronic And Postal Communications (Digital and other Broadcasting Networks) Regulations, 2011.
- Application
2. These Regulations shall apply in relation to-
- (a) Digital Terrestrial Broadcasting Networks,
 - (b) Broadband broadcasting networks ;
 - (c) AM and FM terrestrial broadcasting Networks
 - (d) Migration from Analogue Terrestrial Broadcasting to Digital Terrestrial Broadcasting;
 - (e) Management of simulcast period;
 - (f) Digital Terrestrial Broadcasting spectrum planning, procedures, guidelines and conditions for assignment of multiplexes to Network Facilities Licensee and manage multiplex capacity limits;
 - (g) Standards for Broadcasting Networks in Tanzania and other subsequent revisions thereof;
 - (h) Hybrid networks and value added services in

- relation to Digital Broadcasting as may be determined by the Authority;
- (i) Network Facilities Licensee authorized by the Authority to provide multiplex services for Digital Broadcasting.
 - (j) Construction Permits to operate broadcasting networks.
- Interpretation 3. In these Regulations, unless the context otherwise requires-
- Cap. 306 “Act” means the Electronic and Postal Communications Act;
“access” means the making available by one person or network of electronic communications services or electronic communications networks, or parts thereof, to another person or network, for the purpose of enabling-
- (a) construction, maintenance and operation of an electronic communications network;
 - (b) provision of an electronic communications service; and use of electronic communications services;
 - (c) to construct, maintain and operate an electronic communications network; and
 - (d) to provide an electronic communications service;
- “analogue broadcasting” means the transmission of sound, text and images whether still or moving in a continuously variable signal in the form of electromagnetic or radio waves;
- “AM” means a broadcasting network that applies Amplitude Modulation scheme;
- Cap 172 “Authority” means the Tanzania Communications Regulatory Authority established under Tanzania Communications Regulatory Authority Act;
- “application fee” means a fee paid by an applicant when applying for a Licence;
- “broadband terrestrial broadcasting network” means a

broadcasting network capable of carrying video, audio and data at the recommended speed and quality;

“conditional access” means to restrict television programme access to certain groups of users either because of concerns of privacy or the desire to collect revenue for the services that requires secure encryption of the programme content and secure decryption in digital television receivers. ;

“content service” means services offered for speech or other sound, data, text or images whether still or moving, except where transmitted in private communications;

“content services licence” means an electronic communications licence entitling the holder to provide one or more content applications services;

“content services licensee” means a holder of a content services licence;

“construction permit” a permit issued by the Authority to enable a successful applicant to construct broadcasting network within the specified timeframe and in accordance with prescribed specifications;

“digital broadcasting” means the practice of using advanced digital compression techniques to encode and transmit audio, text, images and video signals resulting in more efficient bandwidth usage;

“dual illumination (simulcast)” means transmission of the same broadcast content in both analogue and digital technologies during transition period;

“dual illumination (simulcast) period” means the period between March, 2010 to 31st December 2012 or such other period as may be prescribed by the Authority;

“the EAC” means the East African Community established by the Treaty for establishment of the East African Community;

“EACO” means East African Communication Organizations;

- “Effective Radiated Power” in its abbreviation “ERP”, means the product of the power supplied to the antenna and its gain relative to a half wave dipole antenna in a given direction;
- “Electronic Programme Guide” in its abbreviation “EPG” means on-screen guide to scheduled television or sound broadcasting programmes;
- “Electronic Programme Information” in its abbreviation “EPI” means a basic initiated call to display a banner over the video indicating at a minimum, the current and upcoming programme title;
- “existing content services provider” means a content service licensee providing content services before licensing of multiplex operators;
- “frequency assignment” means the authorization to use frequencies by the multiplex operator;
- “FM” means a broadcasting network which that applies uses Frequency Modulation scheme;
- “High Definition Television” in its abbreviation “HDTV” means high quality digital television transmission system providing image resolution of 1920 by 1080 pixels;
- “hybrid network” means a multiplatform network which distributes signals using a number of digital electronic media which can be used in part or a combination of the following DVB-T, DVB-C, DVB-S, IP, IPTV, DVB-H, Satellite and any other future platforms;
- “licence” means a licence issued under the provisions of the Acts;
- “licensee” means any person licensed by the Authority;
- “licence period” means the period authorised to the holder of the Licence to provide services;
- “Minister” means the Minister responsible for communications except in relation to content services;
- “Motion Picture Expert Group” in its abbreviation “MPEG” means, a working group of experts that was formed by the International Standards Organization (ISO) for setting standards for audio and video compression and transmission;

