Spectrum auctions: the current policy debates

A PolicyTracker white paper

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A rising star loses its lustre?

Spectrum auctions for mobile licences started in the USA in 1994 and over the next decade overtook beauty contests as the default mechanism for assigning high-value frequencies around the world.

…. industry experts are becoming wary of auctions and some governments are starting to change policy

Transparency has been the key to their success. With an auction there is no doubt who offered the most money for a licence, unlike beauty contests where selection criteria – such as the best management team – are often subjective.

However, the past five years have seen growing concern about the possible impact of steep auction prices on investment, consumer prices, mobile network coverage and 5G rollout. As we explain in this white paper, industry experts are becoming wary of auctions and some governments are starting to change policy.

Concerns about the possible impact of auctions have gained some backing in recent research. A 2017 study by *PolicyTracker* for the European Commission showed an association between poorer 4G network availability and higher auction prices, suggesting an impact on investment. (See graph)

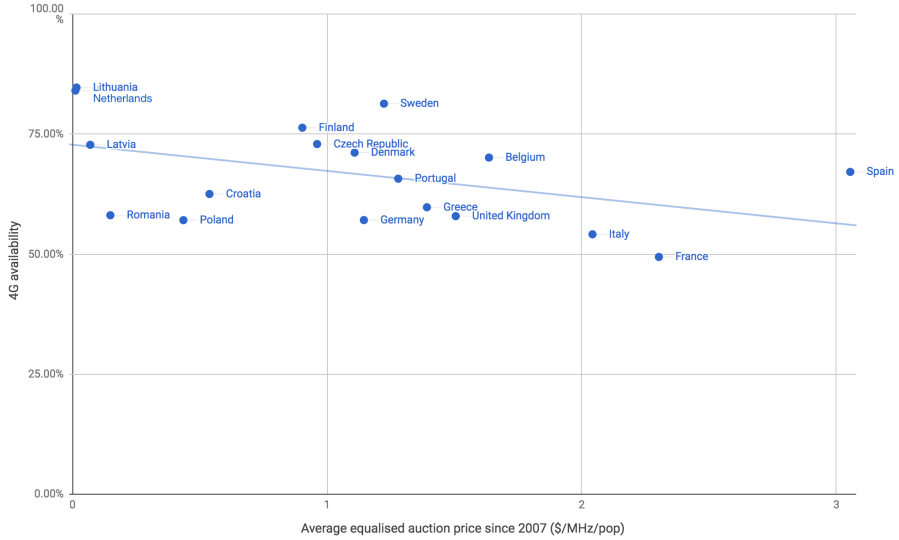

Figure 1: Availability of 4G networks compared with auctions prices. Source: PolicyTracker and Open Signal

Do auction costs influence consumer prices?

The 3G auctions of 2000 kickstarted questions about whether sunk costs affect consumer prices, prompting at least 10 papers over the years that analyse the pro and anti-positions on the issue. It's a subject that remains a key concern for policy makers with 5G auctions looming.

The central question is whether operators pass on the cost of acquiring spectrum, whatever it is, to future subscribers, or instead recognise the money paid as sunk costs.

Professor Martin Cave, an auction expert, summarises the debate: "Operators are bidding for spectrum in the knowledge they will have to put their offerings on the market. For them it's a two-stage process. They are asking themselves, 'How much should I bid for the spectrum?' Well, that depends on how much I can sell the service for.'" Once the operators have paid up, when it comes to setting the prices, logic requires them to think, 'I have spent that money anyway so going forward the objective is to make the most money out of my business on the basis.' That's the sunk cost argument."

... A concern about mobile coverage has added to the auctions backlash

A 2017 NERA study for the GSMA suggested a correlation between high auction prices and high consumer prices. Other academic research, including Cambini and Garelli (2017) and Park, Lee & Choi (2010) has found that auction prices have no effect on the consumer market. The 2017 *PolicyTracker* study agreed that consumer prices were not affected but suggested a connection between poor network investment and high auction prices.

Despite all the studies, there is no consensus among academics and economists on whether there is a link between sunk costs and consumer prices.

The need for coverage obligations

A concern about the level of mobile coverage has added to the auctions backlash, leading to a sense that auctions are not the way to guarantee wide availability and a willingness to consider new approaches.

Many early spectrum auctions were decided purely on the amount of money offered. But as the mobile market has matured coverage obligations and roll-out schedules have been added.

