Issue: Draft for Consultation

REPUBLIC OF LEBANON
TELECOMMUNICATIONS
REGULATORY AUTHORITY

SPECTRUM REFARMING AND PACKAGING FOR BROADBAND WIRELESS ACCESS

BROADBAND LEBANON

23 October, 2008

This document is a consultation on a proposed plan for the refarming and packaging of the Spectrum for the Broadband Wireless Access to be issued by the Telecommunications Regulatory Authority of the Republic of Lebanon. The current version of the plan, as presented in this consultation document, is not yet binding and will only become effective following the completion of the consultation process and the publication of the final version of the refarming and packaging plan.

This consultation document is made publicly available via the Authority's web site to allow interested persons to submit comments and other relevant information. Interested persons may respond in writing to the Authority during the public consultation period. To be considered, responses must be received by 5.00pm on 15 November 2008.

The address for responses sent by post or hand delivery is:
Telecommunications Regulatory Authority
Marfaa 200, Building
Beirut, Lebanon
Attention: The Chairman

Responses may also be sent to the Authority by email to spectrum_refarming@tra.gov.lb or by fax to +961 1 964 341

As part of its process to develop a complete record and allow open public access to the information that forms a basis for its decisions, the Authority will generally publish all responses as received, unless respondents expressly ask that their responses be treated as confidential, in whole or in part. If any respondent wants the whole or any part of its submission kept confidential, then it should state its request, set out clearly the basis for its request, and enclose the information that it wants to be treated confidentially in a separate sealed envelope.

If the Authority agrees that the circumstances warrant confidential treatment, then it will notify the respondent of the same and will open and consider the submission confidentially in this consultation process. If the Authority disagrees, then it will destroy the sealed materials without opening or reviewing them, not consider them in this consultation process, and notify the respondent of the same.

Responses for which confidentiality is requested must be submitted by post or hand delivery and not by email or fax. Failure to comply with this requirement may result in loss of confidentiality.

Capitalized terms not defined herein have the meaning provided in the Telecommunications Law No. 431 of 2002 (the Telecommunications Law).

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1 Purpose and Scope of the Refarming and Packaging Plan

1.1 Background

This Refarming and Packaging Plan for the Spectrum for the Broadband Wireless Access (the Plan) is issued by the Telecommunications Regulatory Authority of the Republic of Lebanon (the Authority). It is designed to provide potential and current stakeholders in the sector with explanations of the Authority's actions relating to the refarming and packaging of the spectrum for the broadband wireless services.

This Plan will be a binding document that states the Authority position and approach in implementing the refarming and packaging of the Spectrum used for the broadband wireless services during its period of validity. It may be subject to review and amendment following consultation and pursuant to promulgation processes. Such review and amendment may be undertaken periodically as deemed necessary by the Authority in light of the development of the Lebanese telecommunications markets, changes to Lebanese national laws affecting the telecommunications sector, or other factors.

In preparing this Plan the Authority has had regard to international best practices for the allocation, packaging, licensing and usage of the Radio Frequency Spectrum, as well as the Lebanese Constitution, general principles of law and other applicable laws and regulations.

1.2 Legal Basis

1.2.1 Telecommunications Policy

The Government of Lebanon, having determined its intent to transform the telecommunications sector in Lebanon from a state-owned monopoly to a competitive market, open to private participation, promulgated the Telecommunications Law to achieve this aim.

1.2.2 The Authority's Mandate and the Telecommunications Law

Article 15 of the Telecommunications Law confers on the Authority the exclusive authority to manage, allocate and monitor the use of Radio Frequencies Spectrum in Lebanon. It provides for the Authority to develop an annual plan for the Allocation of Radio Frequencies, and requires the Authority to consult with the Ministry of Information and other concerned governmental agencies for the TV and Radio broadcasting frequency usage.

Article 16 of the Telecommunications Law provides a framework for the licensing of Radio Frequencies by the Authority, and Article 17 addresses fees payable for use of Radio Frequencies. Article 11 provides for the Authority to be funded from such fees, as well as from fees for Radio Frequency monitoring and management.

The Telecommunications Law provides for the Authority to issue regulations, including under Articles 5(1)(a) and 5(1)(i).

This Plan is issued pursuant to the Authority's powers and responsibilities in the aforementioned provisions of the Telecommunications Law.

1.3 Purpose of this Plan

The principal purpose of this Plan is to provide potential and current stakeholders in the sector with explanations of the Authority's actions relating to the refarming and packaging of the spectrum for the broadband wireless services.

This Plan applies to all Telecommunications Service Providers using Radio Frequency Spectrum in Lebanon.

This Plan, when finalized, will be published on the Authority's website and will enter into effect on the date of its publication in the Official Gazette.

In developing this Plan, the Authority has had regard to the following general principles about the use of scarce radio spectrum:

- to achieve an efficient allocation of the available scarce spectrum; where there is scarce spectrum, the Authority is mindful that the benefits for the final users and the Lebanese economy will be maximised if the spectrum is used efficiently. This requires users of such spectrum to pay a price for using it that in general reflects the market value of this spectrum, unless there are clear social, practical or economic reasons to depart from this principle;
- to ensure that the refarming approach and the award of spectrum maximizes the value of the spectrum over time, bringing though more revenues to the Government of Lebanon; there are significant technological developments in this area, and the value of spectrum in certain bands could increase significantly over time, as such technological developments enable the provision of higher value adding services by the use of such spectrum. The Authority therefore considers that to ensure that the benefits to the users and the Lebanese economy are maximised over time, that it will be prudent for some spectrum to be retained for future award;
- to ensure that spectrum is refarmed and awarded in a way that ensures opening of the market for more competition, infusion of major investments in the sector, continuity and minimisation of disruption; the Authority is aware that a significant proportion of spectrum is currently used by different service providers to offer a variety of different services; within the overall objective of the first principle, the Authority will seek to ensure, where possible, that there is an effort to minimise any unnecessary disruption to existing users of such spectrum.