- “multiplex” means a digital transmission channel which combines program material and other data in a digital form for transmission via a frequency channel;
- “multiplex operator” means that entity that complies, operates content offering on a digital multiplex that decides on the conditional access and Subscriber Management System (SMS) to be used and provides signal transition to the end user.
- “network facilities” means any element or combination of elements, of physical infrastructure used principally for or in the connection with, the provision of one or more network services or multiplex operation, but not including customer equipment;
- “Public services broadcasting” means content service provided by a licensee at a cost borne out of expenditure appropriated by Parliament or other public finances collected through other means of revenue collection;
- “service area” means the geographical area within which a licensee is authorized to cover;
- “Standard Definition Television in its abbreviation “SDTV” means digital television transmission system with 720 x 576 resolutions either interlaced or progressive scanned formats;
- “value added services” means additional or advanced services provided under digital terrestrial broadcasting platform.

PART II
GENERAL PROVISIONS

Obligations of the Authority in relation to broadcasting network

4.-(1) The Authority shall have the following obligations in relation to the broadcasting networks-

- (a) determine standards for broadcasting networks;
- (b) plan and assign frequencies in accordance with the market segment and service area;
- (c) determine categories of multiplex operators as deemed necessary;
- (d) determine number of multiplexes to be used for free to air, pay television and value added services;
- (e) issue construction permit to the successful applicants for broadcasting networks; and
- (f) determine the number of broadcasting networks in every broadcasting market segment and service area.

(2) Initially, the Authority shall licence three national multiplex operators to provide digital multiplex, signal distribution and transmission.

(3) The Authority shall have powers to determine the number of multiplex operators. (3) The Authority shall have powers to determine the number of multiplex operators.

Frequency Assignments for broadcasting networks

5.-(1) The frequency assignments for broadcasting networks shall be issued by the Authority, under the following conditions and arrangements-

- (a) for AM and FM broadcasting networks, in accordance with the market segment and licensed service area;
- (b) in the case of digital terrestrial broadcasting networks, to the multiplex operators, according to the demand and rollout requirements.

(2) The Authority shall plan frequency spectrum to

accommodate emerging digital broadcasting services.

(3) The Authority shall have powers to review multiplex assignments and allocations of frequency spectrum.

(4) The Authority shall have power to announce availability of free multiplexes which may be allocated to new applicants for free to air and subscription content service licence.

(5) Authority shall have power to announce the availability of frequency spectrum for FM and AM in competitive and underserved areas.

(6) In the event of high demand of spectrum resource for broadcasting networks, the Authority may resort to tender process or other methodology to get the suitable content service applicant.

Construction permit for broadcasting networks

6.-(1) The Authority shall issue construction permit to successful applicant to provide broadcasting services for the following-

- (a) transmission sites;
- (b) studio for radio and television stations;
- (c) multiplex head-ends;
- (d) uplink earth stations;
- (e) cable operators;
- (f) broadband content services providers; and
- (g) any broadcasting services as may be determined by the Authority.

(2) The construction permits shall be valid for one year.

(3) Upon completion of construction of the station, the applicant shall invite the Authority to conduct an inspection of the facilities-

- (a) upon approval by the Authority, the station shall be granted one month test transmission; and
- (b) upon satisfactory transmission the station shall be granted operating licence.

(4) In the event that the applicant is not able to start and accomplish construction within the given period, the Authority shall extend or cancel the permit upon receiving written representations from the applicant.

(5) The construction permit holder shall provide written

explanations to the Authority three months before the expiry date of the permit, giving reasons for not accomplishing the construction within the period indicated in the permit.