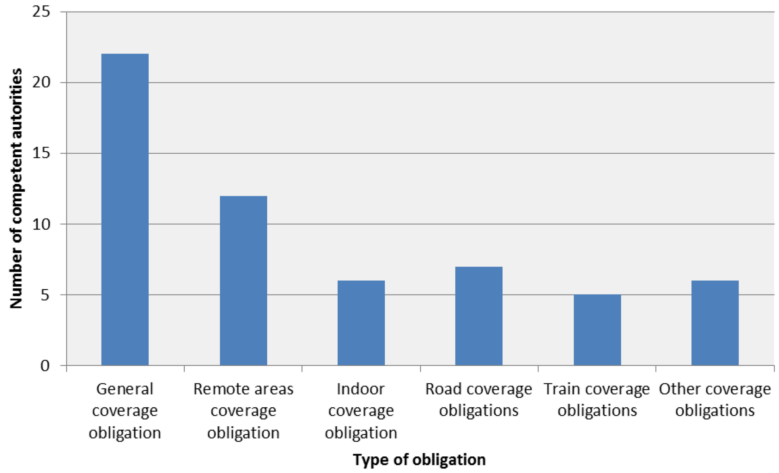

Figure 2: Coverage obligations in the EU. Source: BEREC

A recent report by the EU telecoms regulators organisation, BEREC[1], showed that almost all its members used coverage obligations, although these did vary in scope, as show in the graph. Coverage obligations have become increasingly specific, as can be seen in the 700 MHz auctions in the UK, Sweden and Germany.

…the more stringent the coverage obligations, the less like a free market the auction becomes

The problem is that the more stringent the coverage obligations, the less like a free market the auction becomes. If country A were to make 99% geographic coverage one of the conditions of its 700 MHz auction, who realistically can afford this except the current operators with their existing network of base stations?

If there were no coverage obligations in country A, it would most likely have vigorous competition in the cities, where providing a network is cheap and customers are plentiful. The opposite applies in rural areas, where Country A would likely have little coverage and limited competition.

This rural/urban divide is not politically acceptable as mobile services are increasingly seen as an engine of economic growth. So coverage obligations are likely to remain a central feature of spectrum auctions for the foreseeable future. In fact, they are becoming more specific as regulators recognise that previous rules have failed to fill in all the coverage not-spots.

Coverage trumps free market

The 3.5 GHz auction in Germany and the UK's forthcoming 700 MHz auction have specified that operators must build a certain number of base stations, cover defined geographical areas and deliver specified download speeds in order to meet coverage obligations.

France has taken a more radical approach, allowing operators to avoid auctions altogether if they commit to improving coverage. In many countries expiring licences are renewed through an auction but in 2018 France waived renewal fees for 900 MHz licences in exchange for operator commitment to a defined programme of base station investment[2]. The regulator continued its innovative approach in a July 2019 consultation on awarding 3.4-3.8 GHz for 5G. It proposed awarding 310 MHz in the band via a two-part procedure.

In the first stage, operators would be able to secure blocks of spectrum in exchange for additional commitments ahead of the auction. Those commitments include providing connectivity to vertical

[1] *BEREC report on practices on spectrum authorization, award procedures and coverage obligations with a view to considering their suitability to 5G* Dec 2018

[2] See http://www.policytracker.com/france-announces-4g-5g-plans/ and http://www.policytracker.com/consultations/france-900-mhz-1800-mhz-and-2-1-ghz-consultation/

industries, improving indoor coverage and fixed access products. Operators who agree to deliver those optional requirements would get at least a 40 MHz block for a fixed fee. The second part of the process would involve a traditional auction in which operators could bid for remaining available frequencies.

5G has raised further doubts about the use of auctions

Denmark, which planned and then postponed an auction for 700 MHz, 900 MHz and 2300 MHz spectrum, included a final auction stage in which spectrum winners could take on additional coverage obligations in exchange for reduced prices for the spectrum assigned to them. The draft, however, notes that all bidders, regardless of whether or not they have chosen to make optional commitments, will be subject to a series of coverage obligations.

The impact of 5G

The advent of 5G has raised further doubts about the use of auctions. 5G's use of mmWave with its substantially reduced propagation compared to the traditional mobile bands means it would have much higher deployment costs. The wider economic benefits of 5G leadership has led policymakers to question whether high auction prices will stymie investment. This was another factor behind the French decision.

