



# Spectrum valuation and reserve prices

**Tony Lavender**

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# Valuing spectrum

Allocation decisions

Change of use of spectrum

Cost benefit analysis

Assignment decisions

Initial award

Renewal of licenses

“Market value”

# Types of award

	Auction	Beauty contest
<b>Strengths</b>	<ul style="list-style-type: none"> <li>• Economic allocation efficiency</li> <li>• Transparent</li> <li>• Can be simple (but not always)</li> </ul>	<ul style="list-style-type: none"> <li>• Focus on quality</li> <li>• Thorough procedure</li> <li>• Regulator has greater control</li> </ul>
<b>Weaknesses</b>	<ul style="list-style-type: none"> <li>• Regulator/Government has less control over the end result</li> <li>• Auction is an upfront investment and it may impact on service investment if there are capital constraints</li> </ul>	<ul style="list-style-type: none"> <li>• Doesn't necessarily maximise economic efficiency</li> <li>• Time consuming</li> <li>• Not transparent</li> <li>• Asymmetric information</li> <li>• Judging panel selection</li> </ul>
<b>Application</b>	<ul style="list-style-type: none"> <li>• Situations where there is excess demand</li> <li>• Possible to formulate quality requirements up front</li> <li>• Absence of market distortions</li> </ul>	<ul style="list-style-type: none"> <li>• Limited number of licences</li> <li>• Grip on assignment process is required</li> <li>• Supplementary requirements need to be taken account of</li> </ul>
<b>Risks</b>	<ul style="list-style-type: none"> <li>• Bidder collusion</li> <li>• Design errors could cause wrong assignment</li> <li>• Winners curse (over bidding)</li> </ul>	<ul style="list-style-type: none"> <li>• Appeal procedures</li> <li>• Prices can be set too low</li> <li>• Operators don't keep their promises</li> <li>• Winners curse (too much optimism)</li> </ul>

# Award objectives and assumptions

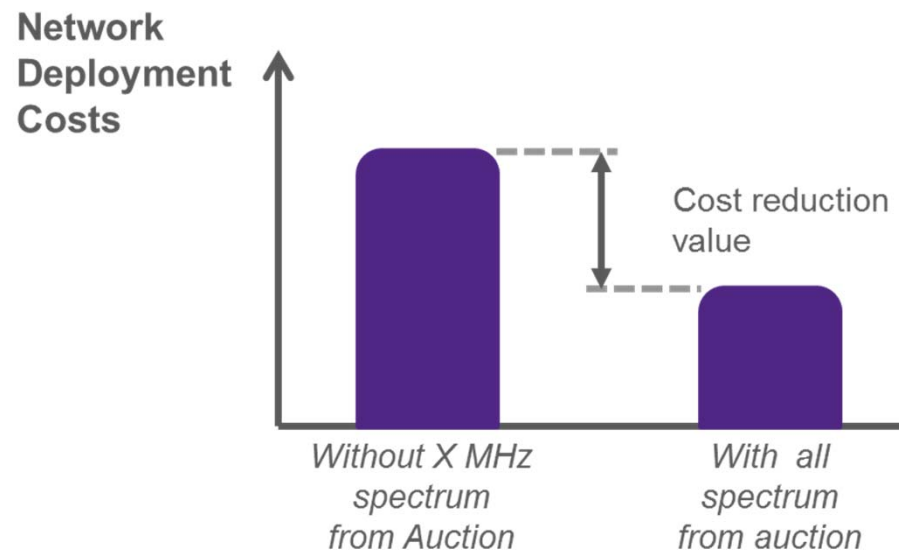
- Objectives influence outcomes and need to be clear what is envisaged
  - Efficiency
  - Benefit to economy
  - Revenue
  - Simplicity and transparency
  - Network rollout
  - Coverage
  - Quality of service
- Key assumptions
  - Licence period
  - Block size / packaging
  - Traffic demand

# Valuing spectrum for award purposes

- A number of different methods
  - Cost reduction
  - Full enterprise
  - Benchmarking

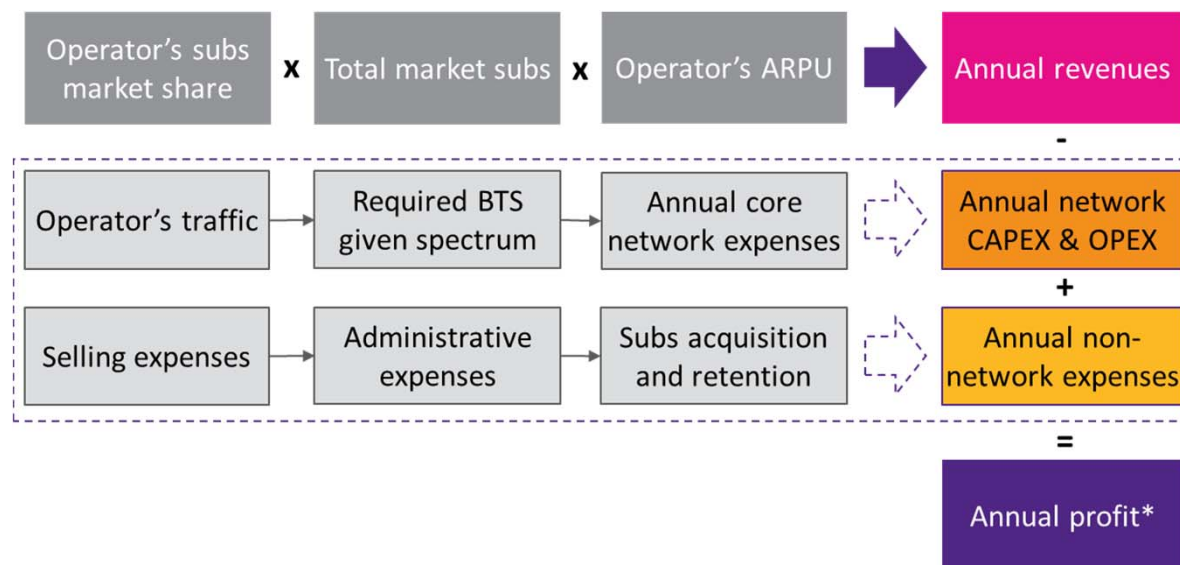
# Cost reduction

- Cost reduction
  - The cost operators would incur in the absence of more spectrum
  - Calculated as the cost of providing capacity without more spectrum (building more sectors / base stations) less the cost of providing capacity with more spectrum
  - Will vary depending on the scale of the operator and nature of the spectrum



# Full enterprise

- Full enterprise
  - Discounted cash flow model of the operators business
  - Calculated as the revenue less cost (for all spectrum holdings) over the licence period discounted using a commercial rate
  - Includes value of brand and other intangibles
  - Produces a higher value than the cost reduction method
  - Will vary depending on the scale of the operator and nature of the spectrum



# Benchmarking

- Benchmarking against previous auction results from within country and from other countries can provide a useful check on values
- Three approaches
  - Absolute value
  - Relative value
  - Econometrics
- It is important to follow a good benchmarking methodology for a robust result but there are inherent issues
  - Absolute and relative value approaches do not take direct account of country differences
  - