

An independent expert review of the ACMA's  
approach to pricing the renewal of expiring  
spectrum licences for mobile operators in  
Australia, commissioned by the AMTA

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## 1. Executive summary

This paper reviews the approach proposed by the ACMA in its document “Expiring spectrum licences (stage 4) - updated preliminary views on pricing”<sup>1</sup> published in December 2025 and examines how the approach compares with international best practice and, given the state of the mobile sector in Australia, the possible consequences for realising the Government’s policy objectives.

With mobile networks requiring constant investment to meet increasing customer needs, yet depressed returns, policymakers and regulators globally are putting greater emphasis on spectrum licensing approaches that will facilitate investment, competition and improved customer experience, with less focus on fees and more focus on incentivising sustainable investment and enabling a strong digital economy.

The Australian Government’s policy objectives for the mobile industry - of spectrum being assigned and used efficiently to drive investment, competition and customer benefits - align strongly with those of like-minded governments in other developed markets. Spectrum licensing is a crucial lever to advance these objectives but, to be effective, needs to be used with care - yet the ACMA’s proposed approach to pricing ESL has not been tested against these objectives.

Comparing approaches taken in other markets to spectrum licence renewal is relevant because mobile operators in Australia operate under similar market, financial and investment conditions as their overseas peers. In all markets, smaller players in particular are constrained in terms of return on capital employed, capital intensity and debt levels - limiting capacity to pay high prices for spectrum. With many operators having sold off tower assets to repair balance sheets, there is little further scope to find new sources of cash for renewals, and unsold spectrum could result.

The fact that such a large proportion of actively used spectrum needs to be renewed within just four years exacerbates the financial challenge for Australian operators. The ACMA state that they “have sought advice on the capacity of licensees to pay for spectrum licence renewals to gain a greater sense of the broader implications of ESL pricing outcomes and whether they align with our policy objectives”, but the consultation is silent on any response, and fails to demonstrate any clear analysis or linkage between pricing and whether the Government’s policy outcomes have a chance of being realised.

The pricing of ESL renewals matters because it directly impacts mobile operators’ abilities to invest in expanding and modernising their networks and improve customer experience. Various pieces of research by economists at the GSMA mobile industry association and at NERA, drawing widely on data from across the global mobile industry, draw a clear correlation between spectrum prices, network investment and customer experience.

Renewing such a significant proportion of mobile spectrum provides a once-in-a-generation opportunity for the Government to shape the future of mobile communications in Australia, to the benefit of users and the wider economy. But the linkage between pricing and the achievement of policy outcomes is complex and multi-dimensional. Simply adopting benchmarks from historical auctions is unlikely to deliver the Government’s desired outcomes.

Given the very high variability of historical auction prices, and the debate around the proposed benchmarking approach, and the risk of getting pricing wrong and adversely impacting policy

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<sup>1</sup> [Expiring spectrum licences \(stage 4\) – updated preliminary views on pricing | ACMA](#)

objectives, the pricing recommendation taken forward needs to be based on a robust and transparent assessment of the likely impact on policy outcomes of a range of pricing approaches and scenarios.

Only then can Government take an informed view on which pricing strategy is most likely to deliver its policy objectives.

## 2. How are policy priorities shaping renewals internationally?

With mobile networks requiring constant investment to meet increasing customer needs, yet depressed returns, policymakers and regulators globally are putting greater emphasis on spectrum licensing approaches that will facilitate investment, competition and improved customer experience, with less focus on fees and more focus on incentivising sustainable investment and enabling a strong digital economy.

### 2.1 Mobile market context

Mobile communications has become an essential good for consumers, businesses and public users. The latest ACMA research<sup>2</sup> confirms that 97% of adults access the internet via mobile phones and that **mobile phone internet use is soaring**. Significant ongoing investment by operators is essential to ensure that mobile service quality, speed and reliability are maintained - by expanding capacity, adding new frequency bands, building more towers and improving network resilience to both environmental and malicious threats.

At the same time, the sector has matured, meaning that there is little prospect of market growth, while competition to win or protect market share means **retail prices have been deflationary** in real terms for many years, impacting the sector's ability to self-finance ongoing investment in network improvements.

As well as ongoing expenditure in more network capacity and quality, new investments will be needed in the next few years to deliver the Universal Outdoor Mobile Obligation (UOMO) and support the introduction of **new technologies such as 6G and new spectrum bands such as Upper 6GHz and possibly 600MHz**.

Many regulators (including the ACMA) also recognise that **renewing licences and assigning new spectrum serve different purposes and merit different conditions**. While auctions can be an effective way to achieve "allocative efficiency" i.e. a fair distribution of new spectrum between competing demands, for renewals the focus is more often on continuity of service and sustainability of investment and competition. This has implications for definitions of spectrum values and prices.

In addition, a combination of adverse market conditions and rising levels of operator indebtedness have led to an increase, globally, in the last few years of **market exits and consolidations**, reducing the number of operators in some markets and potentially impacting innovation, competition and digital resilience.

In this context, simply following historical approaches to dealing with licence expiry and renewal may not align with current market conditions and prevailing policy priorities. Basing renewal prices on historical auction levels could make the spectrum unaffordable and result in frequencies being unassigned and left fallow, and high fees could starve operators of the funds necessary to keep improving networks to meet customers' needs.

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<sup>2</sup> <https://www.acma.gov.au/articles/2026-02/mobile-phone-internet-use-soars-landline-use-keeps-falling-acma-research-shows>

## 2.2 What policy considerations are shaping national and regional approaches to renewals internationally?

Europe - with its diverse range of “Member State” markets, yet ambitions for greater “single market” economic and policy cohesion - provides a rich and helpful reference for how policy priorities are evolving in developed markets internationally.

In his monumental report “**Much more than a market**”<sup>3</sup> published in April 2024, **Enrico Letta** (a former Italian Prime Minister and EU Commissioner) set out a wide-ranging set of recommendations to enable Europe to function better as a single economy. Letta advocates for a strengthening of the single market and highlights the importance of **maximising consumer welfare through investment in advanced communications networks**, and points out that the **deployment of 5G/6G mobile connectivity** augmented by artificial intelligence (AI) and cloud solutions will be crucial to fully realising cross-sector transformations such as electrification, the green transition, resilient supply chain development, and efficiency enhancements through automation. Europe therefore must incentivise the necessary investments to bridge its growing connectivity investment gap, with “**coherent policy decisions... at the European level, particularly regarding the broader regulatory framework essential to underpin 5G development**”.

In the “**Draghi report on European competitiveness**”<sup>4</sup> published in September 2024, **Mario Draghi** (a former President of the European Central Bank) identified three main areas for action to reignite sustainable growth: firstly closing the innovation gap with the US and China, especially in advanced technologies; secondly an action plan for decarbonisation and competitiveness; and thirdly increasing security and reducing dependencies. This will involve “**massive investment needs unseen for half a century**”, to digitise and decarbonise, and reform EU governance, including “**reducing the regulatory burden**”, and a proposal to “**harmonise EU-wide spectrum licensing rules and processes**”.

The ambitions of both Letta and Draghi are encapsulated in the latest draft of EU telecom law.

The previous 2018 European Electronic Communications Code<sup>5</sup> already aimed to improve the coordination of spectrum and facilitate innovation, particularly through 5G networks, and in particular **called for long licence durations, coupled with clear rules on licence renewals**.

The latest draft of the European Commission’s **Digital Networks Act**<sup>6</sup> (DNA) published in January 2026, sets out, according to CMS law<sup>7</sup>, “a coordinated EU radio spectrum strategy with **investment-friendly rules on assignment duration and licence renewal, including rights of use that are, in principle, of unlimited duration** (Articles 13, 18, 24-25, 31).

**The Act’s preferred policy direction is unlimited licence duration by default.** It states that rights of use for radio spectrum should “in principle [be] granted for an unlimited duration” with periodic reviews.... Where a limited term is used, the proposal provides for at least 40 years... The practical impact of this is that mobile operators and infrastructure investors may see improved investment certainty and financeability for long-horizon 5G/6G roll-outs.”

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<sup>3</sup> [Letta Report "Much More Than a Market" \(April 2024\) | European Research Area Platform](#)

<sup>4</sup> [The Draghi report on EU competitiveness](#)

<sup>5</sup> [EU radio spectrum policy for wireless connections across borders | Shaping Europe’s digital future](#)

<sup>6</sup> [The Digital Networks Act | Shaping Europe’s digital future](#)

<sup>7</sup> [Digital Networks Act: EU Connectivity and Investment Framework](#)

### 2.3 How are these considerations reflected in revised approaches to renewals?

It is in this context that an increasing number of regulators across Europe and elsewhere are placing **greater emphasis on ensuring mobile operators have secure long-term access to spectrum rights** - thereby reducing the risks of service discontinuity, stranded network assets and of excessive renewal fees diverting capital expenditure away from network expansion and upgrades – **and revising their approach to renewals to achieve this**.

There is an ever-growing list of regulators deciding to provide licence extensions or renewals free of charge, or at considerably reduced price levels, or in return for operator commitments to additional investments in identified priority areas.

It is notable that in **Spain**<sup>8</sup>, the government made **deliberate legislative changes to embed longer licence durations directly into primary law**, with automatic (free of charge) extension provisions built in. This was to promote regulatory predictability and return on investments, with licence durations ranging between 20 and 40 years.

Similar considerations motivated ANACOM<sup>9</sup> the **Portuguese** regulator to renew 900MHz and 1800MHz licences, at no charge, stating that “renewing the rights... **supports the stability of operations and enables continuity of existing and planned investments by the operators**”.

Referring to the **German** BNetzA’s decision in March 2025 to extend spectrum usage rights in 800MHz, 1800MHz and 2600MHz bands, lawyers Bird & Bird commented: “**BNetzA decided to forego significant fiscal revenue** (predicted to be several €bn) in exchange for ensuring and improving network coverage”<sup>10</sup>.

Understandably, priorities will vary by market. In Europe, with high-speed coverage gaps remaining in many countries, enhanced coverage commitments are currently a common *quid pro quo* in licence renewals (a fuller range of licence renewal case studies is contained in the Appendix).

In a market such as Australia - which, according to ACMA’s report on alternative licensing conditions<sup>11</sup>, has “achieved strong population coverage” - **emerging priorities such as network resilience are more likely to be front of mind for public authorities** - for example, how to ensure that Australians stay connected in the face of more frequent bush fires, flooding and tropical storm events, and where the resulting socio-economic benefits outweigh one-off licensing receipts by the Treasury.