In the UK regulators are proposing a more nuanced approach to the assignment of 26 GHz, a key 5G bands, by auctioning it in areas of expected commercial demand – cities – and leaving it unlicensed in rural areas. The high costs and poor propagation of the higher 5G bands have led many to suggest that spectrum sharing rather than traditional exclusive licences would be a better way of maximising the potential benefits. Here the UK has incorporated sharing into its proposed assignment regime, as has the US in its CBRS approach to the 3550-3700 MHz band.

Israel announced in July 2019 that it will auction 5G spectrum including 700 MHz. To support the venture, the government will give operators the incentive of a 500 million new Israeli shekels (NIS) refund to encourage them to act quickly. The Ministry of Communications reportedly agreed in principle not to increase yearly fees, currently set at NIS 300 million annually. All frequency fees will be reduced for four years, with operators required to meet engineering targets. In the second phase, the state will offer an incentive of up to NIS 200 million for companies to set up 250 5G broadcasting centres.

Is it possible to boost competition without auctions?

According to Dennis Ward, principal at DJWard Spectrum Auctions Ltd, and former spectrum auctioneer for the Canadian regulator, auction theorists and practitioners have worked over the years to improve designs and ensure that results produce certain outcomes.

Some of these outcomes may conflict with each other, such as market competition and ensuring spectrum is put to the highest value use.

We should ask: if spectrum comes burdened with extensive coverage obligations, is the assignment no longer a meaningful, market-driven process but some sort of administrative agreement?

Some countries appear to be managing their spectrum well without auctions.

Despite the absence of auctions, China's mobile market is booming.

China

China licences spectrum by administrative approval. Comparative selection only started being used in 2001, and auctions have not been used yet.

Despite the absence of auctions, China's mobile market is booming. China Mobile had around 932 million mobile subscribers as of May 2019. China Unicom had around 320 million at the end of 2018, while China Telecom had 303 million.

The three operators were recently assigned licences for large bandwidths in mid-band spectrum for 5G services, and all three are testing 5G services. The government is exploring the application of 50 GHz and beyond to meet future demands of mobile broadband.

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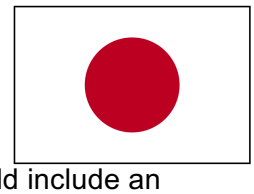
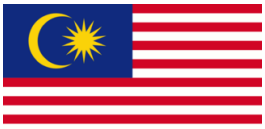
Japan



Japan is having a debate about spectrum assignment, with the cabinet office of Prime Minister Shinzo Abe believed to favour the introduction of actions. Draft guidelines for how to award frequencies in the 1.7 GHz and 3.4 GHz bands led some to conclude that the assignment could include an auction element in a country that has traditionally preferred beauty contests.

NTT Docomo is the largest mobile operator in Japan, with over 77 million subscribers at the end of 2018. KDDI was next, with 55.2 million subscribers as of March 2019, with SoftBank at 39.9 million as of June 2018. The three dominant players have urged the government to proceed cautiously on auctions.

Malaysia



Malaysia is in the process of refarming the 700 MHz, 2.3 GHz and 2.6 GHz bands for mobile services. In its 1 July 2019 consultation document it noted that while the 700 MHz band is usually awarded via an auction process in most countries, "the auction process may inflate the spectrum price and may restrict operators' ability to invest in network development." For that reason, the

regulator proposed allocating the band through a beauty contest. It proposed reassigning the 2.3 GHz band via beauty contest, and the 2.6 GHz spectrum through sharing arrangements based on actual utilisation.

Australia

Australia's regulator recently backed a hybrid approach for future use of the 26 GHz band for 5G that includes class licensed access in 24.25 -24.7 GHz, apparatus licensing in 24.7-25.1 GHz and spectrum licensing in 25.1-27 GHz. The approach would see 2.4 GHz of spectrum set aside for the mobile industry, but it would only be available in metropolitan areas and large regional centres, and would be auctioned. Part of the band would be awarded on an "apparatus" basis that would authorise the licensee to operate devices to which the specific licence relates; this approach usually doesn't imply an auction. Part of the band would be for class licence access for wireless broadband used on private property. A mobile operator seeking nationwide access to 26 GHz would need a combination of spectrum licenses and apparatus licences.