(6) Upon receiving written explanations the Authority shall conduct due diligence to establish whether the reasons given are valid and may reject and cancel the permit or accept and extend the permit to a maximum period of twelve months without further extension.

Obligations of
multiplex
operator

7. The Network Facilities Licensee who has been authorized to provide digital terrestrial broadcasting multiplexing and signal distribution services shall comply with the following-

- (a) to provide access to Free to Air Content Services licensees as primary obligation;
- (b) to provide access to subscription (pay television) on secondary basis;
- (c) to make available, provisioning of content aggregation and programme bouquet handling system that shall support data paths embedded in the DVB stream based on open source (non-proprietary) multimedia system to support Electronic Programme Guide (EPG) and Electronic Programme Information (EPI) for Free-To-Air (FTA) and Conditional Access for subscription services. The schedule on Set-Top-Box (STB) shall describe all services carried on the Digital Terrestrial Television (DTT) platform for the following 7 days;
- (d) submit annually to the Authority for its approval an updated roll-out plan for the provision of National Network Facilities to provide digital terrestrial broadcasting multiplexing and signal distribution services;
- (e) to provide services to current and new content service licensee on a fair, transparent, impartial and non-discriminatory manner;
- (f) to construct, operate, install, manage and maintain network facilities in accordance with the regulations

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- made under the Act;
 - (g) to ensure that every broadcasting transmission is identified by transmitting identification signals or announcements periodically;
 - (h) to ensure that transmission tower heights, antenna and transmission characteristics are in accordance with the parameters as specified in the Rules issued by the Authority;
 - (i) to ensure compliance with infrastructure sharing requirements and standards as provided for under the Electronic and Postal Communications Act;
 - (j) to submit to the Authority any plans for development or facility upgrade for approval for which the Authority reserves the right to reject any such request;
 - (k) within thirty days of a request by a content service licensee enter into a service level agreement with such licensee and provide the access services;
 - (l) to provide, within five years of being licensed, a Head-end in each administrative region of Tanzania for collection of signals for distribution;
 - (m) to provide connectivity fees which are transparent, non discriminatory and cost based in accordance with the bandwidth used per annum;
 - (n) to comply with any regulations, rules and directives issued by the Authority on applicable tariffs;
 - (o) to submit to the Authority, quarterly reports on network utilization, spectrum utilization, interference within and across borders of the United Republic of Tanzania;
 - (p) to provide to the Authority, billing information;
 - (q) to carry signals of content services licensees to service areas in accordance with their licence conditions.

Obligations of
Content
Services
Licensee in

8. A content services licensee -

- (a) may negotiate with multiplex operator on redeployment of usable infrastructure on

relation to terrestrial digital television broadcasting networks

- commercial arrangement during the transition period;
- (b) prepare and submit to the Authority roll-out plan for content services, service area and programmes;
 - (c) prepare and submit to the Authority business plans for digital terrestrial broadcasting framework;
 - (d) ensure that content for transmission carries station identification information by periodic announcements for radio station and logo for television station;
 - (e) shall be responsible to route its source signal to the regional multiplex head-end;
 - (f) provide information to multiplex operator for electronic program guide;
 - (g) provide periodic viewers guide, warning and information on the rating of content;
 - (h) after official analogue switch off, content services licensees under analogue platform shall ensure disposal of obsolete analogue equipment is in accordance with applicable environmental laws; and
 - (i) construct and install infrastructure in accordance with the parameters provided under the Rules made by the Authority.

Obligations of Content Services Licensee in relation to AM and FM Radio broadcasting networks

9. A content services licensee shall:
- (a) prepare and submit to the Authority roll-out plan for content services, service area and programmes;
 - (b) prepare and submit to the Authority business plans for AM and FM Radio broadcasting network;
 - (c) ensure that content for transmission carries station identification information by periodic announcements for radio station;
 - (d) provide periodic listeners guide, warning and information on the rating of content;
 - (e) provide quarterly report to the Authority on the

performance of the network that shall include and not limited to;

- (i) printed footprint of the service area of each transmitter;
 - (ii) effective radiated power of each transmitter; and
 - (iii) percentage of the network availability of each transmitter;
- (f) construct and install infrastructure for AM and FM broadcasting networks in accordance with the parameters provided under the Rules made by the Authority.