Regardless of what particular commitments and benefits are pursued in each market, the pattern is clear: where sustainable investment, innovation and competition are government priorities - and where the regulator aligns its approach to those priorities - **an increasing number of regulators are modernising their renewal methods and putting network quality, competition and customer benefits at the centre of their plans, with fees, if any, a “balancing factor” in the overall scheme**.

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<sup>8</sup> <https://www.gsma.com/connectivity-for-good/spectrum/wp-content/uploads/2025/02/Spain-Spectrum-Licensing-Best-Practice.pdf>

<sup>9</sup> [ANACOM - Renewal of right of use of frequencies allocated to Vodafone Portugal and MEO in the 900 MHz and 1800 MHz frequency bands for terrestrial electronic communications services - consultation](#)

<sup>10</sup> [German Bundesnetzagentur provides decision to extend mobile spectrum subject to conditions - Bird & Bird](#)

<sup>11</sup> [ESL - ACMA report on alternative licensing conditions.pdf](#)

Even for new awards, some regulators in competitive markets see merit in administrative assignment rather than auctions. For the award of 3.5GHz spectrum in **New Zealand**<sup>12</sup>, the regulator **charged about one third of the price being proposed by the ACMA**, in return for **commitments to deliver a faster roll-out of 5G services** to around 55 rural and regional towns across the country, and with **licence receipts being invested directly back into an independent shared rural infrastructure provider**.

It is also interesting to note that **Ministerial objectives for new spectrum awards in the Netherlands changed in 2024**: prior to that, raising revenue was an explicitly declared objective; whereas in the most recent 3.5GHz auction in 2024, raising revenue was intentionally absent from the list of objectives. Previous Dutch auctions raised €3.8bn in 2012 (eight times the reserve price) and €1.23bn in 2020, while the 2024 auction raised €174m. The 3.5GHz auction design ensured competitive allocation together with modest prices. Commenting on the outcome, the Minister said: "5G... helps with innovation in healthcare, but also, for example, with the digitalization of processes in the manufacturing industry or logistics. With the outcome of the auction, we will also ensure that there is **sufficient competition** on the telecom market until 2040. This is **important for prices, supply and innovation**".<sup>13</sup>

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<sup>12</sup> <https://www.gsma.com/connectivity-for-god/spectrum/wp-content/uploads/2023/09/New-Zealand-Spectrum-Licensing-Best-Practice.pdf>

<sup>13</sup> [Three Dutch telcos secure new 5G spectrum](#)

### 3. How do Australian policy objectives compare internationally?

The Australian Government's policy objectives for the mobile industry – of spectrum being assigned and used efficiently to drive investment, competition and customer benefits - align strongly with those of like-minded governments in other developed markets. Spectrum licensing is a crucial lever to advance these objectives but, to be effective, needs to be used with care - yet the ACMA's proposed approach to pricing ESL has not been tested against these objectives.

#### 3.1 How do Government policy objectives compare internationally?

The Government's Statement of Expectations<sup>14</sup> states that "the ACMA's approach to administering regulation **should balance innovation, competition and sustainability** in Australia's communications and media sectors, while safeguarding consumer protections and minimising harms".

The Radiocommunications Act 1992, Section 3<sup>15</sup> states the object of the Act is "to promote the long-term- public interest derived from the use of the spectrum by providing for the management of the spectrum in a manner that:

- (a) facilitates the **efficient planning, allocation and use** of the spectrum; and
- (b) facilitates the **use of the spectrum for: commercial... and non-commercial purposes...**; and
- (c) supports the **communications policy objectives** of the Commonwealth Government."

The Ministerial Policy Statement<sup>16</sup> (MPS) for ESLs specifies five Australian Government communications policy objectives that ought to be considered in the ESL process:

- supporting **service continuity** for end users, particularly where no alternative service is available;
- facilitating opportunities for new entrants and use cases, including for low earth orbit satellites;
- connectivity and investment in regional and remote areas to deliver improved services to end users;
- promote **competition**;
- capacity for **sustained investment and innovation**.

These align strongly with the policy objectives we have seen across Europe, as an example, with a common emphasis on investment, innovation and improved services leading to improved consumer benefits.

The Government in fact makes no mention whatsoever of charging for spectrum. On the contrary, it puts an emphasis on customers: "The ACMA should consider **the potential impact** that certain decisions made in relation to applications for renewal of spectrum licences **may have on end users**".

The Government also stresses investment as a priority: "The Government recognises that mobile and fixed wireless broadband services provide **essential connectivity** to end users. The ACMA should consider ways to **support existing and new investment**".

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<sup>14</sup> [Australian Communications and Media Authority](#)

<sup>15</sup> [RADIOCOMMUNICATIONS ACT 1992 - SECT 3 Object](#)

<sup>16</sup> <https://www.legislation.gov.au/F2024N00367/asmade/text>

The Government also “recognises that spectrum is one component of reliable communications networks and that **significant infrastructure investment** is required to deploy and maintain services.”

The Government further acknowledges “the **significant investment** incumbent licence holders have made to deploy services” and that “the ACMA should consider **existing investment** by licensees, as well as **known market demand for spectrum** and the capacity for **other prospective licence holders** to make the **investment required to deploy and maintain an effective service** with the spectrum.”

In other words, the Government seems to be saying... if there is no one else willing and able to match the investments the current players have made (and will make), there is no more valuable use for the spectrum than supporting the current operators - in effect, **the economic benefit realised by the current licensees is more than the “opportunity cost” to any other prospective licence holders.**

### 3.2 How do the ACMA’s public interest criteria for ESLs compare internationally?

The ACMA’s public interest criteria for ESLs, which they consulted on in 2023<sup>17</sup>, include the following:

- facilitate **efficiency**;
- promote **investment and innovation**;
- enhance **competition**;
- balance **public benefits and impacts**;
- support relevant **policy objectives and priorities**.

These clearly align with the Government’s objectives and have much in common with regulatory goals in other similar markets - but they **do require elaboration**. For example, investment in improved networks and customer experience is one aspect of public benefits; while raising public revenues through licence fees could be another form of public benefit. The point is, there are inherent **public benefit trade-offs** and these need to be clarified and evaluated (alongside investment, innovation and competition) if a **best overall approach** to spectrum licensing is to be secured. And as we’ve seen in European markets, this can result in a **pivot away from fees**.

### 3.3 How well does the ACMA’s proposed approach align with national policy objectives?

The ACMA’s “preferred view is that the renewal of spectrum licences used for mobile services and the nbn, **using prices derived from benchmarking, best supports the policy objectives** in these frameworks. These objectives include promoting competition, providing capacity for sustained investment and innovation, supporting service continuity, and facilitating the efficient allocation and use of spectrum.”

While the ACMA’s decision to follow an administrative procedure to renew the licences appears consistent with its public interest criteria and the Government’s wider policy objectives, the rationale for using auction benchmark values is unconvincing.

The ACMA claims that “market pricing encourages the efficient use of a public resource, supports competition, investment and innovation, and ensures licensees pay a fair price that reflects the value of the spectrum licences they hold” yet there is **no supporting analysis, or consideration of alternatives**.

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<sup>17</sup> <https://www.acma.gov.au/consultations/2023-05/proposed-approach-expiring-spectrum-licences>

The Government - which is “principally concerned with promoting the **long-term public interest derived from use of spectrum**” - has already confirmed, in effect, that the spectrum is in the right hands and is backed by significant network investment.

There is no discussion or analysis by the ACMA of **how different pricing levels would impact operators** - their financial viability, the strength of competitive rivalry between them or their ability to invest - or market outcomes and ultimately the likelihood of government policy objectives being realised.

And yet it is extremely likely that excessive licence fees would reduce operators’ capital budgets remaining for network investment and innovation; could result in lower quality services and mobile user experience; and could be a greater financial burden for smaller players and therefore potentially change the balance of competition in the market. Renewal prices might be greater than operators are willing or able to pay, with the risk that some spectrum might be left “on the table”, reducing efficiency.

No doubt stakeholders will have different views on the interplay and trade-offs between these various considerations and preferred outcomes, and across Europe we’ve seen the range of positions that can be taken. But the point is, those positions on pricing were arrived at after **debate and analysis** of their impact on policy objectives, whereas the **ACMA’s approach to pricing is being done in isolation**.

The views of mobile operators - who are ultimately on the hook to pay the final fee amounts - are also important too. In the approach taken by the UK regulator to setting and revising the level of Annual Licence Fees<sup>18</sup> (ALFs), Ofcom welcomed evidence presented by mobile operators and ALF levels were reduced as a result.

For licensing policy decisions to be robust, they need to **examine options and provide an informed comparison** for consideration. What is the counterfactual to charging full “market value” auction prices for renewal, and how well does each scenario meet the expressed set of government objectives? Is there a clear-cut preference? Are the options similarly attractive but just different? In choosing one option, what is being rejected?

**Without this comparative analysis, it is difficult to have faith that the ACMA’s proposed pricing will advance the Government’s declared communications policy objectives** of “facilitating the efficient planning, allocation and use of the spectrum”.

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<sup>18</sup> [Statement Review of Annual Licence Fees](#)

## 4. Mobile operators in Australia are under the same financial constraints as their international peers.

Comparing approaches taken in other markets to spectrum licence renewal is relevant because mobile operators in Australia operate under similar market, financial and investment conditions as their overseas peers. In all markets, smaller players in particular are constrained in terms of return on capital employed, capital intensity and debt levels - limiting capacity to pay high prices for spectrum. With many operators having sold off tower assets to repair balance sheets, there is little further scope to find new sources of cash for renewals, and unsold spectrum could result.

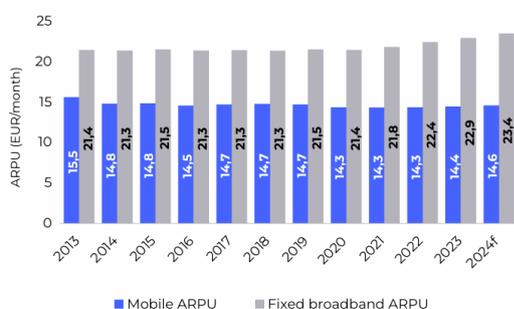
### 4.1 The underlying market context in Australia and Europe

With mobile communications now a fully-penetrated mass market, subscriber numbers have peaked (and indeed may start to come down, given Australia's social media ban on under-16s). Mobile services consumption keeps growing, but prices per GB of data have been falling as fast, with the result that ARPUs have been flat, at best. While general consumer inflation continues to rise, mobile revenues have gone in the opposite direction, falling in real terms.