Hong Kong usually uses auctions but in 2018 decided to award 26 GHz and 28 GHz via an administrative process

Other countries

Hong Kong usually uses auctions but in 2018 decided to award 26 GHz and 28 GHz via an administrative assignment process. As noted, France's "New Deal" for mobile awarded licences in 900 MHz, 1800 MHz and 2.1 GHz with stringent coverage obligations in exchange for unchanged licence fees. The Philippines considered holding its first-ever auction in 2018, but rejected the plan in favour of a beauty contest called "highest committed level of service." In April 2019, Bosnia and Herzegovina awarded licences (in what bands is unclear) to mobile operators for 4G LTE deployment, including better service and coverage conditions.

Alternatives to traditional auctions

"Auctions have become more litigious, more time-consuming to arrange, burdensome for both the regulator and the industry, and have uncertain outcomes that can slow the process of investment," Webb Search CEO William Webb wrote in a March 2019 paper on whether auctions are no longer needed. They "extract revenue from the industry," and it's possible that regulators and operators would be content with simply an equal distribution of available spectrum to incumbents.

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Is the premise that equal distribution to incumbents is a preferred outcome borne out by recent auctions? Last year, Webb noted, saw auctions in the UK (3.4-3.6 GHz); Italy (3.5 GHz); Spain (3.6-3.8 GHz); Finland (3.4-3.8 GHz); Australia (3.6-3.8 GHz); South Korea (3.5 GHz); UAE (3.3-3.8 GHz); Ireland (3.4-3.8 GHz); and Switzerland

(700 MHz, 1.4 GHz and 3.5 GHz). All but the Italian and part of the Australian auctions saw relatively equal distribution across all MNOs.

Italy's auction was unusual because it had very unequal 20 MHz/80 MHz assignments on offer, probably resulting in extremely high prices. Australia's complicated regional auction with only 125 MHz of spectrum available apparently raised prices in some regions but in others there was fairly equal distribution.

"..the key reason for an auction -- that the optimum assignment of spectrum was unclear to the regulator -- is less valid than in the past"

These auctions broadly support the hypothesis that equal distribution of spectrum "is a result supported by the market and one that an auction process tends to deliver," but auctions expected in 2019 and beyond could benefit from alternative approaches, Webb said. One such approach is direct assignment, which could make obligations easier to impose, such as in France. Direct assignment could also involve sharing requirements.

Arguments against direct assignment include that a country using the approach foregoes auction fees that it would otherwise receive, and that such a method hampers new entrants. Nevertheless. "the key reason for an auction -- that the optimum assignment of spectrum was unclear to the regulator -- is less valid than in the past," making it less clear than auctions are the best way to distribute spectrum, Webb noted.

For Ward, direct assignments would appear to be the best alternative to auctions if the current market is shared fairly evenly amongst three or more suppliers. In this case, "more harm can be done with a poorly designed auction than with an even distribution of available spectrum to evenly matched service providers". Ward nevertheless warned the risks of direct assignment, such as claims of unfairness from some operators.

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Auctions still valid but need fresh thinking

Ward believes that "spectrum auctions remain a valuable market mechanism for spectrum assignment but see instances where they might introduce complications that might be avoided through a direct assignment of spectrum." After all, auctions remain an effective, transparent market mechanism for the assignment of a scarce resource to those have the highest valued use, he said.

The conventional approach to licensing spectrum hasn't achieved connectivity policy objectives, which could be a problem for 5G rollout, Gérard Pogorel, emeritus professor of economics and management at Telecom ParisTech, wrote in an October 2018 paper, *Spectrum 5.0: Re Thinking Spectrum Awards for Optimal 5G Deployment.*

There appears "fresh momentum to explore innovation in assignment processes and conditions" to address the disappointing results of traditional auctions for coverage and deployment, Pogorel said.

Innovations could include, for example, the Danish "twist" of giving winning bidders the option to bid for extra coverage obligations in exchange for lower licence fees; or putting auction proceeds into a universal service-like fund which could be used for prioritised societal and political needs such as rural coverage. There could be auctions on coverage obligations -- as opposed to auctions on frequency fees with coverage obligations -- and investment-centred assignment procedures. "Alternatively, and more radically, the spectrum fee could be waived or limited in order to favour investments."

For 5G, he said, "spectrum auctions 5.0 should put an end to the case by case game of successive spectrum assignments," instead putting spectrum at the service of society.•