PART III TECHNICAL STANDARDS

Digital video
broadcasting-
terrestrial
standards

10.-(1) A multiplex operator shall provide services based on the Digital Video Broadcasting-Terrestrial (DVB-T) family standard as provided under the First Schedule to the Regulations.

(2) The Authority may from time to time review the standards as provided under these Regulations.

Network
Configuration

11.-(1) A multiplex operator shall comply with the following network configuration requirements-

- (a) use of Single Frequency Network (SFN) configuration for National coverage and Multiple Frequency Network (MFN) configuration for gap-fillers for deployment of digital terrestrial signal transmission, based on the National Frequency Spectrum Plan;
- (b) deployment of transmitters without put powers and ERPs for both MFN or SFN shall be in accordance with the provision stipulated in the Digital Broadcasting Rules; and
- (c) configure the network in accordance with reception modes as specified in the Second Schedule to these Regulations;

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(2) A multiplex operator shall limit the transmitter

powers of gap fillers to 50 Watts and ensure that does not cause interference to the main networks.

Multiplex
Capacity
Framework

12. A multiplex operator shall offer digital broadcasting services in the following manner:-

- (a) allocate a minimum of one third of total multiplex capacity for Free To Air services or as may be prescribed from time to time by the Authority;
- (b) in allocation of multiplex capacity, priority shall be given to Free To Air Services;
- (c) assigned frequency channels upon justification of demand and availability;
- (d) not to avail to one content service licensee more than 20% of a multiplex;
- (e) transparent in separation of content service functions and multiplex operator functions in the Digital Broadcasting value chain;
- (f) the maximum compression ratio shall be prescribed by the Authority in the digital broadcasting rules;
- (g) Value added services shall not exceed 5% capacity of one Multiplex in use; and
- (h) The multiplex operator shall not be allowed to carry its own produced content, channels or bouquet.

Quality of
Service

13.-(1) A multiplex operator and content service licensee shall be required to comply with quality of service requirements as prescribed by the Authority.

(2) The quality of service requirements include but not limited to the following:-

- (a) point of interface between content services licensee's studio and multiplex operator's Head-end;
- (b) coding, compression and multiplexing stages;
- (c) signal distribution system;

- (d) signal transmission system;
- (e) point of audio and visual production;
- (f) customer premise equipment ;
- (g) customer perception of quality or quality of experience;
- (h) availability of service.

Systems
Interoperability

14.-(1) A multiplex operator shall ensure that there is interoperability in the digital broadcasting chain.

(2) A Multiplex Operator shall ensure interoperability in the following manner-

- (a) all Free to Air channels shall be accessible without any subscription fees on any digital platform through an integrated digital television or a set top box;
- (b) the Authority shall type approve set top boxes and integrated digital television for use by consumers to access digital broadcasting services by Content Service providers through Multiplex Operators;
- (c) all conditional access television channels shall be accessible through a single Set-Top-Box and integrated digital television using mechanisms such as, smart cards, passwords or keys or any other mechanisms compatible with the single receiver system;
- (d) provide flexibility to content services licensee to change multiplex operator without need for additional interface.

(3) Both multiplex operator and content service licensee shall ensure that all the equipment comprised in and contacted to the licensed systems and used in the provision of the licensed services is type approved by the Authority.

Set-Top-Box
Specifications

15. Any person who intends to assemble, manufacture, maintain, import, distribute or sell integrated digital television, set top box, digital radio receiver or any other customer premise equipment for digital terrestrial broadcasting reception shall apply

to the Authority to obtain approval of appropriate class licence and be required to meet requirements as specified under Rules issued by the Authority.

**PART IV
MISCELLANEOUS PROVISIONS**

Service Level
Agreements

16.-(1) The Authority shall issue guidelines on service level agreements between the content services licensees and the multiplex operator.