1.4 Interpretation

Individual clauses containing the word 'shall' and 'will' are mandatory requirements and are binding on licensed providers of Telecommunications Services and applicants for such Licenses.

Individual clauses containing the word 'may' are permissions or recommendations (depending on the context) to providers but are not mandatory.

Individual clauses containing the word 'shall' and 'will', when applied to the Authority, refer to its current intention as to how it will approach the matter referred to.

2 Definitions

Terms defined in the Telecommunications Law shall have the same meaning when used in this Plan. Unless otherwise defined and unless the context requires otherwise, any word, phrase or expression used in this Plan (including capitalized terms) shall have the meaning given to it in the Telecommunications Law. In the event of conflict or ambiguity between the terms defined herein and the terms defined in a License or in the Telecommunications Law, the following order of precedence shall apply:

- First, the Telecommunications Law,
- Second, The Interim Licenses
- Third, this Plan

In this Plan, the following terms shall have the corresponding meanings:

Administrative Incentive Pricing (AIP): Where spectrum usage rights are not auctioned as part of a competitive award process, but where there may be congestion in the demand for the particular spectrum band in question, administrative incentive pricing (AIP) is increasingly used to set spectrum right to use fees.

Authority: The Telecommunications Regulatory Authority of the Republic of Lebanon, established under the Telecommunications Law No 431 dated 22 July 2002 (Telecommunications Law) and Decree No 14264 dated 4 March 2005.

Broadband Access Licenses (BAL): Broadband Access Licenses would entitle the holders to build metropolitan and access networks connecting to customers using any technology of their choice, and to offer customers the same telecommunications services as the National Broadband Licenses. Some of the Broadband Access Licenses would be made available with radio spectrum bands, enabling them to deploy wireless access technology. The Broadband Access Licenses would not, however, have international gateway rights or the right to build a core network during an initial period after the issuance of the National Broadband Licenses. The Broadband Access Licensees would have to acquire international and backhaul capacity from Liban Telecom or from the National Broadband Licensees for an initial period to be defined by the Authority.

Broadband Wireless Access (BWA): Providing users with access to broadband applications within a wireless context through either a Fixed wireless or Mobile wireless types of connectivity.

Decision: Any decision or measure taken by the Authority in exercising its functions, powers, duties or obligations pursuant to the provisions of the Telecommunications Law or any regulation thereunder.

DSP: Data Service Providers.

Frequency Division Duplex (FDD): Frequency-division duplex means that the transmitter and receiver operate at different carrier frequencies. The station must be able to send and receive a transmission at the same time, and does so by altering the frequency at which it sends and receives.

Frequency License: A license to use Radio Frequencies and radio apparatus issued in accordance with this Plan,

Frequency Licensee: A holder of a Frequency License.

Interim License: The License granted by the Authority under the Telecommunications Law to the Data Service Providers to provide Data Services, Internet Services and certain other Telecommunications Services and to use certain Radio Frequencies in the Republic of Lebanon on April 05th 2008 and up to and until the 31st December 2008.

Interim Period: The period authorized by the Authority for the completion of this Plan by the existing 4 DSP's, which will end on October 31st 2009, and which is intended to give DSPs adequate time to avoid service interruption to customers.

Interference: Interference to any form of radio-communication caused by either intentional or unintentional radiation of electromagnetic energy, to the extent that the purpose of the communication is severely compromised or not possible.

ITU: The International Telecommunications Union.

National Broadband Licenses (NBL): National Broadband Licenses would permit the holder to build any telecommunications infrastructure using any technology for a core network (linking nodes in the main cities of Lebanon), metropolitan networks (covering Lebanon's towns and cities), and access networks (i.e., connecting the metro and core networks to the points of presence, or POPs, that concentrate the connections of the customer premises). They would also have international gateway rights, as described further below. The National Broadband Licenses would include substantial bands of frequencies that may be used for wireless access, including the 2.5 GHz and 3.5 GHz bands, as well as the bands used for the microwave backbone.

Plan: This Refarming and Packaging plan for the Spectrum for the Broadband Wireless Access issued by the Authority.

Radio Frequency Spectrum Plan: A plan governing the use of the Radio Frequency Spectrum and dividing it into Radio Frequency Bands with specified purposes, and which may take the form of a Lebanese National Frequency Allocation Table or any other form as the Authority may consider appropriate.

Radio Frequency Band: Any contiguous range of Radio Frequencies.

Radio Frequency Band Plan: A plan governing the use of a certain Radio Frequency Band.

Refarming and Packaging Plan (see Plan)**:** The proposed plan by the Authority for the refarming and packaging of the Spectrum for the Broadband Wireless Access

RFA: The Request For Applications to participate in a tender process for twenty year licenses together with the acquisition of the businesses of two existing mobile network operators, issued by the Authority and the Higher Council for Privatization of the Republic of Lebanon, dated 2 November 2007, as amended from time to time.

RTU fees: Right to use fees for the use of Radio Frequencies that are determined by a decree issued by the Council of Ministers upon the proposal of the Minister and at the recommendation of the TRA.

S_{min}: The minimum spectrum needed to deploy a national access network with reasonable capacity.

Spectrum: The electromagnetic radiation waves naturally propagated along the radio frequency spectrum, used for the transmission and/or reception of data.

Time Division Duplex (TDD): The application of time-division multiplexing to separate outward and return signals. It emulates full duplex communication over a half duplex communication link

Working Day: Any day other than a Saturday, a Sunday, or a day which is an official public holiday for the Government sector in Lebanon.

3 Refarming for Broadband Lebanon

3.1 General

Currently, the market for the provision of broadband services in Lebanon is shared between:

- 6 operational licensed Data Service Providers (DSP), four of which have spectrum allocated;
- a number of licensed but non-operational licensees; and
- an unknown number of unlicensed operators.

The four DSPs with spectrum allocated are: CableOne, PESCO, GDS, Cedarcom. The other two DSP operators that do not currently have spectrum are Sodetel and Solidere.

