GENERAL NOTICE

NOTICE 1240 OF 2008

ICASA

Independent Communications Authority of South Africa
Pinmill Farm, 164 Katherine Street, Sandton
Private Bag X10002, Sandton, 2146

DRAFT BROADCASTING DIGITAL MIGRATION FRAMEWORK REGULATIONS

NOTICE IN TERMS OF SECTION 4(4) READ WITH SECTION 4(1) (b), SECTION 30(1)(d) AND SECTION 31(4)(c) OF THE ELECTRONIC COMMUNICATIONS ACT, (ACT NO. 36 OF 2005).

a) The Independent Communications Authority of South Africa ("The Authority") hereby declares its intention, in terms of section 4(4)(a) of the Electronic Communications Act, 2005 (Act No 36 of 2005) ("the Act"), to make the regulations published herewith in respect of broadcasting digital migration in terms of section 4(1)(b) read with section 30(1)(d) and section 31(4)(c) of the Act and further read with section 4(3) (j) of the Independent Communications Authority of South Africa Act (No. 13 of 2000, as amended and herein after referred to as "the ICASA Act") and further in consideration of policy issued by the Minister in terms of sections 3(1) and 3(2) of the Act.

b) The Authority hereby gives notice that it is inviting interested parties, in terms of section 4(4)(b) of the Act, to make written representations on the draft regulations.

c) A copy of the draft regulations is available on the Authority's website at http://www.icasa.org.za and in the Authority's Library at 164 Katherine Street, PinMill Farm, Block D, Sandton, between 08h30 and 16h30, Monday to Friday.

d) Interested parties who wish to make written representations on the draft regulations are required to submit such representations to the Authority **by no later than 16h00 on 07 November 2008** by post, hand delivery or electronically (in Microsoft Word) for the attention of:

Ms Nozipho Mvulane
Independent Communications Authority of South Africa
Private Bag X10002
Sandton
2146

Delivery address: Block A, Pinmill Farm, 164 Katherine Street, Sandton
Where possible, written representations should also be e-mailed to: nmvulane@icasa.org.za or lpholosi@icasa.org.za.

e) Persons making written representations are requested to indicate if they wish to make oral submissions in the event that the Authority decides to conduct oral hearings in terms of Section 4(6) of the Act.

f) All written representations submitted to the Authority pursuant to this notice will be made available for inspection by interested persons at the Authority's library and copies of such representations will be obtainable on the payment of the prescribe fee.

g) At the request of any person who submits written representations pursuant to this notice, the Authority may determine that such representations or any portion thereof is confidential in terms of section 4D of the ICASA Act. If the request for confidentiality is refused, the person making the request will be allowed to withdraw such representations or portion thereof.

h) With respect to written representations or portions thereof determined to be confidential in terms of paragraph 5 above, the Authority may direct that the public or any member or category thereof, shall not be present while any oral submissions relating to such representations or portions therefore are being made; provided that interested parties shall have been notified of this intention and allowed to object thereto. The Authority will consider the objections and notify all interested parties of its decision.

i) Additional enquiries can be directed to :

Ms Nozipho Mvulane
Tel: 011 566 3249 **OR** Fax: (011) 556 – 3250 **OR** e-mail: nmvulane@icasa.org.za

PARIS MASHILE
CHAIRPERSON

BROADCASTING DIGITAL MIGRATION REGULATIONS

PURPOSE OF THE REGULATIONS

1. The objectives of these regulations are to -

a) regulate the transition of terrestrial television broadcasting services from Analogue transmission to Digital Terrestrial Television (DTT) transmission in South Africa during the dual illumination period;

b) Adopt standards recommended by the ITU, taking into consideration, the provision of section 30 (2) of the ECA

c) prescribe a procedure and conditions for assignment of the DTT multiplexes to the existing television broadcasting services;

d) prescribe the technical standards and conditions for DTT;

e) provide for the allocation and authorization of digital incentive channels.

f) Set out the time frames for the rollout of the digital terrestrial television throughout the Republic

2. DEFINITIONS

In these Regulations, any word or expression has the meaning assigned in the Electronic Communications Act No. 36 of 2005 and related legislation, unless the context indicates otherwise –

"**Act**" means the Electronic Communications Act, 2005 (Act No. 36 of 2005);

"**Analogue broadcasting**" means a transmission of a continuously variable signal which takes the form of electromagnetic waves.