MarketLine estimates that mobile revenues in Australia will grow by 1.8% CAGR in the five years from 2024 to 2029, although it reports that **revenues in the five years to 2024 fell at -2% CAGR**.

Data from the "State of Digital Communications" report published in 2025 by **Connect Europe**<sup>19</sup> (chart below) shows how mobile ARPUs in Europe have stagnated and were estimated to be lower (in nominal terms) in 2024 than ten years earlier.

#### European ARPU trends for mobile and broadband



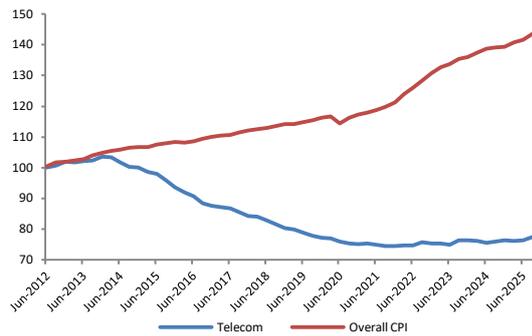
This is explained by analysis from Venture Insights (left hand chart below) which shows how general CPI in Australia has increased cumulatively by more than 40 points over the most recent 13 years on record, whereas pricing for telecoms equipment and services has fallen by more than 20 points over the period. **Had telecom prices kept up with CPI, they would today be 75% higher.**

**ConnectEurope**<sup>20</sup> reports a similar effect for Europe (right hand chart) with telecom retail revenue price changes annually trailing CPI.

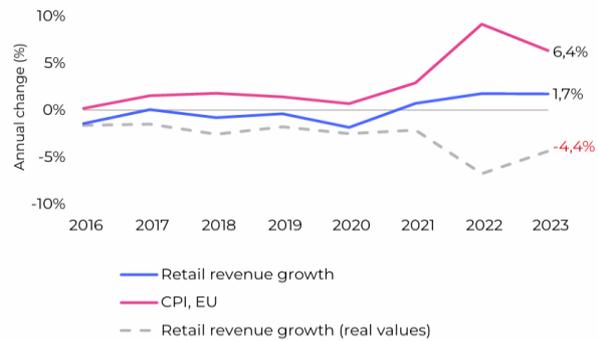
<sup>19</sup> [State of Digital Communications \(2025\).pdf](#) p71 (data provided by Analysys Mason)

<sup>20</sup> [State of Digital Communications \(2025\).pdf](#) p27 (data provided by Analysys Mason)

**CPI vs telecom index (Australia, 2012-2025)**



**European telecom retail revenue vs CPI growth (EU)**



There is no evidence therefore that there is any **support from revenue growth to cover additional spectrum licensing costs**.

In terms of **market structure and shares**, European markets typically have three or four mobile operators, often with skewed market shares. High spectrum costs tend to disproportionately affect the smaller players, limiting the amount they can spend in total between licences and network capex.

In Australia, market positions are also skewed: 6-month mobile revenues publicly reported by operators were: Telstra<sup>21</sup> **\$5.8bn** (to Dec '25); Optus<sup>22</sup> **\$2.9bn** (to March '25) and TPG<sup>23</sup> **\$1.15bn** (to June 25).

## 4.2 Financial considerations

Mobile operators worldwide rely on equity investors and lenders to finance their multi-billion dollar network investments and publicly listed operators in particular have to operate within very precise financial parameters. Investors and lenders have no particular loyalty to the telecom sector, and will divert their funding to other sectors if the mobile operators cannot meet their requirements.

Equity investors will only support the prevailing market capitalisation and share price of the company if they are confident in the level of earnings and dividends over coming years. They will avoid investing in operators where excessive costs erode margins and free cashflow. Capital expenditure is a key metric in this regard, given the need to keep expanding network capacity, roll out new technologies such as 5G and 6G, and improve resilience to critical failures resulting from climate events or cyber attacks.

It is notable that despite all the uncertainties surrounding the wider economy, consumer spending, competition and market share, technology costs and so on - any of which could knock a major listed business off course relative to its financial guidance - it is the uncertainty surrounding spectrum payments that operators tend to call out for investors - which they do by reporting "EBITDAaL" (i.e. earnings... "before spectrum amortisation") and by providing guidance on capital expenditure "excluding spectrum payments".

**The Government's objective to promote investment in the sector relies on securing investor confidence in fair spectrum pricing.**

<sup>21</sup> <https://www.telstra.com.au/content/dam/tcom/about-us/investors/pdf-i/telstra-financial-results-for-the-half-year-ended-31-dec-2025.pdf>

<sup>22</sup> [FY25-Group-MDA\\_Finalv2.pdf](#)

<sup>23</sup> [TPG Telecom - Half Year Report Master](#)

### 4.3 Return on capital employed (ROCE)

Over the longer term, telecom investors expect to make a return on their investment - where the level of return is at least as high as the cost of the capital investment put into the business. Otherwise, the investment is making a loss it would be better for shareholders to dispose of the asset and return the cash for a more profitable purpose.

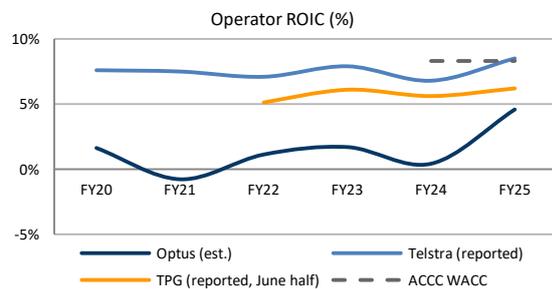
A predicament common to a large number of mobile operators in Australia and much of Europe is that **returns have been below cost of capital for much of the last ten years** - that is, return on capital employed (ROCE), also known as return on invested capital (ROIC) has been below the weighted average cost of capital (WACC). Over time, this erodes investor confidence.

In Australia, ROIC varies between players and over time (see left hand chart below, source Venture Insights) - **between FY20 and FY24, ROIC was estimated to be below WACC for all players**. Only Telstra managed to achieve a ROIC marginally above its WACC in FY2025, and in 1H26 reported an increase to **8.8%**. Optus reported<sup>24</sup> a ROIC of **1.7%** averaged over the five years to Sept 2025, and TPG reported a ROIC of **6.2%** for 1H25.

Note that the ACMA reports that Frontier estimates a WACC for the market of **8.49%** (by comparison 8.31% is used by the ACCC in its Voice Interconnection enquiry<sup>25</sup>).

For Europe (right hand chart below)<sup>26</sup> the picture is similar, with average telecom operator ROCE persistently one or two percentage points below WACC.

**ROIC vs WACC (Australia, %)**



**ROCE vs WACC (Europe, %)**



In Europe, a study<sup>27</sup> prepared in January 2026 by CEPR for the **European Commission (EC)** - and regarded as sufficiently monumental to be reported in the **Financial Times** - found that, for a cohort of 14 major EU telecom groups<sup>28</sup>, **“on average, returns have exceeded the cost of capital over the past decade”**. On the face of it, mobile operators can afford spectrum licence fees and reward shareholders.

But looking into the analysis in a bit more detail, a starker picture emerges. **Returns (on average) exceed cost of capital** (Figure 1 below) **but only if you ignore “goodwill”** - a balance sheet component often arising from mergers and acquisitions - and yet M&A involves real shareholders spending real cash. Whether in hindsight they overpaid is irrelevant to the question of how goodwill is treated from an accounting perspective and its impact on the finances of the business.

<sup>24</sup> [PowerPoint Presentation](#)

<sup>25</sup> [Voice interconnection - WACC](#)

<sup>26</sup> [State of Digital Communications \(2025\).pdf](#) p135 (Source: The Draghi Report, 2024)

<sup>27</sup> [An analysis of the EU telecom sector’s ability to remunerate its cost of capital | CEPR](#)

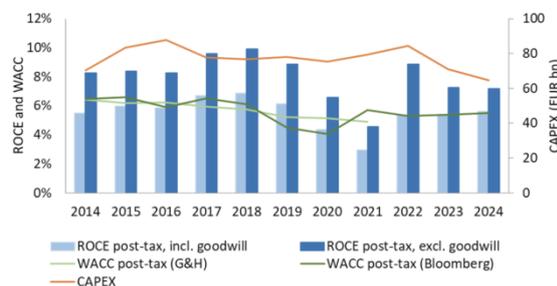
<sup>28</sup> Deutsche Telekom, DIGI, Elisa, KPN, NOS, Orange, Proximus, Tele2, Telecom Italia, Telefónica, Telekom Austria, Telenor, Telia, Vodafone

The majority of the cohort are “national” incumbent operators who have generally retained a head start in their home markets following privatisation, and operate combined fixed and mobile networks at scale. CEPR notes that performance varies significantly across firms, so one can expect “challengers” or mobile-only operators to be among those whose returns have been consistently below WACC (the red “min” line in Figure 4 below).

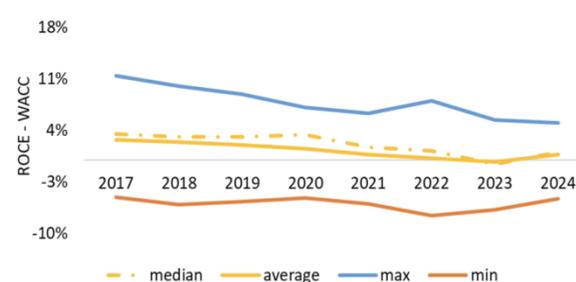
And of course, with three or four mobile operators per market across Europe, there will be smaller operators overlooked in CEPR’s analysis with presumably reduced economies of scale and even lower returns.

### ROCE vs WACC for 14 major European telcos - in aggregate and deaveraged (% , 2014-2024)

**Figure 1** Aggregate group-level return on capital employed (ROCE) post-tax, weighted average cost of capital (WACC) post-tax, and capital expenditure (CAPEX)



**Figure 4** Return on capital employed including goodwill minus weighted average cost of capital for EU country-level operations



The clear lesson is that: if competition is to be preserved in the market for mobile services, **smaller “third operators”, at least, need to be able to survive in the market, and that requires sufficient returns relative to WACC, so care needs to be taken in setting spectrum pricing that will support that policy objective.**

The alternative is that smaller mobile players exit the market, typically through mergers and acquisitions - which has been the pattern in markets like Spain, the UK, Italy, the Netherlands, Romania, Hungary and others. Further discussion of the “ROCE below WACC” effect and its impact on competition and market structure from **analysis carried out by Ofcom in the UK** (and which paved the way for the merger of Vodafone UK and 3UK) is included in the Appendix of this report.