Current Interim Licenses were temporarily issued by the Authority to the six existing operational DSPs. Such licenses expire on 31-12-2008.

To date, spectrum has been authorized on an annual basis without a clear policy on spectrum licensing. This Plan aims to provide a longer term framework for the refarming and licensing of spectrum.

3.2 Position of licensed-and-operational DSPs

The existing DSPs are active in a great number of different frequency bands (1.9 GHz, 2.1 GHz, 2.2 GHz, 2.5 GHz, 3.5 GHz, 5 GHz, 26 GHz others). The current DSPs are operating under Interim Licenses that have been issued by the Authority in April 05th 2008 and valid until 31st December 2008.

As part of the renewal process of the DSPs' Licenses, the Authority has committed for continuity reasons to assign a minimum bandwidth (Smin) in one band to the 4 existing licensed-and-operational DSPs that currently have spectrum allocated. The Authority did not specify at that time the amount of spectrum and band in which the Smin is assigned. This is discussed in Section 4.4.

As part of the Mobile Licenses RFA, the Authority has decided to assign to each mobile licensee, in addition to blocks of 2x10MHz FDD, the option either to have another 2x5 MHz of FDD spectrum in the 1.9/2.1 GHz band or 10 MHz TDD on the 2.5 GHz band. This allocation is pending the auction of the mobile licenses.

3.3 Description of spectrum for BWA auction

2.5 – 2.69 GHz Band

The 2.5 GHz band offers an important opportunity for the development of wireless mobile broadband services; it is designated as an extension band for systems using IMT.

The existing DSPs are using proprietary systems in this band with 6 MHz (case of PESCO and CEDARCOM), and 5 MHz and 1.75 MHz (case of Cable One) and pilot of GDS based on 5 MHz.

3.5 GHz Band

This band was primarily a Fixed Wireless Access ('FWA') band; however, this band was recently opened for mobile wireless broadband communications (ECC/DEC/(07)02)[1]. Certified equipment just for Fixed WiMAX is currently available on the market.

Existing DSPs are using different technologies with TDD and FDD and different channel planning: e.g. TDD carriers of 3.5 MHz (Cable One) and 6 MHz[2] (CEDARCOM, PESCO) and FDD spectrum of 7 MHz (PESCO) and 3.5 MHz (GDS) based on 1.75 MHz and 1 MHz carriers.

1.9 GHz band

This band is designated for IMT and it is part of the 'IMT core band'. iBurst, which is based on the Pre-IEEE 802.20 standard which is not part of the IMT family standards is deployed in Lebanon by CEDARCOM. The Authority reserved 30 MHz FDD as part of this spectrum in the 1.9GHz band for the Mobile Licenses.

26 GHz band

This band is designated for fixed point-to-point (P2P) and fixed point-to-multipoint (PMP) technologies and, in some countries, it is used by broadcasters for multimedia distribution.

GDS is using part of this spectrum as Point-to-Multi-Point 'PMP' to connect their business customers.

3.4 National Broadband Licenses and Broadband Access Licenses

As set out in its Liberalization Roadmap[3], the Authority plans to issue licenses in 2009 with a view to establishing across Lebanon – in the cities and rural areas – access to high speed core, metropolitan and access networks. This policy is borne from the TRA's conviction that the state of the current market in high speed data, Internet and international services needs radical improvements in terms of investment in high capacity networks and introduction of new services that are available in a large number of other countries around the world but not in Lebanon.

The Authority plans to issue two types of licenses which will be structured to optimize the combination of investment and competition:

- National Broadband Licenses; and
- Broadband Access Licenses.

[1] *In the LNFT the band from 3.6 GHz to 3.8 GHz is assigned to Fixed Satellite Services on a primary basis in line with the relevant ITU Recommendations.*

[2] *These are most probably US systems.*

[3] *See the Authority Liberalisation Roadmap*

Subject to Telecommunications Law requirements, the National Broadband Licensees would be permitted to provide almost any telecommunications services that can be delivered across their networks, subject to any Liban Telecom exclusive rights. The Authority is still considering what would be an appropriate number of National Broadband Licenses to issue, but is currently planning to issue up to 2 such licenses. National Broadband Licenses would permit the holder to build any telecommunications infrastructure using any technology for a core network (linking nodes in the main cities of Lebanon), metropolitan networks (covering Lebanon's towns and cities), and access networks (i.e., connecting the metro and core networks to the points of presence, or POPs, that concentrate the connections of the customer premises). They would also have international gateway rights.

Broadband Access Licenses would entitle the holders to build metropolitan and access networks connecting to customers using any technology of their choice, and to offer customers the same telecommunications services as the National Broadband Licenses. Some of the Broadband Access Licenses would be made available with radio spectrum bands, enabling them to deploy wireless access technology. The Authority is still considering the number of BAL licenses to be issued, including the number of National and Regional licenses, and the frequencies that will be provided to them.

3.5 Planning and Implementation Requirements

The primary focus of this plan is on the most common Broadband Wireless Access 'BWA' bands. These are the 2.500 GHz – 2.690 GHz (the 2.5GHz band) and 3.400 GHz – 3.600 GHz (the 3.5GHz band). These bands have to be reassigned in a more efficient way in accordance with International Standards while maintaining the maximum fairness and transparency in order to open the telecommunications market, increase competition and contribute greatly to Broadband Lebanon.

The 2.5 GHz band has better radio propagation characteristics compared to the 3.5 GHz band, enabling a lower cost way to achieve optimum coverage and mobility. This implies that at this time the 2.5 GHz is expected to attract higher values than the 3.5 GHz band.

Both frequencies at the border areas should be coordinated with neighbouring countries (similar to GSM/UMTS systems based on IMT family standards).

The Authority plans to focus initially on the 2.5 GHz and 3.5 GHz bands to minimize the complexity of the refarming and assignment process. In light of the Auhtority's time plan for the process of awarding broadband licenses, **the Authority is defining throughout this document the end of the Interim Period for the completion of the refarming required in relation to these two bands as October 31st 2009**.

