



Commission for
Communications Regulation

Response to Consultation on the Proposed Release of the 26 GHz band

Non-Confidential Submissions to Documents 18/12 and 18/13

Non-Confidential Submissions to ComReg Document 18/12 and 18/13

Reference: ComReg 18/31sR1

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1 Three Ireland Hutchinson Ltd.

26GHz Spectrum Award

Draft Information Memorandum

Response from Three Ireland

March 2018



Three.ie

1. Introduction

Three is pleased to provide this response to ComReg's draft Decision and draft Information Memorandum for the award of spectrum in the 26GHz band. As was stated in response to document 17/85, Three is currently a large user of this spectrum and so has a significant interest in the future of the band. We are carefully following the developments towards a millimetre-wave (mmWave) 5G band which also will have an important bearing on the future use of the band.

ComReg received a broad range of comments in response to its previous consultation, and from different types of interest groups. While each respondent had its own opinion, there seems to have been a strong convergence of opinion on some matters, and ComReg needs to make sure that these views have been fully considered before finalising its decision.

In section 2 below, we re-iterate why Three believes it is incorrect for ComReg to proceed with the award as proposed. Without prejudice to this view, we also provide comments on aspects of the proposed award in the later sections.

2. Delayed Ultrafast 5G

The development of 5G services is currently receiving a lot of attention from manufacturers, standards bodies, operators and regulators world-wide. As we know, ComReg has already awarded spectrum in the 3.6GHz band, however 5G will require both lower frequency and higher frequency spectrum allocations to provide both coverage and capacity. The mmWave band will be used to provide large capacity and ultra-high speed connections, and at present it seems that the 26GHz band will be used for this purpose.

As ComReg itself has pointed out, the Second RSPG Opinion reaffirms that 26GHz should be the pilot mmWave band for 5G. It also recommends that "Member States should make by 2020 a sufficiently large portion of the band, e.g. 1 GHz, available for 5G in response to market demand, taking into account that 5G deployment in this frequency range is expected to be used for local coverage". We note that the requirement is to make a sufficiently large portion of the band available by 2020, and that 1GHz is given as an example, rather than the maximum expected.

Three accepts that there is still some uncertainty regarding the standards and spectrum requirement for 5G; however it is clear that the 26GHz band will be used in Europe for 5G, and it is to be expected that the requirements will be much clearer within the next two years. Nevertheless, there seems to be overall consensus that:

- 26GHz will be used for 5G;
- Standards and equipment will be available from 2020 on;

- Significantly greater bandwidths than ever previously used for mobile will be required in the 26GHz band;

Early chipsets (Qualcomm¹ and Intel²) are now coming available for 5G in the mmWave band that have an operating bandwidth of 800MHz, and Three believes operator requirements will be for up to 800MHz of contiguous spectrum each per operator for optimum service.

ComReg's proposal to re-award the spectrum currently used for fixed links in the 26GHz band for 10 years leaves only 1,562 MHz of spectrum available, and it is broken into two separate sub-bands of 355MHz and 1,207MHz. This only leaves enough spectrum in the band for 1 operator to obtain the optimum allocation, and in reality probably means that no operator will obtain the optimum.

Even though Three currently uses the 26GHz band to provide fixed links (and could not quickly cease using those links), it seems that ComReg's proposal would be a strategic mistake for the development of 5G services in Ireland. To make a decision now that would rule out allocating the optimum mmWave bandwidth for 10 years would be regressive for the development of 5G services in Ireland.

The majority of responses to ComReg's initial consultation (document 17/85) would seem to share the view that work should begin now to prepare the 26GHz band to be cleared out for allocation to 5G service. Three would encourage ComReg to revisit those responses and take them into account before proceeding with the proposed award.

There is a short-term issue to be resolved whereby the current 26GHz licences are near expiry, and there is some uncertainty as to the specific requirement for 5G in the band; however the optimum solution to this short-term issue is not to encourage new investment in fixed links in the band, which would require a 10 year recovery period. Instead, ComReg should provide for an extension or re-award of the current licences for a period of up to 4 or a maximum of 5 years. During this time, clarity can be obtained on the new requirements for 5G in the 26GHz band, any new award can be completed, and arrangements can also be made to move existing services out of the 26GHz band to relevant alternatives. The comments in later sections are without prejudice to Three's view above.

¹ <https://www.qualcomm.com/products/snapdragon/modems/5g/x50>

² <https://blogs.intel.com/technology/2017/02/accelerating-5g-intels-2nd-generation-5g-mobile-trial-platform-at-mwc-17/>

3. A Concrete Block

Three is not satisfied that ComReg and DotEcon have given adequate consideration to the requirements of existing licensees from information provided in response to the previous consultation (document 17/85).

