

Report

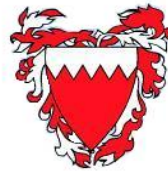
Spectrum policy and planning

A Joint Report Issued by the Telecommunications Regulatory Authority (TRA) and the Ministry of Transportation of the Kingdom of Bahrain (MoT)

27 June 2006

Purpose: Report on the Consultation on the implementation of the frequency allocation and assignment policy

MINISTRY OF TRANSPORTATION
KINGDOM OF BAHRAIN



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Report

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1 Introduction

This document has been issued as a response to the 2005 spectrum policy and planning consultation, issued by the Telecommunications Regulatory Authority (TRA) and the Ministry of Transportation (MoT) of the Kingdom of Bahrain. 15 responses in total were received by the joint agencies following the report, and this document briefly summarises those responses according to the questions raised in the consultation.

Please note that a number of respondents wished their responses to be kept confidential and unpublished – these responses do not appear in the following pages.

Responses were received from:

- CDMA Development Group
- Xpress International
- American Mission Hospital
- Clearwire Telecom (ATCO)
- Royal Gifts
- Intel
- 21st Century Skills
- Batelco
- Bahrain.com
- Kalaam Telecom
- 2Connect

Four further responses were received, but those responding did not wish to be identified.

Although the current document sets out a summary of views and a brief response by the TRA and MoT on each issue, this document is superseded by the Spectrum Allocation and Policy Plan published separately.

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2 Summary of Responses

2.1 General guidelines on spectrum policy: frequency management, award mechanisms and spectrum pricing

Consultation question 1

The TRA and MoT seek respondent views, with reasons, on:

- (1) the view that auctions should be the preferred spectrum assignment mechanism for Bahrain.*
- (2) whether the TRA should consider FCFS as an award mechanism if there is not enough demand to justify an auction.*
- (3) the use of the FCFS method as the preferred option for private, individual and local assignment of spectrum.*

- 10 respondents replied to this question, including Batelco, 2Connect, ATCO Clearwire Telecom, Kalaam Telecom, Intel and XPress International.
- The majority of respondents argued that other allocation mechanisms were preferable to auctions, with only one respondent actively supporting the proposal without modification. Reasons given included the following:
 - auctions artificially increase spectrum pricing
 - auctions favour ‘deep-pocket’ incumbents who are likely to be less innovative than new entrants
 - incumbent purchase may slow down roll-outs, as spectrum may be purchased with the primary motive of preventing new entrants from launching services
 - auctions would further imbalance the competitiveness of Bahrain’s telecommunications market.
- Four respondents argued that beauty contests were preferable as an allocation mechanism in cases where demand exceeds supply, for the following reasons:
 - this mechanism takes into account objective factors other than price
 - auctions are likely to be as resource-intensive as beauty contests
 - the market price of spectrum may be inflated at the time of auction

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- 3G auctions in the UK have proved inappropriate / anti-competitive.
- While almost all respondents recommended FCFS as an award mechanism in cases where supply exceeds demand, three respondents recommended FCFS as most appropriate in *all* spectrum allocation cases. Principal reasons given were the simplicity and speed of the mechanism, the encouragement the system would give to start-up firms, and the small size of the Bahrain market. One respondent recommended that operators awarded licences under FCFS mechanisms should be required to make a minimum level of investment in infrastructure.

TRA and MoT response

The TRA and MoT understand the respondents' concerns about preferring auctions as a method of spectrum assignment. However, the TRA and MoT will retain auctions, subject to Board of Director approval on a case-by-case basis, as the preferred spectrum assignment mechanism, and will reserve FCFS for cases where demand does not justify an auction, which in their view is the most efficient way to assign spectrum and optimise its use. At the same time the TRA proposes to establish auctions in such a way that the price is not inflated, for example, by having a one-round auction where the highest bidder is awarded the licence. This way the selection of the licensee is fair and transparent. As part of an auction pre-qualification, the TRA could make sure that the interests of both commercial parties and consumers are protected, and could aim to prevent the emergence or exacerbation of any positions of market dominance.

Consultation question 2

The TRA and MoT seek respondent views on:

(1) the services for which value-based spectrum fees should apply

(2) the importance of the four drivers to value-based spectrum fees – bandwidth used, frequency band, geography and power level

- Six respondents replied to this question, including Batelco, Intel, 2Connect and Kalaam Telecom.
- Two respondents argued explicitly that no value-based spectrum fees should apply, and most respondents recommended various restrictions on the situations in which spectrum charging should apply. The restrictions suggested included:

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- where there is high commercial demand or potential future harmful interference
- where fees do not impact the incentive for operators to deploy wireless networks and services
- only for revenue-generating (commercial) users of spectrum
- only for voice, data, connectivity, messaging and video services.
- One respondent suggested that frequency band, power, bandwidth and geography (in that order of priority) are all important drivers of fees. Another suggested that differences in spectrum pricing should primarily be driven by bandwidth, with the fee per channel rising with bandwidth up to a certain cap or upper limit after which prices do not increase. This respondent felt that fees should be independent of geography, reuse and power level.

TRA and MoT response

The TRA and MoT agree that not all users of spectrum should be charged value-based spectrum fees. Value-based spectrum pricing will therefore only be used where there is high commercial demand for spectrum, or where there is the potential for interference in the future. Bandwidth considerations shall form the basis of these value-charging arrangements.