4 Spectrum Availability and Distribution

4.1 Available spectrum for BWA auction in 2.5 GHz band

In the 2.5 GHz band there is a total of 190 MHz available. Part of this spectrum will be available for NBLs and BALs. The Authority proposes that part of the spectrum is reserved for the Mobile operators and Liban Telecom, part of the spectrum has to be used as guard bands between different systems. The Authority reserves also a share of the spectrum for future use with a resulting amount of [55-140] MHz available for auction.

Description	Amount of spectrum
Total available	190 MHz
Optional spectrum choice for 2 Mobile operators and Liban Telecom	0 - 30 MHz
Guard bands	10-15 MHz
To be reserved for future use	50 – 80 MHz
Available for auction for NBL/BALs	55 – 140 MHz

In order to cater for the coexistence of TDD and FDD systems in this band, and maintain technology neutrality, the Authority proposes to divide the spectrum in this band. In order to reduce co-existence issues guard bands between TDD and FDD systems are needed together with Block Edge Mask and filters.

As for TDD systems, and in order to increase the coverage extent and throughput, other mitigation techniques are needed such as allowing for coordination of sub-channel allocation to users at the cell edges with a minimum overlapped sub-channels and the synchronization of base stations in the active or diversity set for a tight frequency plan reuse. Otherwise guard bands would be required between TDD systems as well.

A spectrum size of 4x5 MHz (TDD) is considered to be sufficient for Fixed and Mobile WiMAX and for UMTS LTE (TDD) or 2 x 20 MHz for UMTS LTE (FDD).

4.2 Available spectrum for BWA auction in 3.5 GHz band

The 3.5 GHz band extends from 3410[4] MHz to 3600 MHz TDD and FDD systems will have to coexist in the 3.5 GHz band in order to maintain technology neutrality.

[4] *This band could be extended to start at 3400 MHz instead of 3410 MHz*

Description	Amount of spectrum
Total available	196 MHz
Total available in channels	25 channels of 2 x 3,5 MHz
Reserve	28 MHz (4 channels)
Guard bands	7 MHz (1 channel)
To be reserved for future use	0 MHz
Available for auction	20 - 23 channels

An amount of 2x10.5 MHz FDD or 3x7 MHz TDD can be considered to be sufficient for deploying a WiMAX network with sufficient capacity.

4.3 Distribution of spectrum between NBL and BAL licenses

As indicated above, both NBLs and BALs are expected to be able to deploy spectrum in the 2.5 GHz and 3.5 GHz bands. The total available spectrum has to be divided therefore between the NBL and BAL licenses (national as well as regional). Due to its unique characteristics and its value, the 2.5 GHz spectrum will be packaged for the NBL/BAL auctions into national packages and the 3.5 GHz spectrum will be mainly packaged for national (NBL/BAL) licenses but also made available for regional BAL licenses. The Authority considers that if 2 NBL licenses were awarded, the two NBL Licences should be identical in order to create equally strong NBLs. Spectrum in both bands would be expected to give NBLs more flexibility and higher overall capacity, which is likely to increase the attractiveness of these licenses.

The Authority considered different options for the allocation of spectrum between the NBL and BALs, with the aim of ensuring that the NBL would have sufficient spectrum to be able to meet its coverage obligations and operate nationally. As NBLs are expected to be able to participate in the BAL auction, and hence increase the amount of spectrum they hold, if they wish to do so (subject to the overall spectrum caps discussed below). The Authority proposes that the total amount of spectrum designated for the NBL licences, should be 20 MHz TDD in the 2.5 GHz band and 2x10.5 MHz FDD in the 3.5 GHz band. This seems sufficient for the initial period and leaves sufficient spectrum for the BAL auction:

Auction	Content of license
NBL auction	Sufficient spectrum in both 2.5 GHz and 3.5 GHz band
	International Gateway, national fiber network
	Sufficient backhaul spectrum; TBD
	Rights of way, other rights; TBD
	Minimum Rollout Coverage Obligations; TBD
BAL auction	Spectrum in 2.5 GHz and 3.5 GHz bands
	Rights of way, other rights; TBD
	Obligations; TBD

BAL Licenses in the 2.5 and 3.5 GHz bands could be distributed over 4-5 national packages, 1-2 regional packages (X Regions) that could be accumulated by the regional operators. The Authority intends to offer any regional packages in the 3.5 GHz band only.

4.4 Minimum Spectrum (S_{min})

The Authority has defined the S_{min} as minimum spectrum needed to deploy a national access network with reasonable capacity.

In the Interim License it is stated that the S_{min} will be assigned in a certain band. Based on that, each DSP will be awarded S_{min} in one band. Note that DSPs will have the opportunity to acquire additional spectrum in the auction.

In the table below options for S_{min} for the different bands are shown:

Band	1.9 GHz	2.5 GHz	3.5 GHz	26 GHz
S_{min}	5 MHz	10MHz	14-21 MHz	56 MHz

There is a large number of possible choices to select and define S_{min}, but, in principle, all these options are based on policy decisions that must define:

- the size of the S_{min}, band; and
- the way in which the Smin should be priced.

Currently the 4 DSPs are all using spectrum in multiple bands for both residential customers and corporate customers. There two ways in principle that the Authority used to develop options for Smin:

- The Authority considers the individual position of each DSP, and then develops options for Smin that reflected this individual position, with the ultimate outcome resulting in different spectrum amounts and bands being made available as Smin; and

- The Authority develops options where the ultimate allocation of Smin between the DSPs is the same, and then allowing for an interim period of adjustment for DSPs to be able to transit to the ultimate allocation.

Accordingly, the Authority developed a number of options from the possible combinations to define and assign S_{min}. After assessment of a large number of options, the following 4 main options were considered and evaluated by the Authority in more detail:

- Option 1: S_{min} band is determined based on assessment of the usage of the band.
- Option 2: S_{min} can be either in the 2.5 GHz band or in the 3.5 GHz band.
- Option 3: Existing DSPs can select S_{min} in one band or 2 bands.
- Option 4: the Authority defines the band of S_{min}.