(2) The service level agreement shall include without limitations, the following:-

- (a) obligations of multiplex operator;
- (b) obligations of content services licensee;
- (c) connectivity charges and billing arrangements;
- (d) technical and installation support;
- (e) parental control mechanism;
- (f) electronic program guide;
- (g) subscriber Management Support;
- (h) content service licensee studio to multiplex operator equipment;
- (i) disputes settlement mechanism;
- (j) customer care service;
- (k) electronic communication contractors for construction, selling, distribution, installation, commissioning, maintenance, importation etc.

(3) The multiplex operator shall submit to the Authority for its approval, the service level agreement between content services licensee before commencement of service.

Transition
Period

17.-(1) There shall be the transition period for migration from analogue to digital broadcasting which shall commence on the 1st July, 2011 and end on 31st December, 2012.

(2) During the transition period, there shall be dual illumination (simulcast) period running from 1st July 2011 to 31st December 2012.

(3) The Authority shall develop Rules prescribing incentive schemes to encourage content services providers to be

carried by Multiplex Operators on the digital network to realize smooth digital migration during the simulcast period.

(4) In the simulcast period, national content service licensees shall be required to provide simultaneous delivery of the same content on both analogue and digital platforms.

(5) The Authority shall have powers to modify the current licenses for content services, multiplex operator and frequency usage in accordance with the provisions of these Regulations for the purpose of creating a conducive digital broadcasting environment.

(6) In making out modification referred to under sub-regulation (4), the licensee shall not be liable for compensation.

(7) Network facilities licensees authorized to provide digital multiplex services and content service licensees shall-

- (a) prepare and meet roll-out plans within twelve months and phases of implementation approved by the Authority;
- (b) accommodate other services where applicable;
- (c) accommodate new applicants for sound broadcasting;
- (d) attain coverage greater than that during analogue broadcasting at analogue switch-off date;
- (e) not inhibit advancement of technology in the digital terrestrial broadcast chain;

(8) The content services licences under analogue platform shall lapse upon expiry of authorized simulcast period.

(9) The content services licensee under analogue platform shall be required to surrender the frequencies to the Authority upon expiry of the authorized simulcast period for the purpose of re-planning of spectrum.

Simulcast
Period

18. Simulcast shall be mandatory and the content service licensees shall-

- (a) provide simultaneous delivery of the same content on both analogue and digital platforms;
- (b) enter into service level agreement with Multiplex Operator in accordance with Regulation 9(1);

- (c) continue broadcasting content using their analogue infrastructure;
- (d) opt to switch off the analogue transmitter before end of simulcast period where Multiplex Operator exceeds the coverage of analogue service area.

Interruptions and Outages

19.-(1) A multiplex operator and content services licensee shall not intentionally interrupt the operation of the licensed systems and services in the normal course of business, nor may it in the normal course of business suspend the provision of any type of licensed service without having first notified the Authority in writing and having provided reasonable advance notice to person affected or likely to be affected by such interruption or suspension.

(2) The provision of Regulation 16 (1) shall not apply where the interruption or suspension is due to an emergency, an event of force majeure or to other circumstances beyond the licensee's control; or

(3) The interruption or suspension is to a licensed service supplied by the licensee to a person whose broadcasting network is endangering the integrity of the licensed system;

(4) A multiplex operator and content service licensee may be required to give to consumers' outage credit for continuous interruption of services in accordance with the Tanzania Communications (Consumer Protection) Regulations.

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Licensing of Multiple Television Channels

20.-(1) The Authority shall licence multiple television channels taking into consideration the following:-

- (a) each channel in the multiplexes shall require a separate licence;
- (b) subject to Regulation 16 (1), each licensed channel shall have Service Level Agreement with multiplex operator;
- (c) each licence shall have a maximum of three channels in one licensed service area;
- (d) the additional channels shall be licensed, if has different purposes and objective from the licensed

channels.

Appeal

21.-(1) Where the period for negotiations has lapsed and there is failure to reach agreement or a dispute arises between parties under a Service Level Agreement, then any aggrieved party may appeal to the Authority and serve to the opposite party a copy of document containing the appeal.

(2) The party that appeal to the Authority shall at the time of filing the appeal, provide all relevant documentation concerning:

- (a) unresolved issues;
- (b) the position of each party with respect to unresolved issues; and
- (c) any other issue discussed and resolved by the parties.