"**Assigned Frequency**" means the centre of the frequency band assigned to a station;

"**Carrier power of a radio transmitter**" means the average power supplied to the antenna transmission line by a transmitter during one radio frequency cycle taken under the condition of no modulation;

"**Channel authorisation**" means the granting of permission by the Authority to a licensee to commence broadcasting a digital incentive channel allocated in terms of these regulations;

"**Conditional Access (CA)**" means

i. the protection of content by requiring certain criteria to be met before granting access to this content;

ii. a plug-in software applications configured in conjunction with the operating system of a Set Top Box with which broadcasters can restrict access to all or part of their service to a particular group of viewers ;

iii. a method of blocking access to programming, access only being allowed with the correct codes or card to "unlock" the programming; **or**

iv. a system that provides access to users when specific requirements are met, which requirements may include identification, authenticity, registration, payment or combination of all these and other factors.

"**Coverage Area**" means the geographical area within which service from a licensee can be received;

"**Digital broadcasting**" means the practice of using advanced compression techniques to encode and transmit audio, video and image signals resulting in more efficient bandwidth usage;

"Digital incentive channel" means an additional channel allocated to existing television broadcasting service licensee as an incentive for migration from analogue to digital television in terms of these regulations;

"Digital migration" means a process of converting the broadcast of television and sound broadcasting services from analogue to digital technology;

"DTT" means Digital Terrestrial Television,

"Dual illumination period" means a period when the same broadcast content is transmitted in both analogue and digital technology for the purpose of allowing digital adoption by the members of the public;

"Effective Radiated Power" means the product of the power supplied to the antenna and its gain relative to a half wave dipole in a given direction;

"Electronic Programme Guide (EPG)" means on-screen guide to scheduled broadcast television or radio programs. Definition to be reviewed and aligned in line with that in Subscription broadcasting regulations;

"Electronic Programme Information (EPI)" means a basic initiated call to the STB to display a banner over the video indicating at a minimum, the current and upcoming programme title;

"Existing television broadcasting services" means the broadcasting services, which were licensed to provide terrestrial television broadcasting services prior to the coming into force of the Act;

"Frequency assignment" means the assignment of frequencies or a network of frequencies (multiplex) to an existing broadcaster(s);

"Frequency Tolerance" means the maximum permissible departure by the centre frequency of the frequency band occupied by an emission from the assigned frequency;

"**Gain of an Antenna**" means the ratio, expressed in decibels, of the power required at the input of a loss free reference antenna to the power supplied to the input of the given antenna, to produce in a given direction, the same field strength;

"**Hard-switchover**" means a direct transition from analogue to digital broadcasting without first undergoing dual illumination in terms of these regulations;

"**Joint Spectrum Advisory Committee (JSAC)**"means an advisory forum established by the Authority to assist in the co-ordination of the usage of frequencies to minimise or prevent harmful interference during the transition from analogue to digital technology;

"**Marginalized languages**" means isiNdebele, siSwati, XiTsonga and TshiVenda;

"**Mean power of a radio transmitter**" means the average power supplied to the antenna transmission line by a transmitter during an interval of time sufficiently long compared with the lowest frequency encountered in the modulation taken under normal operating conditions;

"**Multiplex**" means a combination of multiple digital data streams into one signal to be transmitted over one carrier frequency, and "**Multiplexing**" is construed accordingly;

"**Multiplex 1**" means a multiplex allocated to public and community broadcasting television services;

"**Multiplex 2**" means a multiplex allocated to commercial broadcasting television services;

"**Necessary bandwidth**" means for a given class of emissions, the width of the frequency band which is just sufficient to ensure the transmission of information at the rate and with the quality required under specified conditions;

"**Out of band emission**" means emission on a frequency or frequencies immediately outside the necessary bandwidth which results from a modulation process but excluding spurious emissions;

"**Peak envelope power of a radio transmitter**" means the average power supplied to the antenna transmission line by a transmitter during, one radio frequency cycle at the crest of the modulation envelope taken under normal operating conditions;

"**Public Value Test**" means a requirement that the authorisation of the digital incentive channels to the public wing of the SABC should seek to meet the programming objectives in regulation 6 (4) and may be subjected to further public processes.