Consultation question 3

The TRA and MoT seek respondent views, with reasons, on whether they should:

- (1) use a combination of administrative charging and spectrum pricing in Bahrain.*
- (2) use spectrum pricing only in areas where congestion exists.*
- (3) use pricing mechanisms for every part of the spectrum.*

- 10 respondents replied to this question, including Batelco, Intel, 2Connect, XPress International, Kalaam Telecom and ATCO Clearwire Telecom.
- Three respondents recommended that spectrum pricing only be used in areas of congestion.
- One respondent recommended adopting the Japanese system, which charges a yearly licence fee for each licence holder varying with the amount of spectrum held and the number of devices deployed over the network.

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- Two respondents recommended that any charges should be based on the revenue-generating potential of the spectrum awarded, and perhaps be reduced in areas where increased competition would be beneficial.
- One respondent recommended that pricing should not apply if the related spectrum has been auctioned, in which case only administrative charging should apply.
- One respondent suggested that a reuse analysis should be conducted before increased spectrum charges start to apply.

TRA and MoT response

The TRA and MoT agree that administration charges should be based on costs, and that additional spectrum pricing should only apply in areas where congestion exists. “Spectrum fees” is the generic term used to refer to the fees that a spectrum licensee has to pay for the use of spectrum (whether they are based on administrative charges or spectrum pricing).

When spectrum is awarded through auctions, the TRA and MoT believe that the value of the spectrum to the licensee has been captured in the price of the licence, therefore creating an efficient way of spectrum assignment. Consequently, when spectrum is awarded through an auction mechanism, spectrum fees will be based on administrative charges, not spectrum pricing.

Consultation question 4

The TRA and MoT seek respondent views, with reasons, on whether discounts should apply for bulk use. What would be the respondents’ preferred option for calculating the level of the discount?

- Six respondents replied to this question, including Batelco, 2Connect and Kalaam Telecom.
- Four of the six respondents were opposed to bulk discounts, for the following reasons:
 - bulk discounting could encourage inefficient use of spectrum
 - larger spectrum allocations involve their own inherent discounts (easier to deploy, etc.)
 - discounting could disadvantage new or smaller entrants.

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- One respondent encouraged the TRA to apply bulk discounts as a way of rewarding operators that have high spectrum usage, thus encouraging such operators to pass discounts directly to end-users.
- One respondent recommended a discounting scheme that would encourage reuse of spectrum.

TRA and MoT response

For the reasons outlined by a number of respondents above, the TRA and MoT will not offer straightforward bulk discounts. However, the TRA and MoT acknowledge that for microwave frequencies and VSAT services bulk discounting could be applied. The rationale behind awarding a bulk discount for use of microwave and VSAT is that the management of the spectrum planning is left to the operator using the allocated frequency. Therefore, the TRA and MoT are willing to consider some savings in terms of overhead costs for the regulators. Consequently, for microwave and VSAT fees, the TRA and MoT will implement a discounted charging structure based on the reuse of spectrum (see the Spectrum Allocation and Policy Plan).

Consultation question 5

The TRA and MoT seek respondent views, with reasons, on their intention to encourage proposals for the introduction of new technologies, and seek comments on the evaluation process outlined and on the balance to be struck between a full and rigorous technology approval process and the rapid introduction of new technologies.

- Seven respondents replied to this consultation question, including the CDMA Development Group, Batelco, Intel, 2Connect and Kalaam Telecom.
- Most supported the proposal and suggested that new technologies based on internationally approved standards should be introduced as rapidly as possible, especially given the internal market and technology assessments carried out by most operators.
- One respondent pointed out the need for power restrictions on new technologies and transparent penalties to be put in place.

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TRA and MoT response

Based on the respondents' views, the TRA and MoT believe that there is strong support from stakeholders to encourage the introduction of new technologies. The TRA will therefore implement the process proposed in the consultation, consisting of a written proposal stage, an internal evaluation by the TRA, a public consultation, and referral to the MoT if a new spectrum allocation is required. The TRA and MoT will also ensure that this process is run as efficiently as possible, in order to minimize the time to market for technologies which are deemed viable options for Bahrain.

Consultation question 6

The TRA and MoT seek respondent views, with reasons, on their intention to encourage proposals for the assignment of spectrum blocks to new technologies and/or services, and seek comments on the evaluation process outlined and on the balance to be struck between a full and rigorous technology approval process and the rapid introduction of new technologies.

- Five respondents replied to this question, including Batelco, Intel, 2Connect and ATCO Clearwire Telecom.
- Two respondents fully agreed with the proposal. A further respondent suggested that a beauty contest award mechanism would involve an inherent technology approval process (through the submission of a technology proposal), thus rapidly dealing with this consideration at the award stage.
- One respondent recommended that the TRA and MoT adopt both technology and service neutrality, and put the emphasis on rapid introduction of new technologies by relying on type approval regulations for technologies used in other countries.

TRA and MoT response

Given the views of the respondents, the TRA and MoT will assign spectrum blocks to new technologies and services, and will follow the same process in this area as the one outlined in the response to Consultation question 4 above. The TRA and MoT will continue to streamline the approval process for technologies subject to international type approvals.

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Consultation question 7

The TRA and MoT seek respondent views, with reasons, on their intention to encourage proposals for the introduction of a light licensing regime, and seek comments on the evaluation process outlined and on the balance to be struck between a full and rigorous technology approval process and the rapid introduction of new technologies.

- Eight respondents replied to this question, including Batelco, Intel, 2Connect, Kalaam Telecom and Bahrain.com.
- Almost all respondents agreed that the introduction of a light licensing regime was a positive step for Bahrain. Three of these stated that they would support a change of legislation to allow areas of unlicensed spectrum. Concern was voiced that the regulation of light licensing regimes should not be too intrusive, and that in some areas type approvals on equipment would be sufficient.