A more detailed description of each option is contained in Annex 1.

The Authority following a careful assessment of the usage of the 2 bands and after a careful consideration is minded to follow Option 4 and define Smin to be assigned to the existing 4 DSP's as 21MHz FDD or TDD in the 3.5GHz. Under this option all DSPs will end-up with the same amount of Smin and in the same band – hence this option would be expected to create a level playing filed amongst DSPs, whilst still providing them with an advantage to reflect the fact they have existing customer bases. Under this option there are also interim provisions, which are described in more detail below.

The Option 1 was not retained as the historical assignment and usage of Spectrum in both bands did not take into account the optimum usage of the bands (some DSP's are assigned huge parts of these bands and the efficiency bits/Hertz is far from being optimal), and thus the Authority objective of maximizing the spectrum value and cater for the optimum usage of this national scarce resource will not be achieved following Option 1.

The Option 2 is not expected to serve the objective of Smin as set by the Authority for the continuity of business for the existing DSP's as their businesses are unevenly split between the 2 bands and this will ultimately create an important hurdle on implementing a smooth refarming plan.

The Option 3 will lead to all the 4DSP's choosing Smin in each band, in order to serve their short term and long terms objectives, which based on the fact that the Authority is minded of setting Smin price significantly discounted from the market value, will not serve the objective of maximizing the spectrum value especially for the 2.5GHz band.

4.4.1 Facilitating transition to Smin

In order to facilitate the process of transition the Authority is planning also the following steps (these cover also the use of other bands :):

- CEDARCOM could continue to use the 1.9 GHz spectrum during the Interim Period but has to pay the same RTU fees as specified in its Interim License.
- PESCO may use part of the reserved spectrum on 2.5 GHz during the Interim Period or they can use the 3.3 GHz or 3.7 GHz bands for the same limited period.
- The 26GHz band will be made available by the Authority for allocation to any Licensed Service Provider (including the existing DSPs, Licensed Cable TV distribution).

- Cable One could use a flexible implementation plan on the 2.5 GHz band, during the Interim Period.
- GDS will be required to free up during the first 6 months of the Interim Period the part of the 2.1-2.2GHz band it had been granted.

In relation to the bands 1.9GHz to 2.3GHz, the Authority intends to propose a moratorium on the assignment of spectrum in those bands, except for the spectrum assigned for the 2 Mobile Licenses and Liban Telecom. The Authority will assess scarcity and evolution of those bands in line with international standards and benchmarks and decide on their future assignment and pricing, including setting their price through an auction.

4.4.2 Setting the price for the Smin

The Authority has not yet decided the precise formula that it will use to set the price of Smin. It expects that the price of S_{min} will be determined as a discount from the average price of the price per MHz resulting from all the Auctions in the 3.5GHz band.

The price for the Right to Use fees (RTU) for the 1.9 GHz will be based on the auction once the moratorium on assigning spectrum in this band is lifted by the Authority. During the interim period of the implementation of this refarming plan, the RTU fees paid by the DSP's will be identical to the fees set in the Interim Licenses.

The price for the 26GHz band will be based on administrative pricing, since there is no congestion of the demand on this band currently in Lebanon. Should the demand on this band increase in a manner that a congestion of demand is experienced in this band, then the Authority might decide to set the RTU fees for this band through an auction. The Authority will continue to monitor the demand on this band in order to assess the congestion on this band on the short and medium terms.

4.5 Inputs for the Refarming Plan

In light of the above, the Authority is proposing the following spectrum allocation:

	2.5 GHz	**3.5 GHz**
Spectrum available in principle	190 MHz	196 MHz
Spectrum for NBL each	*20 MHz*	*21 MHz*
Total spectrum for 2 NBL	40 MHz	42 MHz
Spectrum for Smin	*-*	*84 MHz*
Mobile operators (each 10 MHz)	*10 MHz*	
Total spectrum for mobile operators	30 MHz	
Reserve		28 MHz
Guard Bands	10-15 MHz	7 MHz
Reserved for future use	50 MHz	
Available for BAL auction	55-60MHz	35MHz

The total remaining spectrum for the BAL auction is 55 MHz in the 2.5 GHz, and 35 MHz in the 3.5 GHz band. It is proposed that:

- The spectrum for the mobile operators (optional choice of 1x10 MHz TDD each for the 2 Mobile operators and Liban Telecom) and the reserved spectrum for future use (50 MHz) are combined into one reserved area of 2 x 40 MHz blocks.
- The lower edge of the 3.5 GHz band will be used including the corresponding FDD part.
- The 2.5 GHz band will be packaged into national packages.
- The Authority proposes to arrange the remaining 3.5 GHz spectrum as 3 blocks of 7 MHz and 1 block of 14 MHz.
- The 1 block of 14 MHz in the 3.5 GHz band will be auctioned in the form of regional blocks.
- In Greater Beirut, the 14 MHz package in the 3.5 GHz band will be available as 2 blocks of 7 MHz to all bidders.
- Greater Beirut regional players (Y sub-regions TBD) could have Licenses based on the 26 GHz or alternative bands.

4.6 Maximum spectrum limits

In order to ensure its objective of preventing the emergence of one, or a few operators that control a significant amount of spectrum, and may therefore be able to get to a position that they could behave anti-competitively, and to ensure that the risks for spectrum ‘hoarding’

are minimised, the Authority is proposing that the maximum spectrum (S_{max}) that can be acquired and controlled by any one undertaking is as follows:

- Ceiling resulting from the NBL and BAL auctions: 30 MHz on 2.5 GHz and 35 MHz on 3.5 GHz can be acquired in the auction on a national basis.

Furthermore, the Authority is planning to relax these ceilings in the longer term, when it expects that the reserved spectrum will be made available, as follows:

- Long term ceiling: 60 MHz on 2.5 GHz and 56 MHz on 3.5 GHz

with effect not before 2 years following the NBL and BAL auctions.