"**Radiation**" means the output flow of energy from any source in a form of radio waves;

"**Radio**" means an electromagnetic wave propagated in space without artificial guide and having by convention a frequency lower than 3 000 GHz;

"**Radio communication**" means electronic communication by means of magnetism, radio or other electromagnetic waves, optical, electro-magnetic systems or any agency of a like nature;

"**RFP**" means Radio Frequency Plan;

"**Service Area**" means that part of the coverage area in which the licensee has the right to demand that agreed protection conditions be provided;

"**Spurious Emission**" means emission on a frequency or frequencies which are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information.

"**Usable Field Strength**" means the minimum value of field strength necessary to permit a desired reception quality under specified receiving conditions in the presence of natural and man-made noise and interference.

2. TECHNICAL STANDARDS FOR DIGITAL MIGRATION

(1) During the dual illumination period licensees will be required to provide services based on standards approved by the Regional Radio Communications Conference in Geneva (RRC-06) and in consideration of the policy issued by the Minister in terms of section 3(1) of the Act.

(2) The following standards are adopted as National Standards for the Republic:

(a) Digital Video Broadcasting – Terrestrial (DVB-T EN 300 744) standard for terrestrial digital free-to-air television broadcasting in South Africa;

(b) Digital Video Broadcasting – Satellite (DVB-S EN 300 421) to complement DVB-T and accelerate the roll-out of universal access;

(c) MPEG-4 as the compression standard for DTT roll out provided that existing DTH services may continue to use MPEG-2 with an option to migrate to MPEG 4 when commercially viable;

3. FRAMEWORK FOR DTT MULTIPLEXES

(1) The allocation of multiplexes must take into account the following factors:

(a) Two (2) DTT multiplexes will be reserved for existing television service licensees;

(b) Each multiplex set out for DTT purposes will carry eight (8) channels;

(c) Each DTT channel is entitled to a maximum capacity of 12.5% of the multiplex in which they broadcast;

(d) During the dual illumination period, the same broadcast content must be broadcast in both digital and analogue technologies on Standard Definition Television (SDTV) mode

4. DTT CHANNEL ALLOCATION

(1) Allocation of channels, including digital incentive channels, to existing television broadcasting services in DTT multiplexes is based on the following criteria:

(a) The allocation must aim to increase the number of channels falling under the public wing of the South African Broadcasting Corporation for the purposes of public service programming, including regional broadcasting ;

(b) Digital incentive channels must be assigned proportionally to all commercial television broadcasting services being e-TV and M-Net as well as the commercial wing of the Public Broadcaster (SABC).

(2) A single multiplex (multiplex 1) must be set aside for public service and community broadcasting with:

(a) two (2) channels reserved for services under the commercial services of the SABC;

(b) five (5) channels reserved for services under the public services of the SABC; and

(c) One (1) channel reserved for community television broadcasting services, subject to the application of the following restrictions :

(i) Only permanently licensed services may participate in the multiplex, while temporary community television services may continue to be broadcast on analogue frequencies; and

(ii) Community broadcasting services carried in the community broadcasting channel are restricted to their respective licensed coverage areas, subject to the frequency plan and in terms of the standard terms and conditions for class licensees.

(3) A single multiplex (multiplex 2) must be set aside to carry two (2) e-TV channels and four (4) M-Net channels.

(4) The remaining two channels on Multiplex 2 must be set aside for future assignment.

5. DIGITAL INCENTIVE CHANNEL AUTHORISATION

(1) An existing television broadcasting service licensee may not operate a digital incentive channel allocated in terms of regulation 5 without the prior written authorization of the Authority.

(2) An existing television broadcasting services licensee intending to operate the digital incentive channel must submit an application in writing to the Authority, for the authorization referred to in regulations 3 and 6.

MULTIPLEX 1 (PUBLIC BROADCASTING SERVICES)

(3) Authorisation of channels for public broadcasting as allocated in Multiplex 1will be subjected to a public value test and may be subjected to a public process.

(4) The Public Value test, as applied within the proposed channel, will include the following factors:

(a) The level of educational programming;

(b) The distribution of different languages with an emphasis on the marginalized languages;

(c) The promotion of cultural diversity;

(d) Programming aimed at persons with disabilities, children, youth and women;

(e) The social development of persons in the Republic including programs providing entertainment and information; and

(f) Multi-Genre programming

(5) In following the public process envisaged in regulation 6(3), the Authority may follow a procedure which may include any or all of the following steps -

(a) Publish a notice in the *Gazette* of the application for the channel authorization;

(b) Invite comments from interested persons in relation to the application within the period specified in the notice;

(c) Afford an opportunity to the applicant to submit written responses to representations received in relation to the application within the period specified by the Authority; and

(d) conduct a public hearing in relation to the application.

