Reconfiguring the 900 MHz band/

Allocating the 850 MHz expansion band

Decision paper

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# Executive summary

The Australian Communications and Media Authority (the ACMA) has concluded its consideration of reform options to enable the reconfiguration of the 900 MHz band (890−915/935−960 MHz). Reconfiguration of the band will enable it to be utilised for fourth generation (4G) and fifth generation (5G) mobile broadband services.

The ACMA has also identified (and is progressively clearing) spectrum in the 850 MHz band with a view to creating up to 2 x 15 MHz of harmonised mobile broadband spectrum referred to as the 850 MHz expansion band (809−824/854−869 MHz). The current 850 MHz band is licensed to Vodafone Hutchison Australia (VHA, lower) and Telstra (upper) who use it for 3G and 4G services. The ACMA intends to consult on a draft reallocation recommendation that would include the full 2 x 15 MHz in the 850 MHz expansion band. We are aware though that through Council of Australian Governments (COAG) public safety mobile broadband (PSMB) negotiations there is a request to set aside 2 x 5 MHz of spectrum from the 850 MHz expansion band for a PSMB network.

The ACMA has consulted on reforming the 900 MHz band a number of times. The most recent consultation process, completed in May 2019, once again found little consensus on the optimal approach to reconfiguration. All incumbent operators indicated their support of a move to spectrum licensing and an eventual reconfiguration of the band into 2 x 5 MHz-based lots but differed on the preferred method of achieving that outcome.

A key issue raised in the consultation concerned the risk to continuity of service provision to consumers that could arise should an operator not be successful in gaining access to spectrum, depending on the approach the ACMA takes to reconfiguration and reallocation of the 900 MHz band. Following the consultation process, the ACMA continued to engage with stakeholders to seek additional information about the scope of this risk.

The ACMA remains of the view that the best way to achieve reconfiguration of the 900 MHz band is to undertake a band clearance and price-based allocation in conjunction with an allocation of spectrum in the 850 MHz expansion band.

We acknowledge the concerns of incumbent licensees about service continuity. In the circumstance where the government wishes to mitigate risks to consumer services by providing certainty to incumbent licensees in the band, it is open to the Minister for Communications, Cyber Safety and the Arts to achieve this objective through the use of allocation limits. In other contexts, when seeking to directly allocate spectrum under section 60 of the *Radiocommunications Act 1992* (the Act), the Minister’s power to set spectrum allocation limits has been considered.[[1]](#footnote-2) Such an approach could be designed to achieve outcomes referred to in other countries as ‘spectrum set-asides’.

This approach necessarily requires a number of administrative actions and legislative instruments to be made by the ACMA and the Minister in accordance with the Act. It would also require appropriate consultation with relevant stakeholders. As such, the ACMA cannot commit to the Minister taking any particular action in any particular manner, as both the ACMA and the Minister will need to consider each action on the basis of the facts, information and circumstances at the relevant time.

While the details of the proposed approach to allocation limits are a matter for the Minister, the ACMA will engage closely with the Department of Communications and the Arts (the Department) on this matter. In the event the Minister decides to use the allocation limits power to address service continuity considerations, the ACMA will continue to work with stakeholders to discuss details about the implementation of the allocation.

# Reconfiguring the 900 MHz band

## Background

The ACMA has concluded its consideration of reform options to enable the reconfiguration of the 900 MHz band (890−915/935−960 MHz). The 900 MHz band   
is currently allocated to Telstra, Optus and VHA under apparatus licensing in a   
2 x 8.4 MHz (Telstra and Optus) or 2 x 8.2 MHz (VHA) configuration.

Reconfiguration of the 900 MHz band will enable it to be utilised for 4G and 5G mobile broadband services. The current configuration is not conducive to optimally efficient carriage of 4G or 5G services, which means that large parts of the band are either not being used efficiently, or in some cases, at all. Reconfiguration of the band into 5 MHz paired lots represents the most efficient configuration for the band.