At present, Three operates [~~XXXXXX~~] links in the 26GHz band, of which just over 60% use Huawei hardware, and the remainder use Ceragon/Ericsson. The Huawei equipment is software tuneable from channels 11 to 22, while most of the Ceragon equipment is software tuneable from channels 8 to 17. This means that if Three was to participate in and win 5 lots in ComReg's proposed auction, then the existing linksets could only be easily re-tuned to operate from channels 11 to 17 without requiring hardware change, i.e. the existing assignment, one channel lower, or one higher.

The on-site process required to swap-out existing link equipment includes the replacement of hardware at both ends. This requires a four-person crew to simultaneously work at both ends of the link (2 each end) to remove existing equipment, replace it, re-align dishes, etc. It also necessitates some disruption to service. Where such hardware changes must be made, the cost of installation becomes a significant part of the overall cost of providing the link, and is greater than the hardware cost. In this case, Three would not carry out such work to modify existing equipment, but would instead replace it entirely with new hardware. The new hardware could be expected to function without fault for its normal lifetime. This would allow the full cost of provision to be amortised over the normal working lifetime of the links rather than what would be a significantly shorter period available from modified existing/old hardware.

In addition, almost 50% of the existing links span distances of less than 4km. For this distance, Three is of the view that those links could be provided using a higher frequency band (e.g. E-band). Where Three was required to entirely replace the hardware of links, it would be preferable for a substantial proportion of the links which span 4km or less to be replaced with E-band rather than 26GHz. We regard that this would provide equivalent reliability over short distances, but would allow for greater capacity/bandwidth per link.

The above points illustrate that Three's valuation for obtaining a new 26GHz award is heavily dependent on whether the same (+/- one channel) assignment can be obtained. Three will have a significantly lower valuation for an assignment that would require a move to a different part of the band, and would prefer to migrate shorter links to a different band if this was the outcome.

ComReg's proposal to have a two-stage auction with frequency generic lots to be won in the primary stage means it would be possible for Three to win up to 5 lots in the primary stage, which are then located in a part of the band where substantial re-tuning is required from the existing assignment. In the case of an assignment in a different part of the band, Three

would incur the cost of entirely replacing some of the hardware involved, with the number to be replaced depending on the how the specific assignment maps to existing equipment. In many cases, Three would choose to replace 26GHz links with a different band (e.g. E-band). For the reasons explained, Three will have a higher valuation for lots that are located on the same channels that are already in use (+/- 1) than for lots in a different part of the band. This leaves Three with the possibility of either:

(i) Paying over its valuation

This could occur where Three bids at its valuation based on the existing assignment and wins lots with this bid. It is entirely possible that the Base Price determined would be below Three's valuation for being re-awarded the same lots as are currently in use, but above Three's valuation for a new assignment. In the Assignment Round if Three is awarded lots that are different than those currently in use, then the Upfront Fee may very well be above Three's valuation.

DotEcon's assessment that the above outcome is unlikely to occur is of little use to Three as a bidder. Three's view is that it could well occur, and it is a shortcoming of the proposed award process. Three now requests that ComReg clarifies what options are available to it as a bidder in the event that this does occur – can Three repudiate some or all of its bids from the primary stage without consequence if this arises?

(ii) Not winning at a price below valuation

In order to avoid the above outcome, Three could bid in the primary stage of the auction using valuations derived on the assumption that Three cannot be assured to win its preferred lots in the assignment round. In this case, Three may find that it does not win its preferred number of (or any) lots. The subsequent upfront price paid by other bidders may be below that which Three would have been happy to pay for its preferred assignment.

The above problem is more pronounced in this particular auction that would normally be the case in mobile spectrum awards. This is because such a significant proportion of Three's valuation is dependent on winning specific lots in the assignment round, whereas in previous cases the assignment valuation is a relatively small part of the overall valuation. At this time, we estimate that up to 50% of Three's valuation is dependent on obtaining a specific assignment outcome.

The above circumstances mean that the proposal to have a two-stage frequency generic/assignment round auction is flawed. Either of the above two results would represent an inefficient outcome from the auction. It also would leave Three vulnerable to "gaming" in the assignment round, as all other bidders would know that Three has a significantly higher valuation for maintaining the current assignment.

Three does not accept that it has any unfair advantage derived from being an existing user of the band. The purpose in using an auction as the award mechanism is to determine who the most efficient user will be based on each bidder's valuations. These valuations take into account all of the circumstances relevant for each bidder, and the utility they gain from use of the spectrum. It would be incorrect to selectively discount some sources of value that affect some bidders but not others. ComReg has proposed to use spectrum caps in the auction, which will ensure that there will be multiple winners and prevents hoarding/blocking.

4. Transition Time

Three has previously provided information to ComReg regarding the time that would be required to transition from the current use of the band. There are three different scenarios that might apply:

(i) Three wins the same or substantially the same assignment

In this case no or only a minimal transition will be required, sufficient to plan and implement remote retuning of links.