MULTIPLEX 2 (COMMERCIAL BROADCASTING SERVICES)

(6) The application for the digital incentive channel authorisation for channels in Multiplex 2 must be accompanied by the following information -

(a) the name of the proposed channel;

(b) primary research conducted to establish the demand of the channel;

(c) market impact analysis, including the implication of the proposed channel on diversity of programming, other DTT services and subscription television services;

(d) the primary language(s) of channel;

(e) proof of financial viability ;

(f) submission of a detailed programming plan, including the provision of local content; and

(g) submission of any other related information as required by the Authority.

(7) Channels allocated in Multiplex 2 will only be authorized upon the receipt of an application made in terms of these regulations, subject to compliance with regulation 6.

(8) A decision on an application made in terms of this regulation must be communicated to an applicant within sixty (60) days of the submission of an application, failing which the digital incentive channel will be regarded as having been authorised.

(9) Where the Authority refuses to authorise a channel, the Authority will give written reasons thereof to the applicant within ninety (90) days of the decision not to authorize the digital incentive channel.

(10) Where a digital incentive channel is authorized in terms of these regulations, the Licensee is required to commence broadcasting on the channel within ninety (90) days after the issue of the certification for authorisation by the Authority.

6. ELECTRONIC COMMUNICATION NETWORK SERVICE (ECNS) LICENSEE

(1) Where multiple broadcasting service licensees are allocated in one multiplex, the broadcasting services licensees are required to:

(a) agree on the ECNS licensee to provide the signal distribution services; or

(b) jointly apply for an ECNS licence in the event they choose to self provide, subject to the provision of 5(6) of the Act.

(2) The relationship between the broadcasting services licensees and the ECNS licensee will be based on commercial agreement between the respective parties.

(3) Within one hundred and twenty (120) days of the coming into effect of these regulations, the preferred ECNS will be required to submit technical plans, including multiplexing and transmission plans;

(4) The ECNS licensee will be held liable for all technical aspects of signal distribution including but not limited to interference with other frequency assignments.

(5) The ECNS licensee must ensure that the broadcast signal reaches the following percentage of the population in the Republic:

(a) 50% coverage by 2009;

(b) 80% coverage by 2010;

(c) 100% coverage by 2011.

7. LICENSEE OBLIGATIONS AND DATA CAP RESTRICTIONS

(1) All the multiplexes reserved by the Authority must prioritise the provision of DTT ;

(2) The data services included on the programming will be limited only to EPG and EPI and must not exceed five (5) percent of the overall capacity of each channel.

(3) The broadcasting services licensee must provide both Electronic Programme Information (EPI) and Electronic Programme Guide (EPG) in languages of broadcast on each commercial channel and all official languages in the case of the public service channels.

(4) The ECNS licensee must control the performance of statistical multiplexing in order to ensure that content is transported over optimum bandwidth;

(5) The ECNS Licensee must provide data paths embedded in the Digital Video Broadcasting (DVB) stream based on the non-proprietary open source multimedia system to support EPI and EPG applications.

8. QUALITY OF SERVICE REQUIREMENTS FOR THE DTT MULTIPLEXES

(1) ECNS licensees must provide the Authority with quarterly reports on the quality of standards, including progress in meeting required technical standards and measures undertaken or to be undertaken to manage and prevent frequency interference within South Africa and in the region.

(2) ECNS licensees must keep records of all incidences of frequency interference and include them in their quarterly reports to the Authority.

9. JOINT SPECTRUM ADVISORY COMMITTEE

(1) In order to promote the efficient co-ordination of frequency spectrum management and interference resolution during the dual illumination period, the Authority will establish a Joint Spectrum Advisory Committee (JSAC), as a consultative forum, with broadcasting service licensees and their respective ECNS licensees to co-ordinate usage of frequencies.

(2) The JSAC will advise the Authority on the most efficient processes to be adopted in resolving matters related to spectrum management to minimise or prevent harmful interference during the transition from analogue to digital technology.