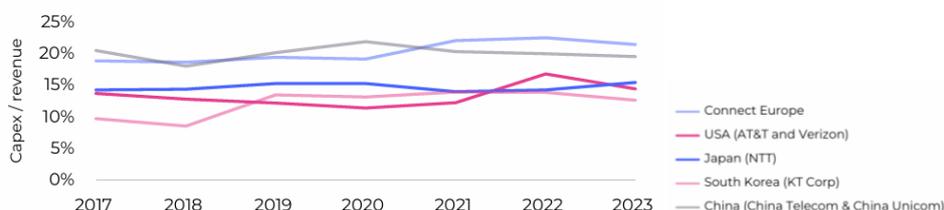
Given the long-running misalignment between ROCE and WACC, the risk of investment flight is very real, and in Europe has manifested itself in terms of market exits, mergers, and sell-out by domestic nationally-listed investors to overseas private equity and sovereign wealth funds. At a time when telecom assets are increasingly regarded as **critical national infrastructure**, regulatory decisions - such as excessive spectrum renewal pricing - that could further and materially **undermine the investment case for existing domestic shareholders** - should be handled with caution.

#### 4.4 Capital intensity

Investors also therefore keep a close eye on **capital intensity** - the proportion of revenues spent on capital investment - and which is typically mid-teens in the telecom sector. If capital intensity is too high, it can be an indicator that free cash, earnings and dividends could be under threat. Given that spectrum licence costs are capitalised, **high licence renewal costs could push up capital intensity** to the level that investors would not be comfortable with. Operators would have to **choose between a partial renewal and paring back their remaining capital budget** i.e. delaying network infrastructure expansion and upgrade.

ConnectEurope<sup>29</sup> reports telecom capital intensity in major regions in the range 10-20% (chart below).

### Capex / revenue regional comparison (%)



Public reporting by operators and analysis by the author indicate the following:

- For FY25, **Telstra** reported total capex of \$3,388m, against revenues of \$23.6bn (of which \$11bn are mobile) and therefore total capex-to-sales was **14.9%** (19.6% including strategic investments).
- For 2024, **TPG**<sup>30</sup> reported total capex “excluding spectrum payments” of \$1bn against total revenues of \$4.7m and therefore total capex-to-sales was **21.6%**. It is forecasting \$900m for 2025 and targeting \$550m-\$650m from 2027.
- Singtel invested A\$9bn(\$7.7bn) in capex at Optus over the five years to Sept 2025, and in FY2025 capex-to-sales for **Optus** was **16%**.

Unlike laying optical fibre or other passive infrastructure, mobile networks require ongoing investment and upgrade to meet evolving market and regulatory requirements. In this regard, the needs of mobile operators in Australia over the medium term are materially no different to those in other developed markets, namely:

- ongoing growth in customer demand for data traffic requires **upgrades to network capacity**, by expanding the number of frequencies supported on mobile masts as well as constructing new infill masts;
- supporting **new frequency bands** - such as the Upper 6GHz band – which will likely involve new radio equipment on all relevant sites, and may also involve upgrading the physical strength of masts and possibly increasing mast heights to ensure compliance with EMF limits;
- incorporating new **6G technology** - expected to be introduced around the end of the decade and which will require further equipment upgrades;
- meeting Government requirements for **improving the resilience of telecom networks** in the event of natural and man-made disasters, consistent with their role today as critical national infrastructure.

Investor analysts are fully aware that new generations of radio technology do not have like-for-like costs compared with previous generations. **5G, for example, requires a denser network grid than 4G and upgraded massive MIMO antennas and improved radios**, meaning that **overall costs are estimated to be 30-60% higher on a stand-alone basis, or 20-35% higher when installed as an**

<sup>29</sup> [State of Digital Communications \(2025\).pdf](#) p42 (data provided by Analysys Mason)

<sup>30</sup> <https://www.tpgtelecom.com.au/sites/default/files/2025-03/TPG-Telecom-2024-AnnualReport-FINAL.pdf>

**overlay** (based on a 2019 GSMA study<sup>31</sup> and updated to reflect estimated cost improvements over time). In the absence of revenue growth, **investors need operators to offset higher infrastructure costs with improved operating efficiency and reduced regulatory costs.**

Operators in Australia are also facing a new “**Universal Outdoor Mobile Obligation**” (UOMO), which will require new technical capabilities and standards to **integrate LEO direct-to-device satellite services into existing terrestrial systems.**

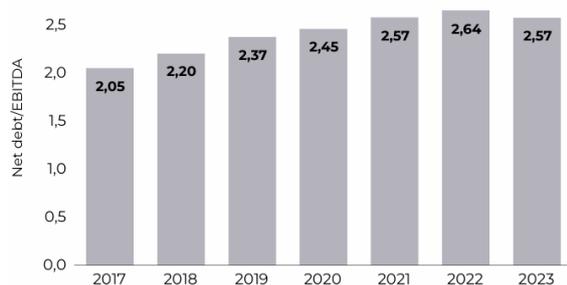
#### 4.5 Debt ratios

As well as equity investors, lenders are an essential part of the funding circle for mobile operators. Without lenders, the returns and dividends from the enterprise would need to be spread across a much wider base of equity investors, reducing the appeal of the business to shareholders relative to the alternatives available to them.

While lenders have preferential rights over equity investors in the business, they do need comfort that their rights are sufficiently secure, which they achieve through covenants on the business and which commonly set maximum limits on the total amount of lending the business can reasonably take on and service, given the level of earnings being generated by the business i.e. a debt servicing ratio defined as “net debt / EBITDA”.

**ConnectEurope**<sup>32</sup> reports net debt/EBITDA increasing overall for the last 7 available years.

##### *Net debt/EBITDA for ConnectEurope members (% , 2017-2023)*



Public reporting by operators and analysis by the author indicate the following:

- In 1H26, Telstra had a net debt of \$16.8bn, a 1H EBITDA of \$4.4bn and debt servicing ratio (net debt / full year EBITDA) of **1.9x** (against an upper comfort limit of 2.25x), plus \$1.4bn in cash and \$3.8bn of unused committed facilities.
- In FY24, TPG’s<sup>33</sup> net debt was \$4bn, EBITDA was \$1.7bn, and net debt (excluding leases) to EBITDA was **2.32x**.
- For FY25, Optus<sup>34</sup> had a net debt of \$6.67bn, EBITDA was \$2.2bn, resulting in a debt ratio of **3x**.

As with capital intensity ratios - and given the high levels of capital expenditure associated anyway with “business as usual” - it is important that, in setting a discretionary level of charges for renewing expiring spectrum licences, the **authorities give due consideration to how operators will finance**

<sup>31</sup> [5G-era Mobile Network Cost Evolution - Networks](#)

<sup>32</sup> [State of Digital Communications \(2025\).pdf](#) p135 (data provided by Analysys Mason)

<sup>33</sup> [TPG Annual report Master](#)

<sup>34</sup> [FY25-Group-MDA\\_Finalv2.pdf](#)

**these charges** and - with borrowing likely to be the first port of call - **what impact the charges will have on debt servicing ratios and credit ratings, and the impact of interest payments on cashflows.**

#### 4.6 Mobile operators revert to asset stripping their networks to raise cash

The alternative means for operators to reduce debt and create headroom for new spectrum licence auctions and licence renewals is to dispose of assets under **sale-and-leaseback** arrangements.

In Europe, there were estimated to be 600,000 mobile towers in 2016, with about 62% self-owned by mobile operators, 15% in operator-led towercos, 10% in joint venture infracos and 13% under independent ownership. By 2025 the number of towers under independent ownership increased to c.300,000 (sources<sup>35</sup>) as a result of most operators **disposing of sites to free up cash for spectrum auctions and network upgrades**: Telefonica completed its exit from tower ownership in Europe over the period 2012 and 2021; Telecom Italia sold 40% of its INWIT tower company in 2015; and Vodafone sold half of the ownership of its Vantage Tower portfolio to partners between 2021 and 2024.

Operators in Australia have similarly sold off assets to raise cash, reduce leverage and strengthen balance sheets.

Year	Activity
2025	TPG sold its Fiber & Fixed Network Assets to Vocus for A\$4.7B in cash proceeds and used c.A\$1.7B of the proceeds to repay debt
2025	Optus sold 340 towers and rooftops to Waveconn (OMERS) for c.A\$340m
2022	TPG sold its Mobile Towers to OMERS for A\$950M and used the proceed to reduce financial leverage and lower borrowing costs
2021	Optus sold a 70% stake its Mobile Towers to AustralianSuper for A\$1.9B and used the proceed to fund 5G expansion and core growth across the group
2021	Telstra sold a 49% stake in InfraCo Towers for A\$2.8B and used the proceeds for debt reduction, share buy-backs and enhanced connectivity in regional Australia
2019	Telstra sold a 49% stake of a Property Trust of 37 exchange buildings for A\$700m and used the proceeds to strengthen the balance sheet under the T22 strategy.

One might argue such assets are non-core and are better put under independent ownership with its own financing structure, but it is also important to bear in mind, firstly, that the **proceeds of the asset sales are one-offs** and yet are replaced by **recurring lease costs** which are a drag on free cashflow and earnings, and secondly, the assets can only be sold once.

**High spectrum licence prices risk operators cutting deeper into core assets to fund renewal fees, but at the expense of losing control over core infrastructure and capabilities and loading up operating expenditure with additional lease costs.**

<sup>35</sup> Analysis based on sources:

[34% of European towers to be owned by independent towercos by 2020](#)  
[Europe Telecom Towers Market Size, Share, 2026-2031 Outlook](#)  
[20250226-PR-Cellnex-FY2024-Results.pdf](#)

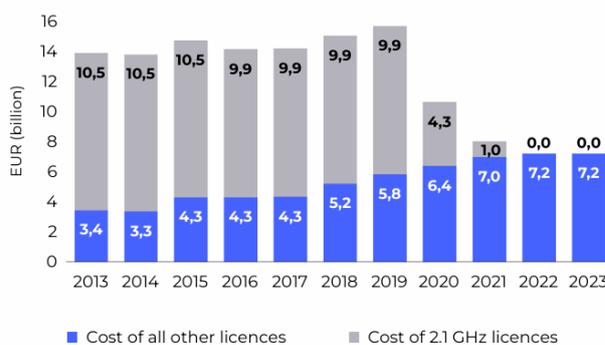
#### 4.7 Historical high auction prices continue to impair the financial viability of operators

The imperative for any mobile operator to “keep up” with its peers and potential new entrants with each new generation of radio technology - as well as with constantly growing expectations and demand from customers - means operators’ balance sheets have become stretched through successive auctions for 3G, 4G and 5G spectrum.