TRA and MoT response

There is a consensus amongst respondents that the light licensing regime is a positive step for technologies operated under licence-exempt regimes in other markets (e.g. WiFi). The TRA will put in place a light licensing regime according to the proposal outlined in the consultation document, but would like to clarify that this will not be full licence exemption, as the latter is not currently permitted by the Telecommunications Law in Bahrain.

Consultation question 8

The TRA and MoT seek respondent views, with reasons, on:

(1) the need for short-term licences for program making and special event (PMSE) purposes.

(2) the licensing procedures suggested and the proposed pricing mechanism.

- Six respondents replied to this consultation question, including Batelco, Kalaam Telecom and Intel. All agreed with the proposal in principle, and a streamlined, minimal-cost award mechanism was recommended for these

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licences. One respondent noted that interference should not be caused to other users of spectrum.

- One respondent argued that if in the future it requires PMSE licences, it should not be called upon to pay if it is using the frequency spectrum which is already licensed to the company, and furthermore recommended that prices should be fixed for 24-hour assignments and not 48 hours, as such events usually last less than 24 hours.

TRA and MoT response

The TRA and MoT will introduce short-term licences for PMSE purposes, for which spectrum fees and TRA fees (licence fees) will apply. Following the comments made in the consultation, the TRA and MoT will not set a specific duration for these licences, but will instead set licence durations on a case-by-case basis. The TRA and MoT will endeavour to ensure that such licences do not cause any interference to other spectrum licence holders. Where a licensee has already been assigned spectrum for other purposes and where it wishes to use it for PMSE purposes it will still need to apply for the necessary licenses and pay the appropriate fees unless it already holds licenses allowing it to make use of that frequency for PMSE purposes.

Consultation question 9

The TRA and MoT seek respondent views, with reasons, on their proposal to introduce new temporary test licences, and on appropriate licence conditions which will both protect existing spectrum users and maximise the value of the tests carried out under such licences.

- Seven respondents replied to this consultation question, including Intel, Batelco, 2Connect and Kalaam Telecom. All agreed with the proposal, and a streamlined, minimal-cost mechanism for these licences was recommended.
- The issue of ensuring that interference is not caused by these licences was raised.

TRA and MoT response

Based on stakeholders' responses, the TRA believes that the introduction of temporary test licences will encourage the introduction of new technologies in

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Bahrain, while protecting existing users of spectrum. The TRA will therefore introduce the new test licences and award them through a simple mechanism.

2.2 200 – 450 MHz

Consultation question 22

The TRA and MoT seek input from respondents, with reasons, on whether they agree that they should:

(1) allocate additional spectrum for Analogue PMR if demand is expressed.

(2) promote the transition of analogue users to digital.

(3) award further spectrum for Analogue PMR use through FCFS, unless spectrum demand exceeds supply (in which case they could revert to an auctions mechanism).

(4) use administrative charging as the approach for spectrum pricing.

- Four respondents, including Batelco and Kalaam Telecom, replied to this question.
- Three respondents fully agreed with the proposal, with one also suggesting that cost considerations were more relevant than promoting the transition to digital.
- One respondent suggested that, given current growth rates, no additional spectrum is required for Analogue PMR, and also recommended that the transition to digital be left to the discretion of the operator.

TRA and MoT response

The TRA and MoT believe that there is still demand for analogue PMR services in Bahrain. Given the level of spectrum availability in the analogue PMR bands, the TRA and MoT believe there is enough capacity for future growth. There will therefore be no change to the analogue PMR spectrum bands. The transition to digital will be left to the discretion of individual operators or users, but the TRA and MoT will in principle favour the migration to digital. Licences will be awarded through an FCFS mechanism and spectrum fees and TRA fees (licence fees) will apply.

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Consultation question 23

The TRA and MoT seek respondent views, with reasons, on which option they should select:

Option 1: allocate spectrum for 'walkie-talkie' applications in frequency bands used for this purpose in other countries.

Option 2: ask current users of this band to move, if possible, to different frequencies.

- Five respondents replied to the consultation question, including Royal Gifts, Batelco and Kalaam Telecom.
- Two respondents agreed with the proposal that spectrum should be allocated for “walkie-talkie” applications and that adequate measures should be put in place to do so.
- Two respondents suggested that it would be unreasonable to expect current users of the band to move.
- One respondent did not provide a specific answer to this question but stressed the importance of allocating spectrum, free of charge, to consumer-based short range ‘walkie-talkies’, in order to open the market to such electronic equipment and regulate the use of these technologies.

TRA and MoT response

There is clearly a demand in Bahrain for ‘walkie-talkie’ applications, and the TRA and MoT acknowledge the importance of allocating clearly defined spectrum for this purpose on a light licensing regime basis. The TRA and MoT will further review with the user the possibility of migrating out of the 446 MHz band. In addition, the TRA and MoT will allocate the 350 MHz band to ‘walkie-talkie’ applications.

Consultation question 24

The TRA and MoT seek input from respondents, with reasons, on whether they agree that they should not allocate spectrum for short-range radio.

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- Batelco, Kalaam Telecom and one further respondent agreed with the proposal.

TRA and MoT response

Short-range radio in this context refers to SRBR and SRBP technologies (not generic short-range services such as WiFi). Based on the responses received, the TRA and MoT will not allocate spectrum to short-range radio.

Consultation question 25

The TRA and MoT seek input from respondents, with reasons, on whether they agree that they:

(1) should not, at this point, allocate spectrum for TETRAPOL and DISCUS, as the technologies would reuse Analogue PMR spectrum

(2) should decide to promote migration from Analogue PMR to TETRAPOL and DISCUS.