In addition, we intend to release additional low-band spectrum in the 800 MHz band to facilitate an outcome for larger contiguous spectrum holdings. Following a review in 2015, the ACMA has identified (and is progressively clearing) spectrum in the 800 MHz band with a view to creating up to 2 x 15 MHz of harmonised mobile broadband spectrum referred to as the 850 MHz expansion band (809−824/854−869 MHz). The current 800 MHz band (825–845/870–890 MHz) is licensed to VHA (lower) and Telstra (upper) for 3G and 4G services.

The ACMA intends to consult on a draft reallocation recommendation that would include the full 2 x 15 MHz in the 850 MHz expansion band. We are aware, though, that through COAG PSMB negotiations, there is a request to set aside 2 x 5 MHz of spectrum from the 850 MHz expansion band for a PSMB network.

## Objectives

In the recent consultation process, the ACMA identified a set of reform objectives to inform any allocation option. To be considered an effective reform process, the reconfiguration of the band should:

result in the band being spectrum licensed

facilitate the 1 MHz downshift in the 800 MHz spectrum licences by allocating the   
2 x 1 MHz that is below the 850 MHz spectrum licences (thereby removing a key regulatory impediment to achieving the downshift)

result in the band being configured in 5 MHz channels

result in licensees being charged a market price, or a price informed by relevant market outcomes

enable licensees to mitigate risks to the continuity of consumer services

support a move to larger contiguous bandwidths.

## Options

Some incumbents argue that services to consumers have the potential to be significantly disrupted depending on the approach the ACMA takes to reconfiguration of the 900 MHz band. This is particularly the case, they argue, if they are not able to win their preferred spectrum through the ACMA’s allocation processes. In that regard, we consulted on two options:

The **encumbered auction option (option 1)** features an extended ‘reallocation period’ to provide rights to incumbent licensees to use the band in its current configuration until 2024. This would give licensees additional time to take mitigation measures if they did not win spectrum (or did not win their preferred spectrum) in an allocation.

The **hybrid option (option 2)** guarantees each incumbent one 2 x 5 MHz lot in a set spectral position in the 900 MHz band by conversion to spectrum licensing. This option requires running conversion and allocation processes simultaneously.

## Consultation outcomes

### 900 MHz reconfiguration

The ACMA has consulted on options to reform the band multiple times over a long period. The most recent consultation process, completed in May 2019, once again found little consensus amongst submitters on the optimal approach to reconfiguration.

Optus argued that the licensees that had extensive deployed infrastructure in the band should be administratively allocated specified blocks of 900 MHz, and the remaining blocks across the 900 MHz and 850 MHz expansion bands should be auctioned. Optus also proposed that if the ACMA considers that it needs to administratively allocate spectrum to all three mobile network operators (MNOs), a ‘further option would be to allocate specified blocks of 900 MHz to the current two 900 MHz networks, and one block of 850 MHz expansion spectrum to the third licensee—reflecting the bands in which their respective 3G networks are deployed’.

VHA considers that the three issues in the paper (900 MHz reconfiguration, 850 MHz expansion band allocation, 850 MHz spectrum licence downshift) should be considered and implemented separately, rather than in the single process suggested by the ACMA. VHA considers that the 900 MHz band should be converted to spectrum licences in its current configuration. The carriers would then participate in an ‘industry-led reconfiguration’.

Telstra’s proposal aligned closely with the encumbered auction option proposed by the ACMA in the [consultation paper](https://www.acma.gov.au/consultations/2019-08/reconfiguring-900-mhz-band-consultation-112019). The Telstra submission suggests that spectrum licences in the 850 MHz expansion band and 900 MHz band should commence when the band is cleared (in 2024) rather than having encumbered spectrum licences prior to 2024. To increase the utility of the spectrum, Telstra suggests early access arrangements could be used for the two bands prior to band clearance. Telstra also argues that payment should occur at the mid-2024 licence start date.

### 850 MHz downshift

There was also no consensus about the approach to allocating the 2 x 1 MHz that is lower adjacent to the 850 MHz spectrum licences, although each MNO agreed that the downshift is an important reform. While Telstra agrees with the approach outlined in the consultation paper, it made an additional suggestion: make a commitment to achieve the downshift a prerequisite for 850 MHz licensees to participate in a 900 MHz band allocation.