Spectrum prices reached their peak during the 3G auctions. This coincided with the nadir of the sector, in terms of growth, investor confidence and M&A activity. Professor Stephen Temple offers a detailed and insightful account<sup>36</sup> of the expansionist strategies of the most ambitious operators in Europe at the time and how that fuelled Europe’s astronomical 3G spectrum auction prices.

It is only in the last few years that operators caught up in exorbitant 3G awards twenty five years ago have been able to finally write down the book value of their licences to zero and eliminate the impact of high levels of amortisation on EBIT. This is illustrated in the chart below - included in the 2025 report by **ConnectEurope**<sup>37</sup> - showing annualised spectrum costs over the most recent 10 years. The grey amortisation of 3G licences has finally expired, but **annualised costs of more recent spectrum licences have more than doubled in the interim.**

*Annualised spectrum licence costs for ConnectEurope members (Euro bn, 2013-2023)*



Yet even if the asset values of 3G licences have expired, **the debt taken on to finance past licences often remains** on the liabilities of the balance sheet, constraining the amount of additional debt that can be secured to pay for licence renewals.

#### 4.8 Sunk business investments mean mobile operators are held hostage

Having invested billions of dollars in network assets and business systems, mobile operators are committed to continuing to operate in the market. They can’t simply “walk away” if renewal prices are too high. They are compelled to continue to get access to spectrum needed to operate their networks. **But, with high prices, some may be forced to economise and be selective in the frequencies they renew – leaving other frequencies “on the shelf” and no longer employed in supporting the Government’s objectives for investment and efficiency.**

<sup>36</sup> [From inside the world’s greatest 3G spectrum auction | GSM History: History of GSM, Mobile Networks, Vintage Mobiles](#)

<sup>37</sup> [State of Digital Communications \(2025\).pdf](#) p91 (data provided by Analysys Mason)

## 5. In some respects, Australia’s renewal is more challenging

The fact that such a large proportion of actively used spectrum needs to be renewed within just four years exacerbates the financial challenge for Australian operators. The ACMA state that they “have sought advice on the capacity of licensees to pay for spectrum licence renewals to gain a greater sense of the broader implications of ESL pricing outcomes and whether they align with our policy objectives”, but the consultation is silent on any response, and fails to demonstrate any clear analysis or linkage between pricing and whether the Government’s policy outcomes have a chance of being realised.

### 5.1 A large proportion of spectrum is to be renewed over a short period

ACMA plans to offer licence extensions to 2044 along the following timeline.

Band	Renewal applications begin	Licences expire
850 MHz & 1800 MHz	June 2026	June 2028
2.5 GHz	October 2027	September 2029
700 MHz	January 2028	December 2029
2.3 GHz & 3.4 GHz	late 2028	2030
2 GHz	October 2030	October 2032

The ACMA proposes to increase total renewal costs by **c.30%**, from the previous preliminary price range of **\$5.0-6.2bn** to a new figure of **\$7.3bn**, and over a period of **just four years** (2028-2032) - compared to a similar amount (for the same ESL bands) that was previously collected **over 11 years**.

Period	Primary Bands	Total Revenue	Price Intensity (\$/MHz/pop)
2013	700 MHz & 2.5 GHz	\$1.96bn	\$1.36 (700MHz) / \$0.03 (2.5GHz)
2017	700 MHz (residual)	\$1.54bn	\$1.25
2018	3.6 GHz	\$853m	\$0.29
2021	26 GHz	\$647m	\$0.01
2021	850/900 MHz	\$2.09bn	\$1.21
2023	3.4/3.7 GHz	\$722m	\$0.29 (3.7GHz) / \$0.07 (3.4GHz)
<b>Total</b>		<b>\$7.8bn</b>	

### 5.2 Significant additional spectrum awards are also expected over this short period

As well as renewals falling due, more than 500MHz of Upper 6GHz spectrum (to support 5G network capacity expansion and the introduction of 6G) is expected to be auctioned by 2028, and potentially 600MHz spectrum thereafter i.e. all falling within the same renewal period. The coincidence of these licensing events will intensify financial stress on smaller operators over this period.

### 5.3 There is limited scope for further cost savings given advanced network sharing

In its 2025 Mobile Infrastructure Report<sup>38</sup>, the Australian Competition and Consumer Commission (ACCC) provided data that confirmed that, outside metro areas, TPG now relies much more on Optus-TPG MOCN shared sites than on stand-alone sites. This indicates that **most of the cost-saving possible through active network sharing has already been achieved** and there is little more operators can do. And given that the TPG's sharing proposal with Optus was approved by the ACCC (whereas its previous one with Telstra was not<sup>39</sup>), we can infer that the ACCC is comfortable with the regional market collapsing into a two-network play. It is hard to imagine there is further scope for additional cost saving.

### 5.4 There are unanswered questions relating to affordability

The ACMA state that they “have sought advice on **the capacity of licensees to pay for spectrum licence renewals** to gain a greater sense of the broader implications of ESL pricing outcomes and whether they align with our policy objectives”.

Stakeholders deserve proper disclosure on this issue. **Whose advice was sought? When was it sought? What “pricing outcomes” were assumed (Stage 3? Stage 4?) and what were the findings?**

Given the widely varying market and financial positions of the players in the market, one would expect the proposals to **impact players differently** and with various **consequences for “policy objectives” - what were they?**

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<sup>38</sup> <https://www.accc.gov.au/system/files/Mobile%20Infrastructure%20Report%202025.pdf>

<sup>39</sup> [ACCC decides not to grant authorisation for Telstra and TPG regional network deal | ACCC](#)

## 6. High spectrum renewal prices have consequences for network quality and customer experience

The pricing of ESL renewals matters because it directly impacts mobile operators' abilities to invest in expanding and modernising their networks and improve customer experience. Various pieces of research by economists at the GSMA mobile industry association and at NERA, drawing widely on data from across the global mobile industry, draw a clear correlation between spectrum prices, network investment and customer experience.

### 6.1 Impact of spectrum costs on mobile network coverage and speed

In their paper "The Impact of High Spectrum Costs on Mobile Network Investment and Consumer Prices"<sup>40</sup> published in May 2017, NERA provided "statistical evidence that links **high spectrum costs to lower network investments and higher consumer prices**, suggesting that excessive prices for spectrum licenses may have an adverse impact on consumers".

The chart below on the left shows the **correlation between lower spectrum costs and higher wireless scores**. These results support the hypothesis in the academic literature that **high input costs suppress investments**. The chart below on the right shows that **higher spectrum costs tend to correlate with higher retail prices**.

#### Correlation of cost of spectrum against... wireless scores and... mobile data pricing

Figure 2. Spectrum Costs and Wireless Score in High-Income Countries

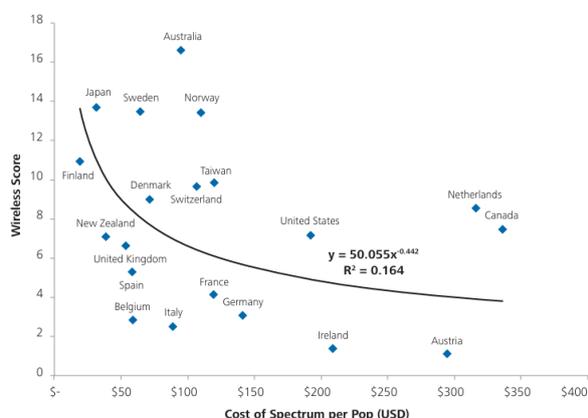
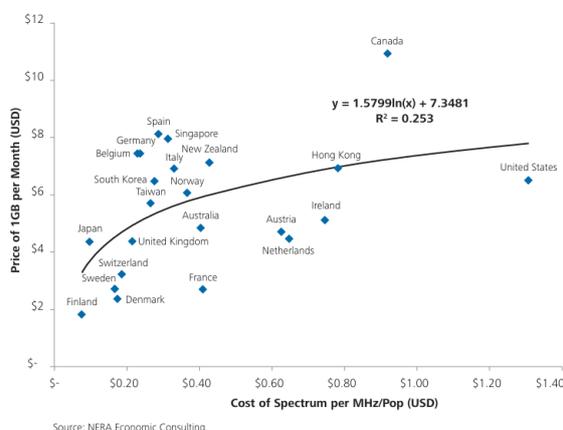


Figure 4. Price and Spectrum Cost Relationship in High-Income Countries



This conclusion would already have been clear from the earlier section of this report that discussed the **impact of high spectrum fees on key financial ratios** and the difficulty some operator may have in increasing their borrowing in order to be able to deliver their network capital expenditure plans.

**Licence fees are sunk costs - but their impact on capital budgets leaves a funding hole that needs to be repaired, yet their impact on balance sheets may make it difficult to extent their credit, with a very real impact going forward on realising network investment and its impact on network quality and customer experience.**

NERA conclude from their analysis that "**lost consumer surplus far outweighs the gain in auction revenues**".

<sup>40</sup> [PUB\\_High\\_Spectrum\\_Costs\\_0517.pdf](#)

## 6.2 Impact of spectrum costs on consumer outcomes

In its Global Spectrum Pricing report<sup>41</sup> published in 2025, the **GSMA** disclosed the results of an econometric study examining the **impact of spectrum costs on consumer outcomes** over the 4G/5G era. The dataset used in the analysis covered more than 230 operators in 97 countries between 2014 and 2023.

The study found that when the price of spectrum does not reflect its underlying value, it leads to distorted investment incentives for operators, resulting in potential underdevelopment of networks and customer experience.

Specifically, the analysis calculated that:

- a 10 percentage point higher “spectrum cost to revenue” ratio **reduced 4G coverage by 4 percentage points and 5G coverage by 6 percentage points**
- a 10 percentage point higher “spectrum cost” **reduced download speeds by 6% and upload speeds by 4%**

The GSMA also observed that “in the 5G era, the **aggregate cost burden of spectrum has increased further**, as much more spectrum has been required for 5G”.

This analysis builds on a previous study<sup>42</sup> conducted by the **GSMA** in 2019 that found that, in the era of 3G and 4G, **high spectrum prices negatively affected consumer outcomes** such as speeds and coverage.