- Three respondents, including Batelco and XPress International, replied to this consultation question.
- Two respondents to this question agreed with the proposal, one making the point that, given the spectrum utilisation benefits of TETRAPOL and DISCUS, current users of analogue systems might be given some incentive to facilitate the general migration to digital.
- One respondent argued that iDEN was preferable to other systems as a PAMR system (see consultation question 28).

TRA and MoT response

Based on the lack of interest shown by the responses received, the TRA and MoT will not allocate spectrum to TETRAPOL and DISCUS at this stage, and will leave the decision to migrate to digital at the discretion of individual operators.

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Consultation question 26

The TRA and MoT seek input from respondents, with reasons, on whether they agree that they should consult with other GCC countries to assess whether they should reserve spectrum for GSM-R for the GCC railway.

- Batelco agreed with the proposal.
- Two other respondents recommended that international consultation be commenced, and furthermore advised that GSM-R was not the only possible solution for the GCC railway.

TRA and MoT response

The TRA and MoT will take no immediate action with regard to the GCC railway, but will continue to monitor developments in the situation.

Consultation question 27

The TRA and MoT seek input from respondents, with reasons, on whether they agree that they should:

(1) assign spectrum for commercial TETRA networks in the 410 – 430 MHz band, provided that spectrum conflicts are resolved, using an auction mechanism.

(2) allocate part of the TETRA 410 – 430 MHz spectrum to private users.

(3) propose a migration plan for current users, to free up spectrum for commercial TETRA in this band.

(4) charge for spectrum an administrative fee covering administration costs.

- Batelco would prefer this spectrum to be identified for TETRA/DISCUS by reusing analogue PMR spectrum.
- Two other responses were received, discussing the availability of spectrum in this band and possible alternatives to the proposal.

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TRA and MoT response

No respondents to the consultation expressed an interest in deploying commercial TETRA networks. At this stage the TRA will not assign spectrum to the deployment of commercial TETRA, but the MoT will allocate spectrum for commercial TETRA. The TRA and MoT are in the meantime commencing discussions on a migration plan out of the 410 – 430 MHz band by current users, so as to ensure that commercial TETRA can be launched in Bahrain if sufficient interest is expressed at a future time.

2.3 450 – 1900 MHz

Consultation questions 10 and 14

The TRA and MoT seek input from respondents, with reasons, on whether they agree that spectrum should not be allocated for future public mobile services in the 400 MHz band.

The TRA and MoT seek input from respondents, with reasons, on whether they agree that spectrum should not be allocated for public mobile services in the 450 MHz band.

- Eight responses were received with reference to this question, including replies from the CDMA Development Group, Batelco, 2Connect, XPress International and Kalaam Telecom.
- Four responses agreed with the consultation proposal.
- One respondent encouraged the TRA and MoT to conduct further research before deciding against the allocation of 400/450 MHz spectrum for mobile use, citing the use of the band for public mobile in other countries and the potential support the CDMA Development Group can give to developing IMT-2000 systems.
- One respondent recommended that the decision about the 400 MHz band be delayed until the technology development is mature. In Batelco's opinion, the 450 MHz spectrum should be reserved for CDMA.
- One respondent felt that the 400 MHz spectrum would be better assigned to fixed broadband services.

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- One respondent argued for a technology-neutral assignment to the 400 MHz band to allow PAMR systems to be deployed.

TRA and MoT response

The consultation here generated a range of responses, and further investigation into this area will be conducted as part of the upcoming consultation on the possibility of granting additional mobile licences. The decision on what should be allocated in these bands, if they do not form part of a public mobile allocation, will be postponed until after that consultation is completed.

Consultation question 11

The TRA and MoT seek initial respondent views, with reasons, on whether spectrum should be allocated for future public mobile services in the 850 MHz band as an alternative to the 1800 MHz band.

- Four responses, including replies from the CDMA Development Group and Kalaam Telecom, were generated by this question. Three advised against a public mobile allocation in the 850 MHz band.
- One response encouraged the TRA and MoT to consider allocating 850 MHz spectrum for future public mobile services, citing availability and cost of infrastructure and handsets, as well as international roaming considerations.

TRA and MoT response

The TRA and MoT acknowledge that there is a case for public mobile within this frequency band, but that there are also currently conflicting allocations in this area. This will be covered as part of the upcoming consultation on the possibility of granting additional mobile licences.

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Consultation questions 12 and 13

The TRA and MoT seek initial respondent views, with reasons, on whether spectrum should be allocated for future public mobile services in the 1800 MHz band.

The TRA and MoT seek respondent views, with reasons, on which of these options would be preferable for future allocation and assignment of GSM spectrum:

Option 1: allocate (and assign) spectrum to GSM 400 only (2x7.2MHz)

Option 2: allocate (and assign) spectrum to GSM 850 only (2x10MHz)

Option 3: award a new licence in the 1800 MHz band (2x(25+5) MHz)

- Three responses, including replies from Batelco and Kalaam Telecom, were received.
- Two of the respondents believe that current allocations are more than sufficient to cover the Kingdom's present and future public mobile requirements, but if new licenses were awarded, option 3 (a new licence in the 1800 MHz band) would be the most appropriate.
- One respondent noted that the current unassigned spectrum in the 1800 MHz band was only sufficient for the current operators' future use. The respondent did not consider a third mobile operator to be necessary, and recommended that any future assignment by the TRA should be to existing mobile network operators for potential MVNO use.

TRA and MoT response

Should an additional mobile licence be awarded, most respondents favored the 1800MHz option. However, this possibility will be examined by the upcoming consultation on the possibility of granting additional mobile licences, along with other options such as licensing an MVNO instead of assigning spectrum.