Optus proposed that the 2 x 1 MHz lot be allocated directly to the licensee of the upper segment of the 850 MHz band (i.e. Telstra). While this would result in the lot being allocated to a relevant party, it is not clear how it is proposed the lot be allocated.

VHA suggested that the ACMA needed to engage further with industry to find a workable solution for the downshift. It did note, however, that:

VHA would consider voluntarily executing a downshift prior to the 850 MHz expansion auction if its continued access to its existing 900 MHz holding is guaranteed by spectrum licences on current payment terms until 2028 to coincide with the expiration of the 850 MHz licence.

### Public safety mobile broadband

Other submissions to the process commented primarily on issues relevant to the allocation of spectrum for PSMB. The allocation of spectrum for PSMB is being managed by the Department. The relevance of PSMB to this allocation is discussed further below.

## ACMA decision on approach to reallocation of the 900 MHz band

The ACMA has now decided on the approach to reconfiguring the 900 MHz band, with a view to providing industry with certainty of arrangements going forward.

The ACMA remains of the view that the best way to achieve reconfiguration of the 900 MHz band is to undertake a band clearance and price-based allocation and offer it in combination with the 850 MHz expansion band.

We acknowledge concerns of incumbent licensees about service continuity and note that should the government wish to mitigate risks to continuity of consumer services by providing certainty to incumbent licensees in the band, this can be achieved through the use of allocation limits. In the past when seeking to directly allocate spectrum under section 60 of the *Radiocommunications Act 1992*, the Minister’s power to set spectrum allocation limits has been considered.[[2]](#footnote-3) Such an approach is referred to in other countries as ‘spectrum set-asides’.

In the event Minister decides to use allocation limits to ensure consumer service continuity, there is no reason to have an extended reallocation period as envisaged under the ‘encumbered auction’ option outlined in the [Reconfiguring the 900 MHz band options paper](https://www.acma.gov.au/consultations/2019-08/reconfiguring-900-mhz-band-consultation-112019). Should the Minister decide not to direct the use of allocation limits in these terms, then the ‘encumbered auction’ option, which employed a lengthy transition window to the new configuration, would remain available to mitigate risks to consumer services.

The hybrid option, raised in the consultation paper, was intended to ensure continuity of consumer services where each incumbent licensee receives one converted   
2 x 5 MHz lot, with the residual spectrum being auctioned. However, there are a number of drawbacks identified with this option:

the hybrid option included conversion to spectrum licensing within the 900 MHz band (as opposed to either the 900 MHz or the 850 MHz expansion band). It is not possible to convert a 900 MHz apparatus licence into a spectrum licence in the 850 MHz expansion band prior to mid-2024 given that this band will be encumbered until that date. This would mean the band would be likely to retain the current level of fragmentation.

the auction part of the hybrid option would be likely to be heavily constrained, with only blocks 2 and 4 (in the 900 MHz band) put up for auction along with the 850 MHz expansion band. Because of the synergies between lots (i.e. 2x10 MHz is worth more than double 2x5 MHz), this would likely preclude a new entrant purchasing 900 MHz band spectrum within the band to aid market entry.

the process for allocating the 2x1 MHz under the hybrid option is complex – allocation would need to occur via auction in the same process as the remaining 900 MHz lots/850 MHz expansion band (but as a separate lot).

Through the use of the Minister’s allocation limits powers, it is possible to provide certainty for incumbent licensees, but also reallocate the entire band. It provides for a key advantage (relative to the hybrid option) in that the spectral position of the ‘set-aside’ lots is not confined to the 900 MHz band. In addition, this option facilitates the use of market-based allocation mechanisms and may also enhance the ability of potential new entrants to participate in the allocation.

In the event the Minister decides to ensure continuity of services via the use of allocation limits, the ACMA will continue to work with stakeholders to discuss details about the implementation of the allocation.