(3) The establishment of the JSAC is subject to the following:

(a) Participation on the JSAC is voluntary;

(b) The committee is to comprise of:

(i) two (2) representatives per existing television broadcasting service licensee at each JSAC meeting;

(ii) two (2) officials of the Authority, one of whom will act as the chairperson.

(4) The JSAC will cease to exist within six (6) months from the date of the switch off of the analogue signal;

(5) Decision of the JSAC are to be reached by consensus submitted to the Authority as a recommendation. Where the votes are equal, the chairperson has a casting vote.

(6) For a quorum of the meeting of the JSAC:

(a) The official delegated as chairperson in terms of regulation 10(3)(b)(ii) must be present,

(b) attendance by no less than 50% of persons entitled to attend the meeting must be secured.

(7) The JSAC shall submit quarterly reports to the Authority on all its activities regarding efficient coordination of the frequency spectrum during the dual illumination period.

10. TRANSITIONAL MEASURES

(1) Within three (3) months of the coming into effect of these regulations:

(a) The broadcasting services licences issued to the SABC, namely SABC 1, SABC 2, SABC 3, SABC 4, SABC 5, are to be consolidated into a single broadcasting licence to provide Free to Air digital terrestrial television services ; and

(b) The broadcasting services licences issued to M-net, namely M-net and CSN, are to be consolidated into a single broadcasting licence to provide subscription digital terrestrial television services.

11. REPEAL AND AMENDMENT OF THE REGULATIONS

(1) These regulations repeal the Television Broadcasting Technical Regulations contained in Notice 2329 and published in Government Gazette No 20553 dated 08 October 1999.

(2) The Authority may amend or repeal these regulations by notice in the Gazette.

12. SHORT TITLE AND COMMENCEMENT

These Regulations will be called the Digital Migration Regulations, 2008 and will come into force upon publication in the Gazette.

ANNEXURE A – TRANSMISSION REQUIREMENTS

1. Transmission Characteristics for analogue and digital television

(1) The electronic communications network service licensee is required to furnish the Authority with accurate records of all transmission parameters such as effective radiated power (ERP), transmit antenna height, transmit antenna pattern (vertical and horizontal) and exact site location to ensure that coverage and interference predictions are performed accurately.

(2) All broadcasting services licensees and ECNS licensees must comply with internationally accepted standards with non-transmission/studio equipment so as to ensure stability in the broadcasting industry and to protect the interests of the viewing public.

(3) All broadcasting services licensees and ECNS licensees must adhere to the Authority's regulations relating to technical standards and specifications applicable to television technical specifications and in compliance with the Terrestrial Broadcasting Frequency Plan.

(4) A uniform channel spacing of 8MHz will be used for both analogue and digital transmission.

(5) In each channel the nominal vision carrier frequency is situated at 1.25MHz above the lower limit of the channel and the associated sound carrier frequency is higher than the vision carrier frequency for both analogue and digital .

2. TABLE OF TRANSMITTER FREQUENCY TOLERANCES

(1) For stations of 1W (vision peal; envelope power) or less this tolerance may be relaxed to 10kHz in rural areas at the sole discretion of the Authority.4

FREQUENCY BAND	TOLERANCE
174 MHz to 254 MHz	500 Hz
470 MHz to 854 MHz	500 Hz[(1)]

3. TABLE OF MAXIMUM PERMITTED SUPRIOUS EMISSION POWER LEVEL

(1) The following table indicates the maximum permitted levels of spurious emissions, in terms of the mean power level of any spurious component supplied by a transmitter to the antenna transmission line.

(2) Spurious emission from any part of the installation other than the antenna and its transmission line may not have an effect greater than would occur if this antenna system were supplied with the maximum permitted power at that spurious emission frequency

(3) For any spurious component the attenuation (mean power within the necessary bandwidth relative to the mean power of the spurious component concerned) must be at least that specified below.

(4) The absolute mean power level given shall not be exceeded

FREQUENCY BAND	SPURIOUS EMISSION LEVEL
174 MHz to 254 MHz Tx o/p > 25W Tx o/p < 25W	60dB/1mW 40db/25$_u$W
470 MHz to 854 MHz Tx o/p > 25W Tx o/p < 25W	60dB/1mW 40dB/25$_u$W

4. DESIGNATION OF EMISSION

(1) Emissions are designated according to their necessary bandwidth and their classification. The necessary bandwidth is expressed by three numerals and one letter. The letter occupies the position of the decimal point and represents the unit of bandwidth.