(ii) Three wins no spectrum

In this case, it will be necessary to find alternative means to provide the relevant connectivity to replace each link. At this point, it is to be expected that the majority of the links will need a radio link as a replacement, as they are predominantly used in locations where fibre is not readily available. It is likely that Three would seek two bands to replace the existing 26GHz spectrum, a higher band for short links (e.g. E-band for < 4km) and a replacement that can provide similar capacity over similar distances to the current 26GHz band.

(iii) Three wins spectrum in a different part of the 26GHz band

As explained above in Section 3, in the event that Three won spectrum in a different part of the band, it might necessitate the replacement of some or all of the existing hardware. Again, Three is likely to move some of the shorter links to a higher band like E-band.

In scenarios (ii) and (iii) above, it would be necessary for Three to replace the hardware for over [X ██████████]. This would involve the design/planning of each replacement, ordering and lead-time for delivery of new hardware. The implementation requires a four-person crew to replace each individual link (2 per end). During implementation, our expectation is that each crew could replace about two links per working day. Even with two or more crews engaged, Three's expectation is that there would be a four-month lead time

before hardware was received (design/planning, licensing, procurement, and lead time for delivery). Subsequent to this, the shortest possible period to physically install replacement equipment would be 16 months, giving an overall transition time of 20 months at shortest. Even this is dependent on being able to quickly identify suitable spectrum and hardware for the replacement and obtain licences. Any shorter transition period would lead to disruption to Three's service.

We note that ComReg has only provided for interim licences for a period of up to 12 months, and indicates that interim licences may only be required for 6-8 weeks (paragraph 3.200). This is inadequate and would be unworkable if the award resulted in either scenario (ii) or (iii) above.

5. What is an Applicant/Winner entitled to?

The draft Information Memorandum describes in some detail the proposed process for the award, including restrictions on applicants. In no case does it describe what an applicant is entitled to if they comply with all of the application requirements; submit winning bids, and pay their upfront fee. It seems that a successful applicant / winning bidder may be entitled to apply for a licence, and nothing more.

“3.21 An Applicant who submits a valid and complete Application shall be eligible to participate in the Award Process.

2.8 Each Winning Bidder will be entitled to apply for a Licence.”

It seems that having met all of the application requirements, become a winning bidder, and paid its upfront fee that the winning bidders must then apply for a licence which might or might not be issued. ComReg seeks to avoid any and all commitments to applicants in the draft terms and conditions:

“4.6 To the extent permitted by law, Interested Parties shall not be entitled to rely on the contents of this IM to argue that they have rights or expectations, pursuant to legitimate expectation, estoppel or other related legal arguments, that:

- i. ComReg will not exercise any of its rights reserved in Section 4.2.6 of this chapter;
- ii. they will be awarded any spectrum at the end of the Award Process;
- iii. bidding in any particular manner will, of itself, guarantee success in the Award Process . . .”

ComReg needs to assure bidders that if they apply and conform to the rules, and that if they submit what is determined to be a winning bid according to the rules set-out in the

Information Memorandum that they then will become a winning bidder. The Information Memorandum needs to further set-out all of the steps necessary for a winning bidder to obtain a licence, and assure applicants that if they comply with those steps then they will be issued with a licence, within a defined time period.

6. What is a Licensee entitled to?

The draft Information Memorandum lists current primary and secondary uses, however it does not clarify the difference in entitlements. ComReg needs to clarify whether a winning bidder who obtains a licence pursuant to this award is entitled to protection from interference from secondary users. ComReg also needs to clarify whether an Interim Licensee is co-primary with a new licensee, or how matters may be resolved if there is a conflict between a new licensee and an existing interim licensee.

7. Duration of Licences

Three would draw ComReg's attention to Three's comments on pages 2, 7, and 8 of its response to document 17/85, and also to section 2 of this document. For the reasons outlined, whether by extension or by award, ComReg should not issue licences in the 26GHz band for a period of more than 5 years at this time. To do so would be to risk delay to the development of 5G services in Ireland. This point seems to have been missed.

8. Application Procedure

ComReg should accept copies of application documents on USB memory stick in addition to CD-Rom. CDs and CD drives are no longer in common use.

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From: Tom Hickey [mailto:Tom.Hickey@three.ie]
Sent: 05 April 2018 15:35
To: Jack O'Dwyer
Subject: Correction to 26GHz Bandplan

Dear Jack

ComReg's consultation document 17/85 last year presented a detailed band plan for the 26GHz band (Fig 2.26). The following is a copy of this Figure as it appeared in the consultation document.