4.7 Unsold spectrum

The Authority will consider its approach to spectrum (and associated licenses) in case such licenses/spectrum are not sold for each type of license/spectrum. As a general principle, to the extent that licenses are not sold because the demand for spectrum is less than the spectrum available, the Authority intends to:

- reserve such unsold spectrum for re-auctioning in the future, and/or
- make such spectrum available in quantities that will allow deployment of the spectrum, on a first come first served basis, subject to any acquirer of such spectrum meeting the technical, legal and any other requirements related to the use of the unsold spectrum.

In choosing between these two options, the Authority will consider the current and potential future use of the unsold spectrum, and will have regard to the principles set out in the introduction to this document.

The Authority expects that where spectrum is reserved for future use, it will not become available again for at least [1-2] years after the date of any auction where such spectrum was made available.

4.8 Timing of the Auctions

The table below provides the proposed timetable for the NBL and BAL auctions.

Auction	Consultation	Announce Time Frame	Run Auction	Migration to interim frequency plan and reduce spectrum usage	Requirement on current DSP's to clear spectrum used in Reserved Band
				6 months from announcement date	End of Interim Period
NBL Auction	Oct-08	Nov-08	Feb-09	May-09	31-Oct-2009
2.5 GHz Spectrum Auction	Oct-08	Nov-08	May-09	Jul-09	31-Oct-2009
3.5 GHz Spectrum Auction	Oct-08	Nov-08	May-09	May-09	31-Oct-2009

Input Table		Results Table		
Description	**Value**	**Description**	**2.5GHz**	**3.5GHz**
No. of NBLs	**2**	In principle available	190	196
Reserved Spectrum (MHz)	**50**	Spectrum for 2 NBLs	40	42
Spectrum in 2.5GHz for NBL (in MHZ)	**20**	Smin for DSPs	0	84
Spectrum in 3.5GHz for NBL (in MHZ)	**21**	Mobile Operator	30	0
Smin in 2.5GHz (in MHz)	**0**	Reserve		28
Smin in 3.5GHz (in MHZ)	**21**	Guard Bands	10	7
No of Smin in 2.5GHz	**0**	Reserve for future use	50	0
No of Smin in 3.5GHz	**4**	**Available for Auction**	**60**	**35**

5 Proposed plan of action

In this section The Authority presents it proposed plan of action in more detail and in a step by step fashion.

In relation to 2.5 GHz spectrum

1. Evacuate the 2.5 GHz spectrum currently used by DSPs during the Interim Period for the implementation of the re-farming plan to be made available for use by the NBLs and BALs.

2. Allocate the 2.5 GHz for National Broadband Licenses:
    a. There will be 2 NBLs which will have 20 MHz assigned in the 2.5 GHz band, together with 2x10.5 MHz in 3.5 GHz
    b. There will be 12x5 MHz in the 2.5 GHz band for national BAL operators

3. Liban Telecom will be awarded in the 2.5GHz the same Spectrum as the 2 Mobile Licenses (total of 10 MHz in the 2.5GHz).

4. Reserve 80 MHz of spectrum in the 2.5 GHz:
    - 50 MHz of 2.5 GHz is reserved for future use: Reserving an appropriate quantity of spectrum in the 2.5 GHz for future use is of crucial importance for the evolution of mobile technology.
    - 10 MHz on 2.5 GHz Band will be retained for Liban Telecom
    - The 20 MHz potentially allocated to the two mobile licensees are added to the reserve spectrum in case they have not already been selected by the Mobile Licensees.

In relation to 3.5 GHz spectrum

5. Evacuate the 3.5 GHz spectrum currently used by DSPs, during the Interim Period.

6. Allocate the 3.5 GHz spectrum for national and regional licenses:
    a. The 2 NBLs will have 2x10.5 MHz in 3.5 GHz.
    b. This leaves 5x7 MHz or 10x3.5 MHz in the 3.5 GHz band for the national or regional BAL operators

7. Award the existing DSPs equal blocks (2x3x3.5MHz) FDD of spectrum in one band (3.4-3.6 GHz referred to as 3.5 GHz). More spectrum can be acquired in the auction.

8. Assign 2x7 MHz of the available 3.5 GHz spectrum to regional licenses.

Other bands

9. Make specific blocks of the 26 GHz band available for existing DSPs for FWA backhauling priced using administrative pricing.

10. Clear the 1.9 GHz band from current usage at the end of the Interim Period as this is allocated for TDD-UMTS (IMT family standards), and CEDARCOM's Pre-I-burst system is not profiled as one of the radio interfaces of the IMT family standards.

11. In Greater Beirut regional licenses can be awarded in the 26 GHz Band.

Other issues

12. Licensed-but-not-operational DSPs will only be assigned regional spectrum with pricing advantage.

13. Mitigation Techniques:
    - Guard bands have been allocated between FDD and TDD.
    - Interference mitigation solutions, like Block Edge Masks, Adaptive Antenna Systems AAS, filtering and synchronization, between adjacent TDD operators will be enforced to avoid additional guard bands.

6 Migration Sequence in the Case of 2.5 GHz

The table in Annex 3 shows the proposed migration for the 2.5 GHz band. The bottom part of the chart shows the proposed allocation of the available 2.5 GHz spectrum for NBLs, for reserve, and for BALs

The initial step is to migrate from the current situation to the Interim Frequency Plan presented above. Within this plan, CEDARCOM has to evacuate the 3 blocks at the lower part of the spectrum to allow Cable One to move 40 MHz into the lower half of the reserve. The availability of NBL spectrum depends upon migration of Cable One which again is dependent upon a (smaller) migration/evacuation of 3 CEDARCOM blocks. The Authority considers that a reasonable period for migration will be 6 months after the announcement of 2.5 GHz spectrum auction (which is currently planned for November 2008).