(2) Emissions are classified according to a set of basic characteristics and are designated by standard symbols.

(3) First symbol - type of modulation of the main carrier.

(a) Amplitude modulated double sideband	**A**
(b) Vestigial sideband	**C**
(c) Frequency modulation	**F**

(4) Second symbol - nature of signal(s) modulating the main carrier

(a) Single channel containing analogue information	**3**
(b) Two or more channels containing analogue information	**8**

(5) Third symbol - type of information to be transmitted

(a) Sound broadcasting	**E**
(b) Television	**F**

(6) Fourth symbol - details of signal(s)

(a) Monophonic sound broadcasting	**G**
(b) Stereophonic sound broadcasting	**H**
(c) Colour television broadcasting	**N**

(7) Fifth symbol - nature of multiplexing

(a) None	**N**
(b) Frequency division multiplex	**F**

(8) For the full designation of an emission, the necessary bandwidth, indicated in four characters shall be added just before the classification symbols.

5. MAXIMUM EFFECTIVE RADIATED POWER (ERP)

(1) Except in the frequency band 3 900 - 4 000kHz, broadcasting stations using frequencies below 5 060kHz or above 41MHz shall not employ power exceeding that which is necessary to maintain economically an effective national service of good quality within the frontiers of the country concerned in terms of the ITU RR2666.

(2) UHF Television Band IV/V = 500Kw

6. MODULATION STANDARDS, EMISSION, BANDWIDTH CHARECTERISTICS OF THE RADIATED SIGNALS FOR ANALOQUE BROADCASTING

Characteristics		
FREQUENCY SPACING	**Nominal radio-frequency channel** bandwidth (MHz)	8
	Sound carrier relative to vision carrier (Mhz)	+5.9996 ±0.0005
	Nearest edge of channel relative to vision carrier (Mhz)	-1.25
	Nominal width of main sideband (MHz)	5.5
	Nominal width of vestigial sideband (MHz)	1.25
Minimum attenuation of vestigial sideband (dB and MHz)		20 (-3.0) 30 (-4.43)
Type and polarity of vision modulations		C3F neg.
LEVELS IN THE RADIATED SIGNAL (% OF PEAK CARRIER)	Synchronizing level	100
	Blanking level	76 ± 2
	Difference between black level and blanking level	O (nominal)
	Peak white-level	20 ± 2

Type of sound modulation	F3E
Frequency deviation (kHz)	± 50
Pre-emphasis for modulation (us) I	50
Ratio of effective radiated powers of vision/sound	10/1
Line frequency f_H and tolerance when operated non-synchronously (Hz)	15 625 ± 0.0001 %

7. FIELD STRENGTH VALUES FOR COVERAGE AREA FOR ANALOGUE BROADCASTING

Service Grade	Field strength threshold value (dBμV/m)		
	VHF Band III	UHF Band IV	UHF Band V
A	65	75	80
B	55	65	70
C	49	60	60

(1)The field strength values for coverage area planning for digital broadcasting for all areas are 58dBμV/m.

8. MODULATION STANDARDS, EMISSION BROADCASTING CHARECTERISTICS OF THE RADIATED SIGNAL FOR DIGITAL BROADCASTING

Article I. CHARACTERISTICS					
Nominal radio-frequency channel bandwidth (MHz)	8				
Nominal width of digital signal (MHz)	7.61				
Type of modulation	COFDM				
Number of carrier per channel	Article II. 8K MODE		Article III. 2K MODE		
	6817		1705		
Carrier spacing	Article IV. 8K MODE		Article V. 2K MODE		
	1 kHz		4 kHz		
Forward error correction rates (FEC)	1/2	2/3	3/4	5/6	7/8
Guard interval	1/32	1/16	1/8	1/4	
Carrier modulation scheme	64 QAM	16-QAM	QSPK		
Hierarchical modulation	$\alpha = 1$	$\alpha = 2$	$\alpha = 4$		

	Non-hierarchical	-QPSK in non-uniform 16 QAM	-QPSK in non-uniform 16 QAM
		-QPSK in non-uniform 64-QAM	-QPSK in non-uniform 64-QAM