Consultation question 15

The TRA and MoT seek initial respondent views, with reasons, on whether spectrum should be allocated for future public mobile services in the 1800MHz band on a technology-neutral basis.

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- Batelco, Kalaam Telecom and one further respondent replied to this consultation question. Two respondents felt that a technology-neutral allocation was preferable, while one respondent strongly recommended that future allocation in the 1800 MHz band be based on GSM technology.

TRA and MoT response

In view of the responses received, and in line with the general principles of the TRA and MoT and the obligations of the Kingdom under the US Free Trade Agreement, it is expected that the allocation of any spectrum to public mobile services in the 1800 MHz band will be on a technology-neutral basis.

Consultation question 19

The TRA and MoT seek input from respondents, with reasons, on whether they agree that the TRA and MoT should allocate and assign frequency bands in the 450 MHz band on a technology-neutral basis for the deployment of mobile or fixed mobile technologies such as Flash OFDM.

- Six respondents replied to this question, including Batelco, Kalaam Telecom, ACT, the CDMA Development Group and 2Connect.
- All agreed with the proposal, with one respondent further recommending that Flash OFDM should be the only technology other than TETRA considered for allocation in the 450 MHz band.

TRA and MoT response

Overall, respondents to the consultation found no fault with the technology-neutral stance of the TRA and MoT in this area. The MoT will allocate spectrum in the 450 MHz band (which could be used to deploy Flash OFDM) on a technology-neutral basis, and the TRA will assign licences, subject to Board approval, through auctions. If the level of interest in the spectrum is too low, the TRA will revert to a FCFS mechanism.

Consultation question 28

The TRA and MoT seek input from respondents, with reasons, on whether they agree that, given the spectrum supply constraints, they should not allocate and assign spectrum for iDEN in Bahrain.

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- Batelco suggested that there is no market demand or business case for such a service at present.
- XPress International submitted a response outlining their case for digital PAMR deployment in the 800 MHz band. XPress International argued that iDEN is preferable to TETRA as a PAMR system, adding that spectrum supply constraints in the 800 MHz band were not sufficient to preclude the deployment of this technology.

TRA and MoT response

The TRA and MoT have considered all views expressed, and in particular Xpress International's response, but remain convinced that, given supply constraints, they could not allocate spectrum to iDEN in Bahrain nor would it be feasible to seek to migrate current users.

2.4 1.9 – 2.2 GHz

Consultation question 16

The TRA and MoT seek input from respondents, with reasons, on whether they agree that spectrum should not be allocated for future public mobile services in the 1900 MHz band (apart from the existing allocations).

- Five respondents replied to this question, including Batelco, Kalaam Telecom and the CDMA Development Group.
- Four respondents agreed with the proposal.
- One respondent believed that allocation of 1900 MHz spectrum for public mobile services was not only feasible but also in the best interests of Bahrain's businesses and consumers, as:
 - an available 30 MHz of spectrum can easily support the introduction of public mobile services
 - 3G deployment would not be precluded if CDMA2000 (a mature and proven 3G technology) was implemented
 - the benefits of licensing mobile systems here outweighed the disadvantages of precluding DECT and WLL assignments.

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TRA and MoT response

The TRA and MoT acknowledge that further public mobile provisions in this band are technically possible. However, in light of the responses received, the TRA and MoT consider that it is not appropriate at this time to allocate further spectrum in the 1900 MHz band to future public mobile services. The TRA and MoT believe that the existing allocations in this band are sufficient for current public mobile requirements, but this position may change following the upcoming consultation on the possibility of granting additional mobile licences, which will examine the issue in further detail.

Consultation question 17

The TRA and MoT seek input from respondents, with reasons, on whether they agree that:

(1) the MoT should not plan to make any specific allocations for TD-SCDMA in Bahrain, although UMTS - TDD spectrum could be used to deploy the TD-SCDMA technology.

(2) the TRA and MoT should therefore render the UMTS – TDD spectrum “technology-neutral”.

- Batelco, Kalaam Telecom and one further respondent agreed with the proposal.

TRA and MoT response

There was broad agreement in this area that the proposed approach was the most suitable option for Bahrain. The TRA and MoT will therefore not make any specific allocation for TD-SCDMA in Bahrain, and will designate the UMTS-TDD spectrum as technology-neutral.

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Consultation question 18

The TRA and MoT seek input from respondents, with reasons, on whether they agree that:

(1) the MoT should continue with the current allocation of frequency bands for UMTS-TDD.

(2) future awarding of spectrum should be on a technology-neutral basis.

- Batelco, Kalaam Telecom and one further respondent agreed with the proposal.

TRA and MoT response

Again, there was broad agreement in this area that the proposed approach was the most suitable option for Bahrain. The MoT will therefore not change the bands designated for UMTS-TDD spectrum, and the TRA will award this spectrum on a technology-neutral basis in the future.

Consultation question 20

The TRA and MoT seek input from respondents, with reasons, on whether they agree with their approach to leave the future use of 3G spectrum (upgrade to “3.5G” and “4G”) to the discretion of market players.

- Five responses to this consultation question were received, including replies from Batelco, Kalaam Telecom, 2Connect and the CDMA Development Group.
- Four respondents agreed with the proposal.
- One respondent recommended that spectrum be reserved for 4G until the third mobile operator consultation is complete, as a potential third public mobile licence may force one of the mobile operators to upgrade to 4G.

TRA and MoT response

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The broad consensus of respondents to this consultation question was that market forces should determine when and whether the upgrade to 4G is necessary. The TRA and MoT will therefore proceed with the proposed approach.