## Combined allocation with 850 MHz expansion band

The ACMA considers the 850 MHz expansion band and 900 MHz band spectrum are at least partially substitutable. Therefore, a combined allocation will enhance the efficiency of allocation and use of the spectrum. A combined allocation enables larger (and more efficient) contiguous holdings by individual carriers.

The ACMA intends consulting on a draft reallocation recommendation relating to the 850 MHz expansion band that will be consistent with previous ACMA decisions on the timing of clearance of existing apparatus licences from that band. In accordance with these decisions, final clearance of legacy apparatus-licensed services from the 850 MHz expansion band will not be completed until mid-2024. Prior to final clearance of these services, the successful 850 MHz expansion band spectrum licensee(s) will be required either to negotiate for earlier clearance or coordinate access with incumbent apparatus-licensed operators until that clearance process has concluded.

The ACMA is aware that through COAG PSMB negotiations, there is a request to set aside 2 x 5 MHz of spectrum for a PSMB network in the 850 MHz expansion band. The ACMA intends to consult on a draft reallocation recommendation that would include the full 2 x 15 MHz in the 850 MHz expansion band. However, we expect that consistent with the COAG PSMB request, 2 x 5 MHz of this spectrum will be withheld from the price-based allocation.

## Allocation format

As part of this process, the ACMA will allocate the spectrum licences in accordance with section 60 of the Act—that is, via auction, via tender or for a predetermined or negotiated price. Format is typically determined following a reallocation recommendation.

At this stage the ACMA is considering a number of potential approaches to allocating the bands, including simultaneous multi-round ascending (SMRA) auction formats, the ‘enhanced’ SMRA auction format (ESMRA) used in the 3.6 GHz auction, or a combinatorial sealed-bid approach.

### Simultaneous multi-round ascending auction format

In the standard SMRA auction format, all lots are open for bidding at the same time and all lots remain open while acceptable bids are placed on any lot. The SMRA format is an open ascending auction format and features a simple price discovery process. In past auctions, bidders have been able to piece together desirable packages of items across many rounds.

### Enhanced SMRA format

This ‘enhanced’ SMRA auction format, or ESMRA, is a generic lot clock auction format. The allocation stage offers frequency-generic lots for each product. If demand exceeds supply for any product, the auction continues to the next round. The allocation stage concludes when there is no excess demand across all products.

The next stage—an assignment stage—determines the specific frequency ranges awarded to each winning bidder from the first stage. While there is no requirement for a bidder to bid during the assignment stage, this stage gives bidders the opportunity to submit additional bids, at prices they choose, to express their preferences for particular frequency assignments for each product.

### Package-bidding formats including sealed-bids

There are a number of auction formats that enable bidders to place bids on packages of lots, including the combinatorial clock auction (CCA) used by the ACMA in the digital dividend auction. There are also other package bidding auction formats. For example, in 2016 the Danish Energy Agency conducted a combinatorial multi-round auction (CMRA) for the 1800 MHz band, an auction format that combines an iterative 'pay-your-bid' approach with package bidding.

Another relevant option in this context is a sealed bid combinatorial auction format. This is a ‘single shot’ allocation, where bidders submit bids for all of the possible combinations of lots they are interested in. These bids can be mutually exclusive (that is, the auctioneer only selects one bid per bidder). The auctioneer determines the combination of bids that yields the highest value and then announces the successful bidders.

The winning bidders are those whose bids make up the highest value combination of bids for the lots on offer. However, pricing in such an auction format can be either first price—where the winning bidder pays their highest bid, or second price—where the winning bidder pays the highest value that other bidders were willing to pay for the spectrum. Second-price pricing rules within a combinatorial auction format can be complex and have been subject to criticism.

The sealed bid combinatorial auction format is likely to be only suitable in a relatively simple auction where the number of lots on offer is reasonably low, as is the case in this 900 MHz/850 MHz expansion band allocation, so that the number of possible combinations of lots requiring bids is feasibly low. It is likely to be suitable in scenarios where the benefits of price discovery are limited, and there are large risks associated with open ascending auction formats. In addition, it would be relatively simple to ensure an allocation is consistent with the outcomes sought as part of this reform, in particular that consumer service continuity is assured.