(3) A licensee against whom an appeal is filed shall respond to the other licensee's appeal and provide additional information required within twenty one days from the date the appeal was filed with the Authority.

(4) The Authority may require the appealing party and the responding party to provide such information as may be necessary for the Authority to reach a determination on the unresolved issues.

(5) Where any party refuses or fails to respond within thirty days from the date of any request by the Authority, the Authority may proceed to resolve such issues on the basis of the information available to it from whatever source derived and make a determination on the issues including imposing appropriate conditions on implementation of the terms and conditions parties to the agreement.

(6) A multiplex operator shall submit all disputes involving other licensees to the Authority for determination.

Penalties

22. Any licensee who contravenes any provision of these Regulations commits an offence and shall be liable on conviction to a fine of not less than Tanzanian Shillings five millions.

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FIRST SCHEDULE
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TECHNICAL STANDARDS FOR MULTIPLEXER

(Made under Regulation 10)

- (a) Digital Video Broadcasting-Terrestrial (DVB-T EN 300 744) for free to air and subscription services and where necessary Digital Video Broadcasting-Satellite (DVB-S EN 300 421) to compliment the terrestrial service as a relaying standard to remote areas due to terrain and lack of terrestrial infrastructure;
- (b) MPEG-4/H.264 AVC or its higher compression format developed for DTT after issuance of these Regulations and as may be approved by the Authority;
- (c) MPEG-4 based STB and backward compatible with MPEG-2;
- (d) Multiplex Operators to provide network security to prevent stolen STBs from being used outside Tanzania and **the** East African Community region.
- (e) STB to be open and Interoperable with networks within the Republic and **the East African Community** region;
- (f) The DVB-T Head-end shall support Standard Television (SDTV) and provisionally upgradeable to support High Definition (HDTV) programming.
- (g) Standards applicable to STBs should also apply to IDTV (Integrated Digital Television Receivers)]
- (h) Provision of Over The Air (OTA) capability by the STB;
 - (i) STB-Cost, (Multicrypt vs Simulcrypt) Simulcrypt to be the option;
 - (ii) Use of technology which shall ensure low cost to end-users

SECOND SCHEDULE

REQUIREMENTS FOR NETWORK CONFIGURATIONS
INCLUDING PARAMETER FOR MFN

(Made under Regulation 11)

1. In planning network configuration, a Multiplex Operator is required to consider the following:

- (a) Effective Radiated Power;
- (b) Service Area;
- (c) Transmitter Arrays;
- (d) Reception Modes.

2.-(1) A Multiplex Operator shall adhere to reference planning configurations for DVB-T in accordance with the following reception modes and frequency bands:

- (a) fixed reception;
- (b) portable outdoor reception or lower coverage quality portable indoor reception or mobile reception;
- (c) higher coverage quality for portable indoor reception.

(2) The reference planning configurations for DVB-T that shall be used are summarized in Table 1

Table 1: Reference Planning Configurations for DVB-T

RPC	RPC 1	RPC 2	RPC 3
Reference location probability	95%	95%	95%
Reference C/N (dB)	21	19	17
Reference $(E_{med})_{ref}$ (dB(μ V/m)) at $f_r = 200$ MHz	50	67	76
Reference $(E_{med})_{ref}$ (dB(μ V/m)) at $f_r = 650$ MHz	56	78	88

$(E_{med})_{ref}$: Reference value for minimum median field strength

RPC 1: RPC for fixed reception

RPC 2: RPC for portable outdoor reception or lower coverage quality portable indoor reception or mobile reception

RPC 3: RPC for higher coverage quality for portable indoor reception

Reference frequencies for VHF Band is 200 MHz and for UHF Band is 650 MHz. For other frequencies, the reference field-strength values in Table 1 shall be adjusted by adding the correction factor defined according to the following rule:

–
$$(E_{med})_{ref}(f) = (E_{med})_{ref}(f_r) + \text{Corr};$$

- for fixed reception, $\text{Corr} = 20 \log_{10} (f/f_r)$, where f is the actual frequency and f_r the reference frequency of the relevant band quoted in Table 1;
- for portable reception and mobile reception, $\text{Corr} = 30 \log_{10} (f/f_r)$ where f is the actual frequency and f_r the reference frequency of the relevant band quoted in Table 1.