Consultation question 21

The TRA and MoT seek input from respondents, with reasons, on whether they agree that the current 3G spectrum allocation should remain the same.

- Three responses were received, from Batelco, Kalaam Telecom and the CDMA Development Group. Two agreed with the proposal, while one suggested a further allocation to 3G (see consultation question 16).

TRA and MoT response

The TRA and MoT see no current need to change the existing 3G spectrum allocation, although this will be an issue revisited in some detail in the upcoming consultation on the possibility of granting additional mobile licences.

Consultation question 29

The TRA and MoT seek input from respondents, with reasons, on whether they agree that they should not allocate and assign frequencies in the 2 GHz bands for fixed wireless access.

- Three respondents (Batelco, Kalaam Telecom and Intel) replied to this consultation question. Two agreed with the proposal. One respondent believed that 2.3 GHz should be allocated for mobile broadband wireless applications, and pointed out that 2.3 GHz has good potential for global harmonization, especially in the APAC and LAR regions.

TRA and MoT response

The TRA and MoT believe that sufficient spectrum for mobile broadband wireless applications is available in other spectrum bands (for instance, and as outlined in this document, in the 3.5GHz, 10GHz or 26GHz bands). Therefore, and given the current spectrum allocation in the 2GHz bands to public mobile technologies, the 2 GHz bands should not be allocated for fixed wireless access.

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2.5 2.3 – 3.4 GHz

Consultation question 30

The TRA and MoT seek respondent views, with reasons, on their proposal not to change the current spectrum allocation and assignment in the 2.5 – 2.7 GHz band for the time being, but to start reviewing with current users a potential migration plan out of this band.

- Seven respondents replied to this consultation question. These included the CDMA Development Group, Intel, 2Connect, Kalaam Telecom, ATCO Clearwire Telecom and Batelco.
- Five respondents broadly agreed with the consultation proposal. Some made supplementary recommendations, including:
 - that the developments related to this band in the European market be closely monitored, as it progresses towards harmonisation for the deployment of IMT-2000 systems
 - that spectrum should additionally be made available in each of the 2.5 – 2.7 GHz, 3.5 GHz, and 5.4 GHz bands, allowing each operator spectrum in each main frequency and a better overall deployment
 - that once the current users have migrated, the IMT 2000 recommendations should be implemented.
- One respondent proposed that the bands be opened up to mobile wireless broadband as soon as possible, and in a technology-neutral manner, rather than be restricted to IMT-2000 only.
- One operator saw no reason for withholding assignment of the 2.5 GHz band and reserving it for mobile services, and requested that any bands not currently in use be licensed to a broadband wireless operator immediately.

TRA and MoT response

The TRA and MoT are in principle supportive of an allocation in these frequency bands, including but not limited to IMT-2000 standards. Should such an allocation be made, it is likely that it would be done on a technology-neutral basis, in line with the general principles of the TRA and MoT. Due to current usage of the spectrum, it will not be possible to allocate it at this time, but the TRA and MoT will start to review with users if it would be feasible in the long term to migrate out of these bands.

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Consultation question 37

The TRA and MoT seek respondent views, with reasons, on their proposal to reserve spectrum for WiBro in the 2.3 GHz band, provided spectrum conflict with current users can be resolved.

- Eight respondents replied to this consultation question, including Batelco, Intel, ATCO Clearwire Telecom, 2Connect, Kalaam Telecom and Bahrain.com.
- Three respondents agreed with the proposal, one of these pointing out that, as WiBro is a specific profile (channel and duplexing) of WiMAX, flexible duplexing and channel allowances in the band would accommodate WiBro as well as any other WiMAX profile.
- One respondent recommended a technology-neutral approach to spectrum allocation in this band.
- One respondent noted that 2.3 GHz should be reserved for low-power broadcasts, as it can be dangerous over certain power levels, and suggested that the 2.6, 3.5, 5.4 and 5.8 GHz bands were better suited to such services.
- One respondent pointed out that WiMAX and similar technologies should not be allowed to mimic public mobile networks and thus sidestep the agreed need for controls on such operators.

TRA and MoT response

In principle, the TRA and MoT are in favour of an allocation to wireless applications in this area. The TRA and MoT accept Intel's point that WiBro is a particular configuration of WiMAX wireless technology, and will advocate a flexible duplexing and channel allowance approach in all wireless allocated bands. However, governmental applications currently preclude an assignment of spectrum at 2.3 GHz to wireless applications, and therefore the TRA and MoT will discuss with the current users of this spectrum whether an alternative arrangement can be reached.

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2.6 3.4 – 10 GHz

Consultation question 31

The TRA and MoT seek respondent views, with reasons, on their proposal to allocate spectrum and license fixed wireless access operators in the 3.5 GHz band, and further seek views on:

(1) the number of operators to be licensed.

(2) the proposal to prohibit the provision of mobile services, and the length of time such a prohibition should last.

- Eight responses to this consultation question were received, including replies from Batelco, Intel, ATCO Clearwire Telecom, 2Connect and Kalaam Telecom.
- The majority of respondents agreed with the proposal to license FWA services in this band. One respondent preferred a technology-neutral approach, incorporating flexible duplexing (FDD or TDD), and channelization of equipment. A private respondent recommended that the band should not be open to commercial operators only. However, existing governmental use of the spectrum could make allocations problematic.
- Rather than proposing a specific number of operators, one respondent recommended allocating large blocks of spectrum per operator (40 – 50 MHz or more), in order to accommodate modern broadband services. Another suggested that the TRA and MoT should let market dynamics determine the number of licences allocated, and that sufficient spectrum is available to license two operators readily.
- One respondent proposed that 2-4 operators (to be determined by a beauty contest) should be allocated large bandwidths of roughly 68 MHz. Another respondent suggested that at least two licences should be awarded.
- Three respondents disagreed with the final part of the proposal, arguing that it would be difficult to enforce and to regulate between nomadic and mobile services in practice, and that currently available devices offer only limited mobility. One respondent felt that if a restriction was imposed, it should last no longer than 12 months. One respondent also recommended that WiMAX and similar technologies should not be allowed to mimic public mobile networks and thus sidestep the agreed need for controls on such operators.