Migration schedule for the Interim Period in the case of the 2.5GHz band

DSP	From (in MHz)	Total (in MHz)	To (in MHz)	Total (in MHz)	As % of 'old' assignment
Cable One	2566 - 2596 and 2602 - 2638	66	2530 - 2565	40	66,67%
PESCO	2638 - 2642,5 and 2668 - 2692	36	2665 - 2690	25	41,67%
CEDARCOM	2650 - 2667 and 2524 - 2530 and 2538 - 2544 and 2555 - 2561[5]	18[6]	2650 - 2665	15	83,00%
GDS[7]	2500 - 2515 (pilot project)	0	2500 – 2515 during the Interim Period.	15	100%

[5] Some of those frequencies are currently used by Cedarcom but not included in the Interim License and thus not licensed by the Authority.

[6] Cedarcom Interim License includes the frequencies from 2649MHz up to 2667MHz inclusive.

[7] GDS Interim License does not include those frequencies from 2500MHz up to 2515MHz inclusive.

7 Migration Sequence in the Case of 3.5 GHz

The table in Annex 4 shows the proposed migration for the 3.5 GHz band. The bottom part of the chart shows the proposed allocation of the available 3.5 GHz spectrum for NBLs and for BALs.

The proposed sequence is as follows:

- The reserve spectrum is reassigned as soon as possible at the lower edge of the 3.5GHz band.
- PESCO migrate both of their TDD bands temporarily to 3.7 GHz, and their FDD business. Major network redesign should be anticipated with the associated throughput time.
- Subsequently CEDARCOM, GDS and Cable One migrate

The Authority considers that in the case of the 3.5 GHz spectrum, as the required refarming is more significant, that a reasonable period for migration will be up to the end of the Interim Period.

Migration schedule for the Interim Period in the case of the 3.5GHz band

DSP	From (in MHz)	Total (in MHz)	To (in MHZ)	Total (in MHz)	As % of 'old' assignment
Cable One	3480 - 3494 (FDD)	28	3466.5 – 3477.0 (FDD)	21	75%
PESCO	3410 - 3438 (FDD) 3473 - 3480 (FDD) 3494 - 3500 3600 - 3606	82	3435 – 3456 (FDD)	42	50%
CEDARCOM	3452 – 3459 (FDD)[8]	7[9]	21 MHz in 3.6GHz band	21	300%
GDS	3459.5 – 3473.5 (FDD)[10]	14[11]	3456 – 3466.5 (FDD)	21	150%

[8] Some of those frequencies are currently used by Cedarcom but not included in the Interim License and thus not licensed by the Authority

[9] Cedarcom Interim License includes the frequencies from 3452.125MHz up to 3455.625MHz inclusive.

[10] Some of those frequencies are currently used by GDS but not included in the Interim License and thus not licensed by the Authority

[11] GDS Interim License includes the frequencies from 3459MHz up to 3466MHz inclusive.

8 Auction

8.1 Possible Outcome of the Auctions

In addition to the 4 DSPs and the 2 NBLs the Authority plans to package the remaining 2.5 GHz and 3.5 GHz spectrum such that the outcome of the auctions may be limited to a maximum of 3 additional operators in 2.5 GHz band & 1 additional national operator in the 3.5 GHz band and a number of regional operators. The NBLs and National BALs can bid for the Regional 14MHz blocks in Greater Beirut Area. (Please refer to the Annexes 3 and 4 for the Packaging of the 2.5GHz and 3.5GHz)

Spectrum Overview	Total		Assigned		Auctioned		Reserved	
	2.5GHz	**3.5GHz**	**2.5GHz**	**3.5GHz**	**2.5GHz**	**3.5GHz**	**2.5GHz**	**3.5GHz**
Today (MHz)	190	190	160	190				
% of total			84%	100%				
Near future (MHZ)	190	200	0	126	95	35	80	28
% of total			0%	63%	50%	18%	42%	14%

Note: Total sum of assigned, auctioned and reserved is less than total because of guard band allocations

8.2 Auctions Sequence

The Authority is considering the auction sequence that will best serve its objectives, taking also into account a timeframe that allows sufficient time for bidders to evaluate the opportunities. It is currently planning to auction the NBL licenses first, followed by the BAL licenses immediately afterwards.

As the NBLs are the licenses that are expected to be used in order to achieve TRA's objective of providing a basis for deployment of infrastructure to offer broadband services throughout Lebanon, this sequence is the preferred sequence. It will also provide clarity to potential bidders for BAL licenses, and enable bidders for NBL licenses to acquire additional spectrum if they so require.

Existing DSPs can participate in the NBL auction, separately or in combination with the other DSPs. If the spectrum ceiling is exceeded, any surplus spectrum will be auctioned in the BAL auction.

Annex 1: Options for Smin

Option 1:
The Authority assigns the S_{min} as follows: CEDARCOM on 1.9 GHz, Cable One on 2.5 GHz, PESCO on 3.5 GHz and GDS on 26 GHz

Smin is determined on the basis of a preliminary evaluation that the centre of gravity' of operations of DSPs is in those bands. This option leads to a maximum amount of spectrum to be auctioned. Operators can continue using part of their spectrum in order to support their major network and business.

Option 2:
Smin will be assigned to the existing DSPs either in the 2.5 GHz or in the 3.5 GHz band.

CEDARCOM can keep on using 1.9 GHz spectrum during the Interim Period, and pay the same RTU fees as specified in its Interim License, and following the lift-off of the Moratorium on this band, the demand for the 1.9 GHz will be assessed by the Authority and, if there is scarcity, the band will be auctioned

GDS can keep on using 26 GHz spectrum but has to pay the RTU fees based on administrative pricing as will be defined by the Authority and set by a Decree to be issued by the Council of Ministers.

This 26GHz band is deemed made available by the Authority for allocation to any Licensed Service Provider (including the existing DSP's, Licensed Cable TV distribution), and the pricing of the RTU fees will be based on administrative pricing.