**In practice therefore this analysis implies that high spectrum renewal prices in Australia are likely to involve trade-offs and have consequences for investment in network expansion/improvement and consumer mobile pricing, in short, the Government’s policy objectives for the sector and its customers.**

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<sup>41</sup> [GSMA Global Spectrum Pricing](#) (p33)

<sup>42</sup> [Impact-of-spectrum-prices-on-consumers.pdf](#)

## 7. Is the current ESL pricing proposal likely to deliver the Government's policy objectives?

Renewing such a significant proportion of mobile spectrum provides a once-in-a-generation opportunity for the Government to shape the future of mobile communications in Australia, to the benefit of users and the wider economy. But the linkage between pricing and the achievement of policy outcomes is complex and multi-dimensional. Simply adopting benchmarks from historical auctions is unlikely to deliver the Government's desired outcomes.

Given the very high variability of historical auction prices, and the debate around the proposed benchmarking approach, and the risk of getting pricing wrong and adversely impacting policy objectives, the pricing recommendation taken forward needs to be based on a robust and transparent assessment of the likely impact on policy outcomes of a range of pricing approaches and scenarios.

Only then can Government take an informed view on which pricing strategy is most likely to deliver its policy objectives.

### 7.1 What trade-offs need to be considered?

The Government's policy objectives provide a high-level framework for renewals. Detailed proposals need to be fleshed out and evaluated against these objectives – often there will be **trade-offs** to consider. Pricing is just one component, and in many cases it is treated as an output, not an input.

The primary test for spectrum pricing should be the public interest, considering consumer affordability, market conditions and the need to support technological advancement like 6G and AI. The **current ACMA pricing proposal does not demonstrate that it meets public interest objectives** and risks adverse outcomes such as unsold spectrum, reduced investment, higher consumer prices and changes to the competitive dynamics in the market.

Over 25 years of mobile broadband spectrum licensing, governments and regulators have taken a wide **variety of approaches** to auction pricing.

For the UK's 3G auction in 2000, the Government's overriding aim was "to secure... the timely and economically advantageous development and sustained provision of third generation services in the United Kingdom", with three specific objectives: **efficient use of spectrum; effective and sustainable competition**; and to "design an auction that is best judged to **realise the full economic value to customers, industry and the taxpayer** of the spectrum. The latter objective was worded to make it clear that the **interests of industry and consumers should be taken into account**, rather than just maximising the proceeds for the taxpayer."

To run the auction, the UK Government appointed NM Rothschild - the investment bank previously retained to lead some of the UK's largest privatisations including British Gas and BP. While it was not written down, the UK Government's approach was essentially another privatisation.

In its report<sup>43</sup> in 2014 on the **UK's 4G spectrum auction** - which raised only 2/3 of the £3.5bn figure in the previous Autumn Statement<sup>44</sup> - the **National Audit Office** focused its analysis, not on the

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<sup>43</sup> [4G radio spectrum auction lessons learned \(executive summary\)](#)

<sup>44</sup> [Autumn Statement 2012 - Cm 8480](#)

receipts, but on Ofcom's two primary objectives for the auction, namely **maintaining a competitive market and efficient allocation of the spectrum**. The **£2.4bn collected** was a second-order effect in the context of Ofcom's estimate of **expected consumer benefits of £20bn**.

Given the wide range of outcomes possible, **the process chosen for renewals in Australia needs to demonstrably deliver against the Government's stated objectives and maximise public interest objectives**.

## 7.2 Caution is needed in setting pricing, given inherent uncertainties

As well as illustrating policy trade-offs and outcomes, past auctions in the UK (and elsewhere) also demonstrate how notoriously difficult it is to estimate values and prices for spectrum auctions. Despite best efforts to predict what prices will be achieved in auctions, the reality is often very different, and a word of caution to all concerned.

Following the **5G auction in the UK** in March 2021, Nic Fildes reported in the **Financial Times**<sup>45</sup>: "The UK's latest spectrum auction has **fallen short of analysts' predictions**, raising just **£1.36bn** for the Treasury as heavily indebted mobile phone operators fought shy of a bidding war to boost their national 5G networks.... some analysts had predicted this auction could raise more than **£2.5bn**."

Following the **4G auction in the UK** in February 2013, Tim Harford reported in the **FT**<sup>46</sup>: "It's almost 13 years since the UK government raised £22.5bn in one of the biggest auctions of all time, for the right to use radio spectrum for 3G mobile phone services. The next big thing, 4G, has been **auctioned for around a 10th of that price, and a third less than the sum the Treasury had pencilled in**. What went wrong?"

He further comments: "**If we had known what the auction price was going to be, we wouldn't have needed an auction**. The whole point of the auction is to reveal how much bidders want the prize, and to charge them accordingly." **With so much uncertainty around spectrum values, and with knock-on consequences for the achievability of government policy objectives, pricing needs to be approached with caution**.

As well as **uncertainty**, there is also an apparent underlying **downward trend** in pricing, as illustrated in the chart below from the ACMA's paper<sup>47</sup> – and where prices in Australia for sub-1GHz frequencies appear to have fallen by c.60% between 2017 and 2021.

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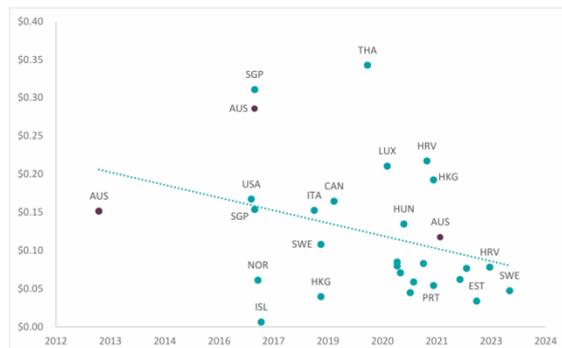
<sup>45</sup> [5G spectrum auction raises just £1.3bn for UK government](#)

<sup>46</sup> [Don't blame Ofcom if 4G price isn't right](#)

<sup>47</sup> [Preliminary views paper 4 - Pricing for ESLs.pdf](#)

## Normalised prices of sub-1GHz spectrum awards in selected markets (2012-2024)

Figure 1: Sub-1 GHz: benchmark scatterplot (single-year A\$/MHz/pop prices, converted using PPP exchange rates)



Note: The single-year A\$/MHz/pop values represented in the diagram are based on nominal amounts from the year of allocation – that is, they are not adjusted to reflect any changing value of spectrum over time.

Indeed, with such wide variation in prices paid in recent years, and their corresponding consequences, the key question is: **what is a safe level of charging that will still allow and incentivise the sector to meet the full set of government and public policy objectives, while accommodating the inevitable uncertainty.**

A final critical consideration is the **asymmetry of impacts** - in other words, **the consequences of setting pricing “too high” are much more adverse** - for the sector, for investment and for mobile users - **than the consequences of setting them “too low”**. The process of setting renewal pricing needs to take into account the **imbalance of risk and impact**, and arrive at an informed pricing position that will **maximise the likelihood of achieving national benefits and minimise the risk of harm.**

With so much at stake, in terms of the affordability of spectrum prices and the impact on operators’ ability to afford to continue to invest in networks and drive competition, regulators should be duly cautious about repeating the mistakes of the past.

### 7.3 Renewals serve a different purpose to competitive new awards

It is not at all clear that auction prices are a sound starting point for renewals, particularly where policy objectives are different. **The prices achieved in the competitive award of new spectrum often reflect the value of competitive rivalry between mobile operators.** The ACMA makes the comment that, in auctions, “incumbents may bid strategically to acquire spectrum” and that “auctions could see reductions in competition, choice and service quality for consumers”.

Mobile operators and regulators typically agree on this point: that, despite their high cost, auctions remain the best (or the least-worst) way to allocation new spectrum between competing applications. **Auctions serve a very specific economic purpose in this scenario - to determine allocative efficiency** i.e. how new spectrum should be apportioned between competing applicants, to achieve the optimal overall economic outcome. And it can be this effect (as well as high reserve prices) that leads to high auction prices.

But ensuring competitive or allocative efficiency is **not the core purpose of renewals** - and the ACMA itself makes a similar distinction: “In the current Australian market, auctions are less likely than renewal to deliver the right mix of service continuity, competition, and technology investment and innovation that benefit Australian consumers.”

Indeed, the ACMA believes that the competition that often underpins auction awards of new spectrum is absent in the case of ESLs, and there is no appetite for entrants or alternative players: “Through our extensive consultation processes and analysis of local and international markets, **no alternative competitor to the three incumbent MNOs has emerged**” while also concluding that

“renewal of the ESLs used for wireless broadband services is most likely to maintain existing competitive tension in the mobile market.”

Different purposes will likely mean different prices, particularly if they are regarded as an output rather than an input to the process.

#### 7.4 Auction pricing can reflect enterprise values rather than marginal values

Competitive awards for new spectrum - considered (at the time) as essential for success (or even just survival) in the race to launch “next generation” mobile technologies - can lead to inflated pricing, sometimes even reflecting the enterprise value of the bidder i.e. reflecting the concern that failure in the auction would be tantamount to failure in due course in the market.

In his 2023 assessment<sup>48</sup> of lessons from the UK 3G auction in 2000, Geoffrey Myers at the London Business School comments: “For the four incumbent mobile operators ..., the concern was to avoid being ‘dead in the water’... This may have led to incumbent operators being willing to **bid up to their entire enterprise value in the mobile market**, not just their incremental value for the spectrum actually being sold in the auction.”

This concern among incumbents is not a one-off - aspects repeat every time there is an auction for spectrum for the latest mobile technology, whether that is 4G, 5G or shortly 6G. There is obviously a **limit to the number of times a mobile operator can pay away its enterprise value** and thus the onus is on regulators to proceed with caution.

A good starting point is to consider **opportunity cost** i.e. **the value to the next best use**. Paying that value as a minimum ensures the spectrum is put to the best use. The ACMA already accepts that mobile use maximises benefits: “While there are other potential uses of ESL spectrum, our analysis suggested that these uses **could not deliver the broad social and economic benefits of wireless broadband technology** and can often be authorised using difference spectrum”.

#### 7.5 A way forward

This paper has highlighted that a high proportion of mobile spectrum currently in use needs to be renewed in short order. Mobile operators will not all have the same financial capacity to pay “market value” prices. High prices come with consequences for Government objectives - including investment, competition and consumer benefits. Regulators in many other markets now regard renewals as an opportunity to prioritise digital policy objectives over maximising cash proceeds.

Given the very high variability of historical auction prices, and the debate around the proposed benchmarking approach, and the risk of getting pricing wrong and adversely impacting policy objectives, the pricing recommendation taken forward needs to be based on a robust and transparent assessment of the likely impact on policy outcomes of a range of pricing approaches and scenarios.