## Allocation timeline

As noted in the ACMA’s [*Five-year spectrum outlook 2019-23*](https://www.acma.gov.au/publications/2019-09/publication/five-year-spectrum-outlook-2019-23), timely access to spectrum is of increasing importance to an innovative and dynamic economy. When considering how best to meet increasing consumer demand for broadband services, the ACMA believes that reconfiguration to ensure the efficient use of existing mobile broadband spectrum allocations, achieved through efficient configuration and appropriate infrastructure and technology investment, should have the same high priority as identification of potential new mobile broadband spectrum allocations in response to changing highest value use.

Consistent with this, the ACMA has prioritised this allocation in the forward allocation work program such that it will be offered following the forthcoming 26 GHz auction. The ACMA will undertake consultation on draft reallocation recommendations early in 2020 and is anticipating the allocation to take place in the last quarter of 2021.

## Downshift in the 850 MHz spectrum licences

The addition of a 1 MHz guard band between the 850 MHz band base-transmit segment and the 890–915/935–960 MHz base-receive segment will significantly increase the usability of the lower segment in the 900 MHz band. This can only be achieved via a downshift of the existing 850 MHz band spectrum licences.

The ACMA indicated previously that this downshift would occur when the 850 MHz licences expire in 2028 and will make recommendations to the Minister accordingly (in relation to band configurations that will support the downshift) at an appropriate time to operationalise this. However, the ACMA has also foreshadowed it will look at ways to expedite this process so the benefits can be realised sooner.

The *[ACMA’s long-term strategy for the 803–960 MHz band](https://acma.govcms.gov.au/publications/2019-12/report/acmas-long-term-strategy-803-960-mhz-band-decision-paper)* decision paper set up the process of clearing the two blocks of 1 MHz of spectrum into which the downshift would ultimately occur. In order to allocate these two blocks of 1 MHz as a spectrum licence, as part of this approach for reconfiguring the 900 MHz band the ACMA will attach the 2 x 1 MHz to the lower 2 x 5 MHz lot in the 900 MHz band. The owner of the lower 900 MHz lot is a beneficiary of the downshift and would be able to potentially use the 2 x 1 MHz in negotiations with 850 MHz spectrum licensees to facilitate the downshift.

It would be necessary for the 2 x 1 MHz lot to expire in 2028 to align with the expiration of the 850 MHz licences. This would allow the ACMA to facilitate the downshift at this time in the event it is not achieved at an earlier date.

## Licence terms

Where possible, the ACMA typically allocates spectrum in licence durations such that expiry dates align with those of adjacent spectrum licenced bands, in order to potentially simplify future moves to larger contiguous blocks.

However, aligning renewal cycles in this context would suggest a licence termination date of 2028, which is the end date of the 850 MHz spectrum licences. While there are clear benefits of aligning renewal cycles, it is likely to have material costs in this context, as licence terms would be less than seven years.

At this stage, the ACMA is intending to allocate this spectrum for a term of 15 years (except for the 2 x 1 MHz that is lower adjacent to the 850 MHz spectrum licences, as noted above). However, the tenure issue does not need to be resolved immediately but would be addressed after the re-allocation declaration. As such, the above observations are preliminary thoughts only.

## Next steps

To give effect to the decisions and preliminary views outlined above, the ACMA will commence work on the reallocation of the 900 MHz band and the 850 MHz expansion band. This will include consultation on a draft reallocation recommendation to the Minster in accordance with section 153G of the Act.

Following consultations with incumbent licence holders in the relevant bands, and subject to any additional information obtained, the ACMA may make a reallocation recommendation to the Minister in accordance with section 153F of the Act. If the Minister decides to make a re-allocation declaration under section 153B of the Act, the ACMA will commence work to progress allocation of spectrum licences.

The ACMA will continue to work with stakeholders to discuss details about the implementation of the allocation.

1. See, for example, the [Draft ministerial direction on unsold 700 MHz spectrum](https://www.communications.gov.au/have-your-say/draft-ministerial-direction-unsold-700-mhz-spectrum) [↑](#footnote-ref-2)
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