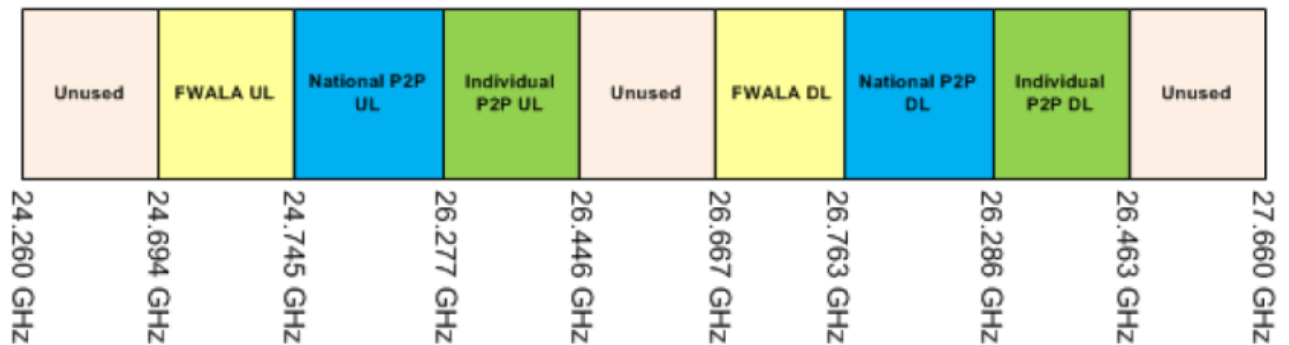


Figure 2: 26 GHz band plan overview

There were some errors in the above figure, in particular for the last four frequencies (26.763GHz; 26.286GHz; 26.463GHz; 27.660GHz). This error makes it difficult to determine the correct bandwidth of the unused spectrum.

In document 18/12, ComReg presented a further band plan in Fig of that document:

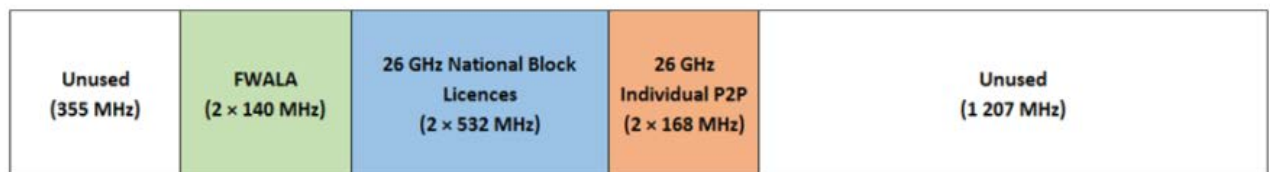


Figure 2: 24.25- 27.5 GHz

This document shows that there is 355MHz of unused spectrum at the lower end of the band and 1.207GHz of unused spectrum at the upper end of the band, however it is difficult to reconcile this band plan with the more detailed one from document 17/85. This is made more difficult as the start and end frequency for each sub-band is not shown.

Three now requests ComReg to issue a corrected/updated version of these two diagrams which correctly and clearly shows the beginning and end frequency for each sub-band.

Regards
Tom Hickey

3 Vodafone Ireland Ltd



Vodafone Response to ComReg documents:

Response to Consultation and Draft Decision on the proposed 26 GHz Spectrum Award 2018

Reference: ComReg 18/12 :

26 GHz Band Spectrum Award - Draft Information Memorandum

Reference: ComReg 18/13 :

Vodafone welcome the opportunity to comment on the proposals in the two ComReg documents

Response to Consultation and Draft Decision on the proposed 26 GHz Spectrum Award 2018
Ref:18/12 :

26 GHz Band Spectrum Award - Draft Information Memorandum Ref: 18/13

Comment on 18/12

In our submission to ComReg Consultation 17/85 we proposed that the current 26GHz assignment to fixed links should be extended for a period of 7 years to allow for the possible introduction of mobile use at that time.

We maintain the position that the assignment of the large portion of the 26GHz band, as proposed in the Draft Decision 18/12, to fixed links for the longer period of ten years risks limiting future use of the band for mobile applications.

As a general principle we believe that alignment of spectrum allocations with other European countries will best support service for Irish customers.

Aligning the timing of spectrum assignments in Ireland with the assignment of these new bands in other EU countries would ensure that customers in Ireland have access to the best services.

We note also that the current service to mobile customers is highly reliant on the radio links now operating in this band, and in the event that we are not assigned spectrum as part of this process considerable time will be required to replace these in another band.

Comments on 18/13

Given ComReg's decision to proceed with this auction, and the decision to make the licence duration 10 years we are generally in favour of the format chosen for the auction.

Our auctions expert has commented that the sealed bid format is essentially a pure Vickrey auction, so it would make most sense for each bidder to pay exactly their Vickrey price (the "opportunity cost" calculated just for that individual bidder). That would fully incentivize truthful revelation of bidder values. The more complicated base price rule in 135 would then not be needed.