Only then can Government take an informed view on which pricing strategy is most likely to deliver its policy objectives.

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<sup>48</sup> [Avoiding regret: how mobile phone companies \(and others\) can learn lessons from overbidding in spectrum auctions - LSE Business Review](#)

## Appendix 1 - About the author

Stephen Pentland has 35 years of experience working in the international telecommunications sector as a strategy, policy and spectrum licensing expert.

He had global responsibility for network and spectrum policy at Vodafone Group from 2014 to 2025 and managed 4G and 5G licensing and renewal activities covering some 25 markets across Europe, Africa and Asia, comprising approximately 75 separate awards and a total consideration of more than \$15bn. He co-chaired the GSMA's European spectrum policy group and represented Vodafone at the GSMA's global spectrum strategy group.

Prior to Vodafone, Stephen worked in the telecom and media sector as a strategy consultant for more than 20 years, advising governments, regulators, mobile operators, consortium partners and investors on: policy development; digital migration; the design and shaping of licensing awards; business valuations and network costing; and auction participation. He advised various mobile operators and consortium partners in preparation for Europe's 3G auctions, and was the business strategy advisor to NM Rothschild during its mandates to run 3G awards in Belgium, Denmark and Hong Kong.

Stephen has a Masters in Electronic & Information Sciences Tripos (EIST) from the University of Cambridge, England. He provides independent strategy and policy advisory services to a range of sector clients and lectures on telecom policy at a business school in Spain.

## Appendix 2 - Innovative renewal approaches in Europe

Regulators across Europe and elsewhere are placing greater emphasis on ensuring mobile operators have secure long-term access to spectrum rights and revising their approach to renewals to achieve this by providing licence extensions or renewals free of charge, or at considerably reduced price levels, or in return for operator commitments to additional investments in identified priority areas.

A number of case studies are listed here.

In **Portugal**, in February 2016, ANACOM approved<sup>49</sup> the renewal mobile operators' expiring 2100MHz spectrum rights for a period of 15 years, at no cost and in return for new coverage obligations to improve coverage in 588 underserved parishes.

In 2018, the **French** regulator, ARCEP, renewed 900, 1800 and 2100 MHz licences due to expire between 2021 and 2024 under its "New Deal"<sup>50</sup>, whereby **operators agreed to accelerate 4G rollout and provide nationwide, high-quality mobile coverage as an alternative to paying any renewal fees**. The regulator found that, after five years, the share of the population covered by 4G across all four operators had almost doubled (from 45% to 88%) and the share living outside of a 4G network had declined from 20% to 11%. Meanwhile, almost two thirds of the population now had access to 30 Mbps services or higher (up from 37%).

In April 2021, ANACOM in **Portugal** further approved a draft decision<sup>51</sup> to renew mobile operators' expiring 900MHz and 1800MHz spectrum rights until 2033, **at no cost and in return for new coverage obligations** to improve coverage in a further 100 underserved parishes, commenting that "it considers that renewing the rights... **supports the stability of operations and enables continuity of existing and planned investments by the operators**".

In June 2022, **Spain's** Ministry of Economic Affairs and Digital Transformation<sup>52</sup> revised its General Telecommunications Law (LGTel) to include an article enabling a one-time **extension to any existing spectrum licences, at no upfront cost, for a period of up to 10 years, and with a maximum licence term of 40 years**. All four mobile operators requested an extension of their licences in the 800 MHz, 900 MHz, 1800 MHz, 2.1 GHz, 2.6 GHz and 3.5 GHz bands.

In 2024, **German's** Bundesnetzagentur announced a decision<sup>53</sup> to extend existing usage rights in the 800 MHz, 1800 MHz, and 2600 MHz bands for an interim period of five years. Instead of a full-market auction, the extension was **granted at reduced prices** (which was the result of negotiations and were not disclosed by BNetzA) subject to specific coverage obligations and competitive conditions. BNetzA's justification during its consultation stage<sup>54</sup> was that "the spectrum is currently being used by the three established mobile network operators and is **contributing to the nationwide**

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<sup>49</sup> [ANACOM - Renewal of rights of use of frequencies allocated in 2100 MHz band for terrestrial electronic communication services - final decision](#)

<sup>50</sup> [Suivi du New Deal Mobile | Arcep](#)

<sup>51</sup> [ANACOM - Renewal of right of use of frequencies allocated to Vodafone Portugal and MEO in the 900 MHz and 1800 MHz frequency bands for terrestrial electronic communications services - consultation](#)

<sup>52</sup> <https://www.gsma.com/connectivity-for-good/spectrum/wp-content/uploads/2025/02/Spain-Spectrum-Licensing-Best-Practice.pdf>

<sup>53</sup> [Bundesnetzagentur - Press - Bundesnetzagentur extends mobile spectrum subject to conditions](#)

<sup>54</sup> [Consultation draft of a decision on not ordering award proceedings and on extending spectrum rights at 800 MHz, 1800 MHz and 2600 MHz and of a decision on carrying out competitive proceedings at a later point in time](#)

**coverage of consumers with high-performance broadband services.** In view of the expiry of the spectrum usage rights at the end of 2025, the President's Chamber of the Bundesnetzagentur aims to create **planning and investment certainty** for the market participants”.

In 2024, the **Czech** national regulator, CTU granted O2 and T-Mobile extensions to 2044 for their 900MHz and 1800MHz licences - the process **prioritised infrastructure investment over immediate state revenue**, using an administrative procedure whereby it imposed specific coverage and quality obligations instead of seeking to charge the full-market price.

## Appendix 3 - Reasonableness of ACMA's valuation method

Setting aside the question of whether charging full “market value” is effective in addressing the Government’s policy objectives, the benchmark method adopted by the ACMA and its advisors raises a number of concerns, including: a level of confidence that is not justified given the variability of the data set; inconsistent identification and handling of outliers; using CPI to misrepresent pricing trends; failing to take account of the trend of falling spectrum prices over time and failure to reflect dilution effects from expansion of licensed bands.

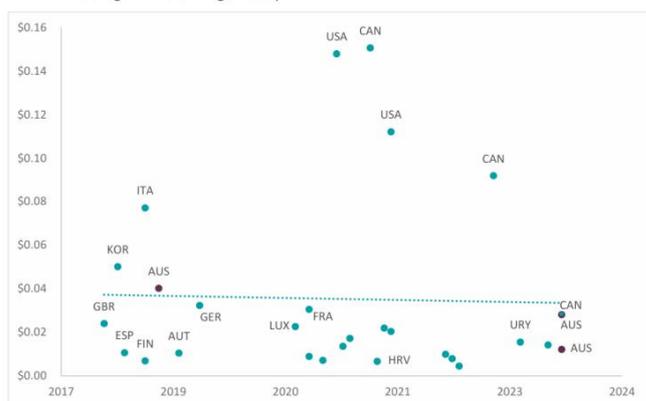
### The AMCA's level of confidence is not justified given the variability of the data set

One can always calculate the average value of a data set - but **if that data set itself has huge variations, it raises a question about the usefulness of the average.** It's a fact that spectrum auction prices vary wildly over time and between markets. They are subject to a wide range of factors and variables reflecting the circumstances of each award and the particular market.

There is no better example of this than the pricing for 3.4GHz spectrum - where prices across Europe varied by a factor of eight times, and where the prices for the US (and Canada) would literally be “off the chart”, had the axes not been doubled in range.

### Normalised prices of 3.4GHz spectrum awards in selected markets (2017-2024)

**Figure 10:** 3.4 GHz: benchmark scatterplot (single-year A\$/MHz/pop price, converted using PPP exchange rates)



*Note: The single-year A\$/MHz/pop values represented in the diagram are based on nominal amounts from the year of allocation – that is, they are not adjusted to reflect any changing value of spectrum over time.*

With policy outcomes the ultimate objective of the renewal exercise, the priority must be to understand how to set pricing within a sensible range to maximise the chances of achieving those outcomes and to minimise the risk of unintended consequences.

As mentioned in section 7, there is an **asymmetry of risk** in this exercise - **the consequences of setting pricing “too high” are much more adverse - for the sector, for investment and for mobile users - than the consequences of setting them “too low”.**

### The analysis is inconsistent in its identification and handling of outliers

The selection and validation of spectrum award data is simplistic. The huge variation in observed prices is confirmation that outcomes are the result of various factors, and the results would be more useful if there was a bit more scrutiny of these factors, and a better-informed approach to handling of outliers.

The inclusion of US data is a helpful example to illustrate the concern.

Firstly, with an addressable market of c.340m citizens, **the size of the US market is incomparable to Australia and most of the other benchmark countries**. It supports unprecedented economies of scale for successful operators in the market which, together with (almost uniquely) the **absence of spectrum caps**, has fuelled bidders' appetites - time and again - to try to gain a "winner take all" spectrum advantage over their competitors. As a result, prices have been driven to extraordinary levels - reaching \$22bn for 3.45GHz spectrum in 2022; \$81bn for 3.7GHz spectrum in 2021; \$19bn for 600MHz spectrum in 2017 and \$41bn for AWS-3 (1700/2100) spectrum in 2015 – approaching a quarter of a trillion dollars cumulatively.<sup>55</sup>

Secondly, the merger in 2020 between T-Mobile and Sprint has created a **formidable third player** in the market, and resulted in **very strong competitive dynamics** in the US. The market in Australia could not be more different - three market players, but with very different levels of market share and profitability, and a history of mergers among weakest players that did no more than preserve the viability of a weak third player, rather than result in three strong rivals now apparent in the US.

Thirdly, **the exorbitant prices for 3.7GHz spectrum are likely a result of scarcity for 5G capacity spectrum**. While 3.4-3.8GHz was the band in favour elsewhere in the world, CBRS shared-use of much of the band meant availability for exclusive nationwide licensing was highly restricted, and neither was there the future prospect of expanding into the Upper 6GHz band, which the US had already allocated for WiFi.

Fourthly, **US mobile licences have a very strong expectation of free of charge administrative renewal** - assuming the applicant is continuing to use the licence for the purpose originally intended; that there has been no permanent discontinuity of service and that the licensee has substantially complied with applicable rules and FCC regulations. Yet the benchmark analysis assumes "licences with relatively short durations (10 years)", which misrepresents the annualised value.

As if to add insult to injury, despite the outlier warning signals, the benchmark analysis **amplifies the impact of the US pricing** by giving it one of the highest weightings in the overall benchmark calculation.

DotEcon also comments that "prices from uncompetitive auctions (where significant spectrum is unsold) or administrative allocations do not reliably reflect market value and therefore provide limited or no useful information for a benchmarking exercise". Without more transparent analysis, there is a risk that, as well as high outliers being included, relevant data points may have been excluded.