TRA and MoT response

The TRA and MoT are, in principle, in favour of an allocation to FWA applications in this band. The number of operators to be licensed is limited by the need to

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prevent interference among current users of the band. From the responses received and the spectrum constraints, it appears that two licences is the optimum number of licences to be awarded in this area. These will be awarded through an auction on a technology-neutral basis.

As mentioned in reference to consultation question 37, the TRA and MoT will advocate a flexible duplexing and channelization allowance where spectrum has been allocated to FWA applications. Although the TRA and MoT understand the practical difficulties pointed out by respondents, the licences awarded will prohibit the provision of mobile, but not nomadic, services. Nomadic services are defined as applications of wireless access in which the location of the end-user termination may be in different places but it must be stationary while in use. In practical terms and as opposed to wireless services, no handover between cellular coverage is allowed in nomadic environment.

Consultation question 32

Further study of the use of the 5.8 GHz band for FWA is required. In the meantime, the TRA and MoT seek respondent views, with reasons, on:

(1) the proposal to allocate the band and issue licences under a light licensing regime, subject to satisfactory alternatives being available for the current occupants.

(2) the proposal to permit commercial enterprises to operate public communication services in the band.

(3) the proposal not to limit the number of enterprises operating public communication services in the band.

(4) the alternatives of permitting only private use, or of permitting private use alongside commercial operation (under a light licensing regime) of public communication services.

(5) the timescale on which demand for the above services is likely to develop.

- Eight responses to this consultation question were received, including replies from Batelco, Intel, the American Mission Hospital, 2Connect and Kalaam Telecom.
- The light licensing regime was supported by four respondents. Two other respondents preferred a licence-exempt, technology-neutral assignment, while a further respondent emphasized the need to ensure that light licensing

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would not cause interference to existing users of the band. One respondent recommended that the current allocation in this band be maintained until technical developments in the area have progressed.

- A variety of responses was received concerning which combination of private and public use should be permitted.
 - two respondents felt that both private and commercial use should be licensed
 - one respondent would prefer solely private use to be permitted, and was opposed to limiting private usage to indoor use if commercial operators are also licensed
 - one respondent thought that light licensing of public communications services run by commercial operators would be to the detriment of similar services operating under different licensing requirements, while a further respondent thought that public communications services would cause unacceptable levels of interference in the band.

TRA and MoT response

As at this time there is still substantial government usage of the band, the TRA and MoT will examine what, if anything, can be done to free spectrum in this area. If in due time spectrum is freed up, the TRA will favour a light licensing approach to allocating FWA applications in this spectrum, which, as designated in response to question 31 above, would permit the provision of nomadic but not mobile services.

In terms of assignment, all users in this band will have output power limitation. The maximum power output will be 100mW.

All users will have to be licensed in accordance with the light licensing regime.

Consultation question 36

The TRA and MoT seek respondent views, with reasons, on:

- (1) the proposal to allocate the relevant spectrum but not to award exclusive FWA licences in the 2.4 GHz and 5 GHz ISM band.*
- (2) the proposal to assign spectrum in this band under a light licensing regime, subject to satisfactory alternatives being available for the current occupants.*
- (3) the advantages or otherwise of permitting service providers to offer commercial communication services on the basis of a light licensing regime.*

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- Six respondents replied to this consultation question, including the American Mission Hospital, Batelco, Intel and Kalaam Telecom.
- Three respondents supported the light licensing regime, with a further two pressing for licence-exempt allocations in these bands.
- With regard to whether both public and private use should be permitted:
 - two respondents favored private use only, with one also suggesting that, if commercial use were permitted, private use should not be limited to indoors only
 - two respondents favored both private and commercial use
 - one respondent felt that the conditions of the regime would determine whether commercial communication services should be permitted.

TRA and MoT response

In line with international technical standards, spectrum in the 2.4 GHz and the 5GHz band assigned under a light licensing scheme. Therefore, all users in this band will have output power limitation.

2.7 10 – 20 GHz

Consultation question 33

The TRA and MoT seek input from respondents, with reasons, on whether they agree that they should:

(1) allocate and assign 2 x 40 MHz frequency bands to, at the most, one FWA operator in the 10 GHz band.

(2) use an auction mechanism to award this spectrum and revert to First Come First Served if there is not enough interest expressed for the licence.

- Four responses to this consultation were received, including replies from Batelco and Kalaam Telecom.
- No respondent disagreed with the award of the licence, with the qualification that current users of the band should not suffer interference as a result. One respondent queried why only one licence was to be awarded. (see below)

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- One respondent agreed with the award mechanism for this licence. Two others were opposed to an auction process, with one of these asking the TRA and MoT to reconsider whether there is any real likelihood of spectrum scarcity in this area, and thus any need for an auction.