The standard deviation used for the calculation of the location correction factor of each RPC shall be as follows:

- for RPC 1 and RPC 2: 5.5 dB in VHF and UHF,
- for RPC 3: 6.3 dB in VHF and 7.8 dB in UHF.

(c) A Multiplex Operator shall use four Reference Networks (RNs) in order to cover the different implementation requirements for DVB-T networks as follows: large service-area SFN, small service area SFN & dense SFN, small service area SFN for urban environment and semi-closed small service area SFN.

I: Large service-area SFN (Table 2)

- (a) This network consists of seven transmitters situated at the centre and at the vertices of a hexagonal lattice.
- (b) The transmitters have non-directional antenna patterns;
- (c) The service area is assumed to exceed the transmitter hexagon by about 15%.
- (d) This network applies to: fixed, outdoor/mobile, and indoor reception, for both Band III and Bands IV/V.
- (e) For portable and mobile reception, the size of the real service areas for this type of SFN coverage is restricted to 150 to 200 km in diameter

Table 2: Parameters of Large Service Area SFN

RPC and reception type		RPC 1 Fixed antenna	RPC 2 Portable outdoor and mobile	RPC 3 Portable indoor
Type of network		Open	Open	Open
Geometry of service area		Hexagon	Hexagon	Hexagon
Number of transmitters		7	7	7
Geometry of transmitter lattice		Hexagon	Hexagon	Hexagon
Distance between transmitters d (km)		70	50	40
Service area diameter D (km)		161	115	92
Tx effective antenna height (m)		150	150	150
Tx antenna pattern		Non-directional	Non-directional	Non-directional
e.r.p.* (dBW)	Band III	34.1	36.2	40.0
	Bands IV/V	42.8	49.7	52.4

The e.r.p. is given for 200 MHz in Band III and 650 MHz in Bands IV/V; for other frequencies (f in MHz) the frequency correction factor to be added is: $20 \log_{10}(f/200 \text{ or } f/650)$ for RPC 1 and $30 \log_{10}(f/200 \text{ or } f/650)$ for RPC 2 and RPC 3.

* The e.r.p. values indicated in this table incorporate an additional power margin of 3 dB.

For the guard interval length, the maximum value $1/4 T_u$ of the 8k FFT mode is used.
The Licensed Multiplex Operator shall ensure that the distance between transmitters in an SFN does not exceed the distance equivalent to the guard interval duration.

II: Small service area SFN, dense SFN (Table 3)

- (a) The network consists of three transmitters situated at the vertices of an equilateral triangle.
- (b) The transmitters have non-directional antenna patterns.
- (c) The reference service area is hexagonal.
- (d) This network applies to: fixed, outdoor/mobile and indoor reception, for both Band III and Bands IV/V.
- (e) The network is intended for small service area SFN coverage.
- (f) Transmitter sites with appropriate effective antenna heights are required to be available for this type of network and self-interference restrictions are small.
- (g) Typical service area diameters should be from 30 to 50 km.

TABLE 3: PARAMETERS OF SMALL SERVICE AREA SFN

RPC and reception type		RPC 1 Fixed antenna	RPC 2 Portable outdoor and mobile	RPC 3 Portable indoor
Type of network		Open	Open	Open
Geometry of service area		Hexagon	Hexagon	Hexagon
Number of transmitters		3	3	3
Geometry of transmitter lattice		Triangle	Triangle	Triangle
Distance between transmitters d (km)		40	25	25
Service area diameter D (km)		53	33	33
Tx effective antenna height (m)		150	150	150
Tx antenna pattern		Non-directional	Non-directional	Non-directional
e.r.p.* (dBW)	Band III	24.1	26.6	34.1
	Bands IV/V	31.8	39.0	46.3

The e.r.p. is given for 200 MHz in Band III and 650 MHz in Bands IV/V; for other frequencies (f in MHz) the frequency correction factor to be added is: $20 \log_{10}(f/200 \text{ or } f/650)$ for RPC 1 and $30 \log_{10}(f/200 \text{ or } f/650)$ for RPC 2 and RPC 3.