### Selective use of historical spectrum pricing trends

In applying "time trend adjustments", DotEcon's analysis identified "**a decline in real prices** across some band groupings... [which were] non-linear, and it is uncertain if they will persist". DotEcon's solution was to "only use benchmarks from 2018 onwards".

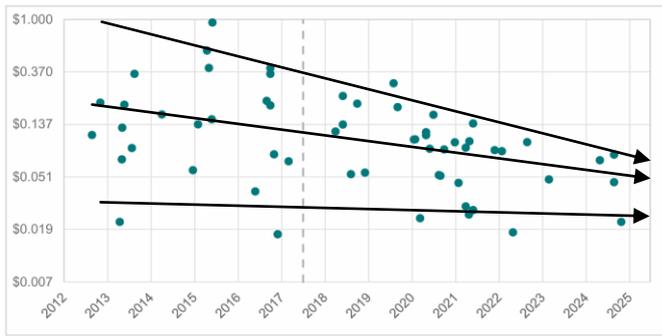
In other words, DotEcon was selective and chose data that suited its analysis and ignored data that didn't.

Taking even a rudimentary look at the data set of prices provided by DotEcon, in this example for sub-1GHz spectrum, it is hard to believe there is not a **persistent downward trend** over at least ten years, likely already falling below \$0.05/MHz/pop/annum, and likely to continue a downward trend over the next six years until the renewal process is complete.

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<sup>55</sup> [Auctions Summary | Federal Communications Commission](#)

## Normalised prices of sub-1GHz spectrum awards in selected markets (2012-2025)



### Using CPI misrepresents mobile pricing trends

The ACMA supports DotEcon’s proposal to use consumer price index (CPI) to adjust or “index” benchmark prices over time, and as a replacement to the Mobile Service Revenues (MSR) factor previously proposed - explaining “maintaining a flat projection for MSR **may not capture the effects of upcoming mobile spectrum allocations** (which have not been formally planned) as it **relies solely on historical data rather than forward-looking information**”. So... it’s OK to base spectrum prices on historical auction benchmarks, but it’s not OK to use historical trend in MSRs.

DotEcon uses the same approach to adjust between time periods: “The \$/MHz/pop single-year prices derived in the previous step are proposed to be adjusted for inflation (CPI) from 2025 to the relevant commencement date of renewed spectrum licences in each ESL band. This is done by multiplying the single-year prices by the index value for the applicable licence commencement date.”

The latest MSR in Australia for 2023 (shown below<sup>56</sup> – note 2024 and 2025 in the chart are forecasts only) are effectively **level in nominal terms relative to the figure in 2009** - i.e. over 14 years, **any growth in customer numbers has been fully offset by ARPU’s falling**. Also, there have been no adjustments made to reflect the impact of “significant changes to MTAS (termination) rates [that] have caused year-on-year revenue declines” to wholesale revenues - i.e. even a flat MSR trend is overstated.

### Mobile service revenues in Australia (FY05-23, estimated for FY24, 25)

Figure 14: Mobile service revenue inputs to MSR/MHz/pop index



Note: FY24 and FY25 figures are forecasts based on 5% annual growth in MSR.

<sup>56</sup> [Preliminary views paper 4 - Pricing for ESLs.pdf](#) p55

With **spectrum benchmark prices and ARPUs both falling over that period**, the adjustment to spectrum pricing benchmarks (whether to index over time or to adjust between time periods) surely **cannot be anything but negative**.

At the same time, CPI in Australia has been positive over the period (see charts in section 4.1). No one disagrees that CPI reflects general trends in consumer pricing - but it clearly **has no relevance to mobile pricing**, and has no basis for use in the ESL calculations.

Furthermore, CPI-based indexing could lead to a **self-fulfilling inflationary cycle in mobile prices**, assuming inflated spectrum costs are passed on through higher consumer pricing.

The mobile operators of Australia are not the first to point out to regulators the **hazards of simplistically following generic consumer “basket of goods” CPI pricing trends**. In its submission to Ofcom in 2024 to support a review of Annual Licence Fees (ALFs)<sup>57</sup>, on behalf of Virgin Media O2, NERA comments that: “Ofcom adjusts ALF each year based on UK consumer price inflation (CPI). In recent years, this has **led to significant increases in ALF at a time when the value of the relevant spectrum bands worldwide has been falling**. We present data that demonstrates **these adjustments have contributed to a material misalignment in prices**, with current ALFs for all three bands being too high. Looking forward, the appropriate annual adjustment approach depends on the future path of spectrum prices and general inflation. If spectrum prices were projected to rise, then a CPI adjustment may be appropriate. However, **the greater likelihood is that spectrum prices will continue to fall** in the period to the next ALF review...”.

### **Failure to reflect per-MHz price dilution effects from expansion of licensed bands**

A further consideration is the fact that mobile operators in Australia and elsewhere in the world have to regularly **expand the amount of spectrum they use**, to support continuous growth in customers’ use of mobile data - while ARPUs have been falling. The impact is illustrated in the left hand chart below, from the GSMA’s Global Spectrum Pricing report<sup>58</sup>, which shows **falling revenues per MHz of spectrum**.

Pricing future spectrum licence renewals on historical benchmarks fails to take account of this downwards trend and risks having an unsustainable **runaway effect** on costs.

Analysis by the GSMA<sup>59</sup> confirms that, in Europe, aggregate mobile spectrum costs (excluding original 3G costs) have **risen to 8% of annual recurring revenue** (right hand chart below). **Moderating renewal fees could be instrumental in reversing this trend** and freeing up cash for capital investment in network improvements.

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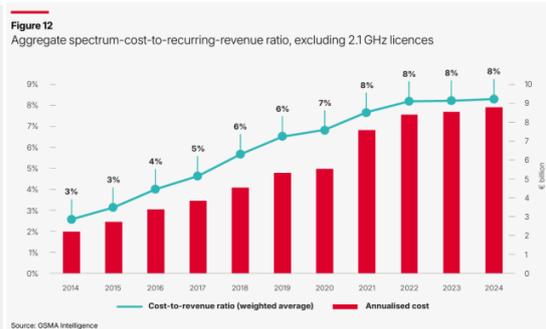
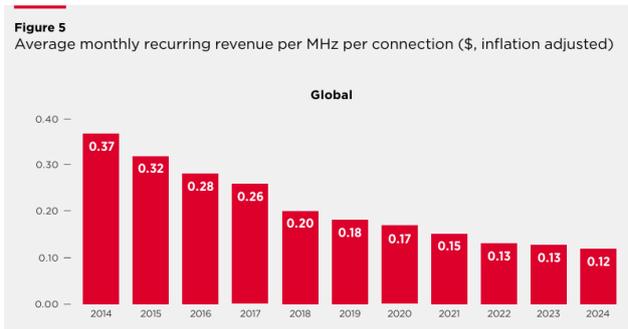
<sup>57</sup> <https://www.ofcom.org.uk/siteassets/resources/documents/consultations/category-1-10-weeks/consultation-review-of-annual-licence-fees/responses/vmo2-nera-report.pdf?v=404079>

<sup>58</sup> [GSMA Global Spectrum Pricing](#)

<sup>59</sup> [Spectrum-Pricing-and-Renewals-in-Europe-v2.pdf](#)

**Mobile revenues per MHz of spectrum  
(2014-2024)**

**Aggregate spectrum costs as % of mobile revenues  
(2014-2024)**



## Appendix 4 - The impact of “ROCE below WACC” on competition and market structure - Ofcom’s view

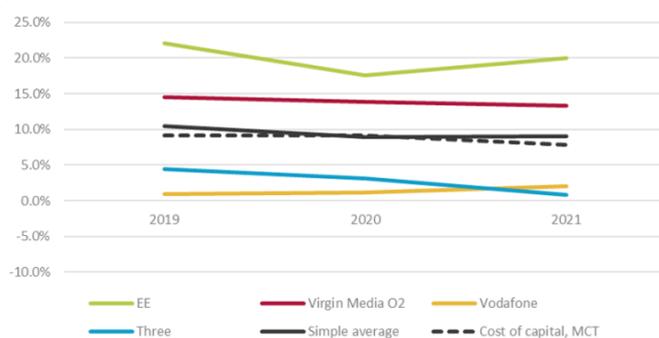
Interestingly, the conclusions of the recent EC report into the average ROCE (referenced in section 4 of this report) echo the findings of a previous report published by Ofcom in the UK in December 2022 entitled: “Ofcom’s future approach to mobile markets and spectrum”<sup>60</sup> where the UK regulator comments: “We find that **average industry returns (on an economic basis) have been above the cost of capital over the last three years** (see “Figure 4.2” below). This indicates that firms in the industry can, on average, cover their costs and earn a sustainable rate of return.”

“However, **financial returns vary across MNOs**. Specifically, the two smaller MNOs (Three and Vodafone) earned returns below the cost of capital between 2019 and 2021 and Three’s return on capital employed (ROCE) has been declining over this time period. This contrasts with the two larger MNOs that have earned returns above the cost of capital.”

Ofcom further sets out “**a risk that competition among MNOs weakens**. This could happen if one or more of the smaller MNOs become weaker competitors, and are less able to exert a strong price constraint on other operators. **A weakened MNO may also be less able, or have less incentive, to invest as fully in its network** than a larger, stronger player. If so, it may opt to scale back investment to reduce its costs, which could affect its future quality of service and potentially its ability to retain or gain market share. In turn, this may weaken the incentives of rival operators to invest in improving their networks, leading to weaker competition and poorer outcomes for customers.”

### ROCE by UK mobile operators (% , 2019-2021)

Figure 4.2: Economic return on capital employed (ROCE) by MNO, pre-tax nominal including 5G spectrum



For a sector where authorities have, more often than not, sought to block mergers, Ofcom’s position in this report was noticeably progressive, and arguably lent weight the Competition and Markets Authority’s decision<sup>61</sup> in December 2024 to allow the merger of Vodafone UK and 3UK, with the market going from four players to three.

For a market like Australia - already collapsed to three players, yet facing similar issues of ROCE and sustainable competition - the approach to pricing the renewal of spectrum licences will be a critical factor in determining the future prospects of the sector and ongoing investment, competition and customer outcomes.

<sup>60</sup> [Conclusions paper: Ofcom's future approach to mobile markets and spectrum](#)

<sup>61</sup> [CMA clears Vodafone / Three merger, subject to legally binding commitments - GOV.UK](#)