TRA and MoT response

The TRA and MoT understand concerns about auctions (see consultation question 1), but will use this mechanism to assign the FWA licence in this spectrum band, unless demand is not high enough to justify an auction. Given the spectrum constraints in the 10GHz band, there is just enough spectrum at the moment to award one FWA licence without interfering with other users or scaling down the bandwidth potentially available to the FWA licensee. The TRA will therefore issue a single licence in this band. The TRA also believes that a single licence will be sufficient to satisfy demand in this area. Appropriate guard bands will be put in place so that the new operator will not be permitted to interfere with the other allocations in this band.

Consultation question 34

The TRA and MoT seek input from respondents, with reasons, on whether they agree that they should:

- (1) allocate and assign spectrum (2 x 100 MHz) in the 28 GHz band to a fixed wireless operator*
- (2) award this spectrum through an auction process*
- (3) allocate 2 x 100 MHz spectrum in the 26 GHz band for future use by a public operator, and keep it in reserve for the time being.*

- Batelco agreed with the proposal but had doubts over the level of congestion in the FWA bands, and suggested a re-evaluation of whether an auction was the most suitable award mechanism.
- Kalaam Telecom queried why only one licence was to be awarded, and suggested that an auction process was not fully appropriate. Kalaam Telecom agreed with the reservation for future public operator use.

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TRA and MoT response

No opposition to the proposed spectrum allocation was raised by the consultation, and consequently the allocation will proceed accordingly. The TRA and MoT refer respondents to their comments in consultation question 1, and will award this spectrum through an auction mechanism, subject to Board of Directors approval, unless it becomes apparent that demand is not high enough to justify such a process. Two licences will be awarded in the 26GHz and 28GHz bands.

Consultation question 35

The TRA and MoT seek respondent views, with reasons, on:

(1) whether they agree that they should delay the allocation and assignment of spectrum in the 40 GHz band to FWA operators until the market has a better visibility of this band's future as regards high capacity fixed wireless services to business and consumers.

(2) reserving the 40.5 – 43.5 GHz spectrum for FWA licences.

- Batelco and Kalaam Telecom agreed with the proposal.

TRA and MoT response

No objections were raised to this proposal, and consequently the TRA and MoT will wait for the results of the assignment in the 26 / 28 GHz bands before acting on the 40GHz. The 40.5 - 43.5 GHz spectrum will be allocated for future FWA operator licences, but no spectrum will be assigned to FWA operators at this point.

Consultation question 38

The TRA and MoT seek respondent views, with reasons, on their proposals to postpone the frequency allocation, assignment and equipment type approval for Ultra Wide Band in Bahrain until testing of technology has proven successful.

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- Three responses, from Batelco, Intel and Kalaam Telecom, were received to this question.
- One respondent agreed with the proposal, but suggested bearing the technology in mind during long-term planning.
- Two respondents believed that UWB development has advanced to the point where spectrum and regulatory considerations are necessary, and encouraged the development of appropriate regulations in the near future.

TRA and MoT response

The TRA and MoT will proceed as outlined in the consultation document and postpone frequency allocation for the Ultra Wide Band, and will furthermore continue to monitor developments in this area.

Consultation question 39

The TRA and MoT seek respondent views, with reasons, on their proposals to continue to regulate the use of Free-Space Optics through equipment type approval.

- Batelco, Kalaam Telecom and 2Connect agreed with the proposal.

TRA and MoT response

Free-Space Optics will continue to be regulated through equipment type approval.

Consultation question 40

The TRA and MoT seek respondent views, with reasons, on their proposal to continue with the current allocation and assignment practices for VSAT, namely:

- (1) no further frequency allocation for VSAT.*
- (2) new licences being dealt with on a First-Come-First-Served basis.*
- (3) private and public users being charged a spectrum fee in addition to the licence fee.*

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- All three respondents, including Batelco and Kalaam Telecom, agreed with parts one and two of the proposal.
- One respondent had no objection to the overall charging structure changing, but would object to any licence fee increases resulting from such a change. Another respondent also suggested that fees should be minimised to ensure that this type of solution is economically viable. The third pointed out that fees are already subsumed within satellite operators' space segment charges. This respondent recommended that VSAT licensing should preferably be based on a light reign regulatory approach, involving Class Licences.

TRA and MoT response

Responses to the consultation in this area tended to agree with the proposed allocation, but expressed concern over the fee structure. The MoT will charge a reasonable spectrum fee in addition to the licence fee, but would like to point out that this will not lead to an increase in the licence fee itself.

Consultation question 41

The TRA seeks respondent views, with reasons, on its proposal that all planes and ships visiting Bahrain and using fixed satellite services should obtain the relevant licence.

- Three respondents, including Batelco and Kalaam Telecom, replied to this consultation question.
- One respondent agreed with the proposal. The other two respondents considered the proposal excessive and probably not cost-effective.

TRA and MoT response

The TRA and MoT have considered the responses and would like to point out that non-civilian planes and ships will be exempt from this requirement. All other aircraft and vessels, however, will have to obtain the relevant licence to use fixed satellite services whilst in the territory of the Kingdom of Bahrain.

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Consultation question 42

Respondents are invited to provide input, with reasons, on whether they believe there is interest in mobile satellite services in Bahrain and on how the TRA and MoT should deal with those operators that offer services in the region, i.e. should they be licensed to offer services or be required to ensure that they have roaming agreements with local operators, where their systems allow them to do so.

- As far as Batelco is aware, only a small number of Thuraya customers regularly use MMS, and those customers can roam in Bahrain using Batelco's network.
- Another respondent considered roaming agreements with currently licensed operators the only viable option.

TRA and MoT response

It appears from the consultation responses received that interest in mobile satellite services is small, and that current users of these services are able to roam using existing agreements with mobile service operators. No additional action seems to be required, and mobile satellite services will not be licensed for the time being.