In order to reduce and limit the negative effects of disruption of service on existing customers for Pesco, Cable-one, and Cedarcom one alternative will be to authorize them to use during the Interim Period, the spectrum in the 2.5GHz band that is reserved for future use by other BAL Licensees. The same period is synchronized for the usage of the spectrum in the 1.9GHz band for Cedarcom. This option will, following the inclusion of this band and the Mobile Wimax 802.16e 2005 technology under the IMT family of Standards, put GDS at an unfair competitive disadvantage towards customers' awareness of the new mobile Wimax technology and services that are offered by the 3 other DSPs during the Interim Period, and thus might limit its ability to develop later on its customers' awareness based on this technology. Therefore, in order to ensure fair and equal conditions among the existing 4 operational DSP's a minimum part of this band that is reserved for future use by the Authority, will be assigned to GDS during the Interim Period in line with the flexibility observed by the Authority towards the other 3 DSPs. The actual choice of DSPs depends on their assessment of the relative value of each of the bands and of the opportunity to buy sufficient spectrum in the auction.

As part of this potential option DSPs could choose a S_{min} based on their own assessment and this gives DSPs the choice which might lead to less favourable outcome e.g. 4 S_{min} in 2.5 GHz.

Option 3

DSPs will get 2 S_{min} according to the following plan[12]:

CEDARCOM on 1.9 GHz and 2.5 GHz, Cable One on 2.5 GHz and 3.5 GHz, PESCO on 2.5 GHz and 3.5 GHz and GDS on 3.5 GHz and 26 GHz

This option reflects no drastic change from the current situation, is not in line with current Authority commitments (only 1 S_{min} per operator), and could reduces the opportunity for a the establishment of a level playing field amongst existing DSPs and potential new entrants..

Option 4

S_{min} will be assigned in the 3.5 GHz band. DSPs must vacate the 2.5 GHz band

- CEDARCOM can keep on using 1.9 GHz spectrum during the Interim Period, and pay the same RTU fees as specified in its Interim License, and following the lift-off of the Moratorium on this band, the demand for the 1.9 GHz will be assessed by the Authority and, if there is scarcity, the band will be auctioned
- GDS can keep on using 26 GHz spectrum but has to pay the RTU fees based on administrative pricing as will be defined by the Authority and set by a Decree to be issued by the Council of Ministers.
- This 26GHz band is deemed made available by the Authority for allocation to any Licensed Service Provider (including the existing DSP's, Licensed Cable TV distribution), and the pricing of the RTU fees will be based on administrative pricing.

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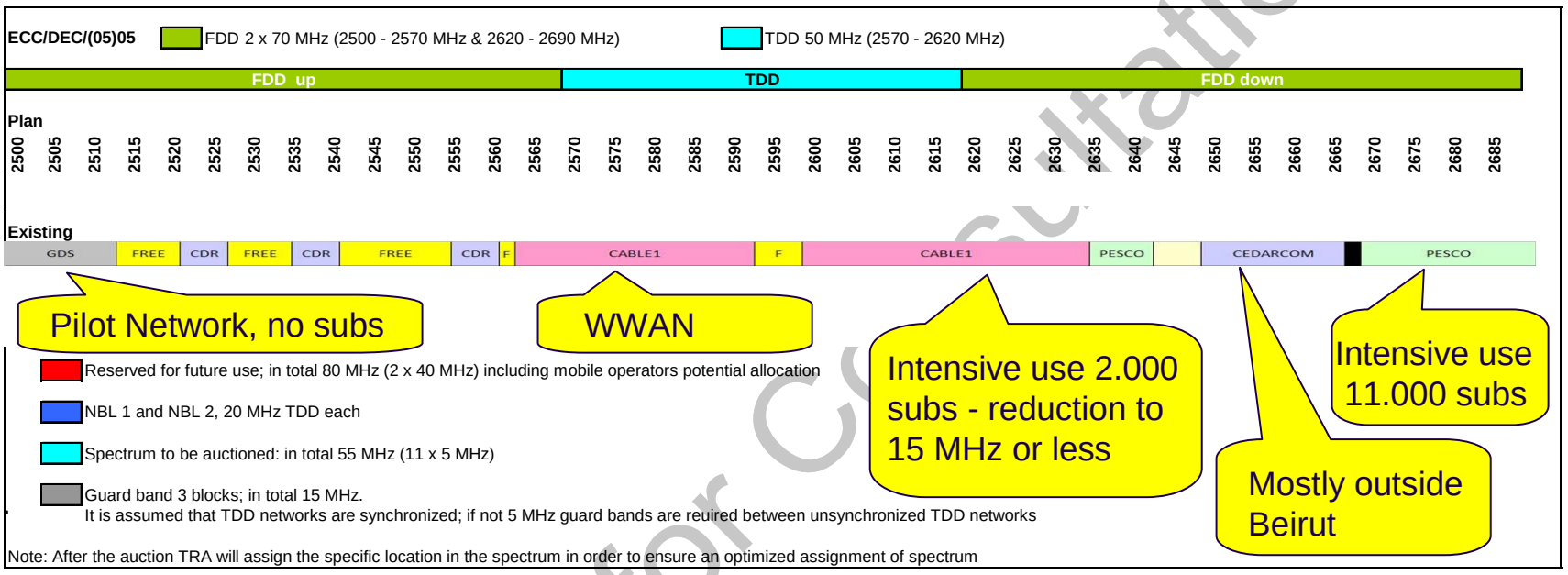
Existing DSPs will be treated fairly and a high level of continuity of service to the core and critical business services is maintained for a fair period of time. It will also lead to a maximum of spectrum to be auctioned in the 2.5 GHz band.

[12] *This plan is based upon an analysis of the frequency bands used by the DSPs.*

Annex 2: Migration Sequences



Annex 3: Migration Sequence for the 2.5 GHz band

Please refer to the file “Annex 3 Migration sequence for the 2_5GHz.pdf”

Annex 4: Migration Sequence for the 3.5 GHz band

Please refer to the file “Annex 4 Migration sequence for the 3_5GHz.pdf”