* The e.r.p. values indicated in this table incorporate an additional power margin of 3 dB.

In this network the inter-transmitter distance is 25 km in the case of portable and mobile receptions. It is therefore possible to use a value of $1/8 T_u$ (8k FFT) for the guard interval. The same guard interval value might also be feasible for fixed reception, with its greater distance between transmitters of 40 km, since fixed roof-level reception is less sensitive to self-interference because of the directional properties of the receiving antenna. The parameters and the power budgets of this network given in Table 3 shall be used.

III: Small service area SFN for urban environment (Table 4)

- (a) The geometry of the transmitter lattice of this network and the service area are identical to those of Small Service Area SFN, dense
- (b) This network applies to: fixed, outdoor/mobile and indoor reception, for both Band III and Bands IV/V.
- (c) This Network is intended for small service area SFN coverage in an urban environment.

TABLE 4: PARAMETERS OF SMALL SERVICE AREA SFN FOR URBAN ENVIRONMENT

RPC and reception type		RPC 1 Fixed antenna	RPC 2 Portable outdoor and mobile	RPC 3 Portable indoor
Type of network		Open	Open	Open
Geometry of service area		Hexagon	Hexagon	hexagon
Number of transmitters		3	3	3
Geometry of transmitter lattice		Triangle	Triangle	Triangle
Distance d (km)		40	25	25
Service area diameter D (km)		53	33	33
Tx effective antenna height (m)		150	150	150
Tx antenna pattern		Non-directional	Non-directional	Non-directional
e.r.p.* (dBW)	Band III	24.1	32.5	40.1
	Bands IV/V	31.8	44.9	52.2

The e.r.p. is given for 200 MHz in Band III and 650 MHz in Bands IV/V; for other frequencies (f in MHz) the frequency correction factor to be added is: $20 \log_{10} (f/200 \text{ or } f/650)$ for RPC 1 and $30 \log_{10} (f/200 \text{ or } f/650)$ for RPC 2 and RPC 3.

* The e.r.p. values indicated in this table incorporate an additional power margin of 3 dB.

IV: Semi-closed small service area SFN (Table 5)

- (a) This network is intended for cases in which increased implementation efforts regarding transmitter locations and antenna patterns are undertaken in order to reduce the outgoing interference of the network.

- (b) The geometry for this network is identical to Small Service Area SFN, dense, except for the antenna patterns of the transmitters, which have a reduction of the outgoing field strength of 6 dB over 240 degrees (i.e. it is a semi-closed RN).
- (c) This network applies to: fixed, outdoor/mobile and indoor reception, for both Band III and Bands IV/V.

TABLE 5:PARAMETERS OF SEMI-CLOSED SMALL SERVICE AREA SFN

RPC		RPC 1	RPC 2	RPC 3
Type of network and reception type		Semi-closed Fixed antenna	Semi-closed Portable outdoor and mobile	Semi-closed Portable indoor
Geometry of service area		Hexagon	Hexagon	Hexagon
Number of transmitters		3	3	3
Geometry of transmitter lattice		Triangle	Triangle	Triangle
Distance between transmitters d (km)		40	25	25
Service area diameter D (km)		46	29	29
Tx effective antenna height (m)		150	150	150
Tx antenna pattern		Directional 6 dB reduction over 240°	Directional 6 dB reduction over 240°	Directional 6 dB reduction over 240°
e.r.p.*(dBW)	Band III	22.0	24.0	32.5
	Bands IV/V	29.4	37.2	44.8

The e.r.p. is given for 200 MHz in Band III and 650 MHz in Bands IV/V; for other frequencies (f in MHz) the frequency correction factor to be added is: $20 \log_{10}(f/200$ or $f/650)$ for RPC 1 and $30 \log_{10}(f/200$ or $f/650)$ for RPC 2 and RPC 3.

* The e.r.p. values indicated in this table incorporate an additional power margin of 3 dB.

Dar es Salaam
29th November, 2011

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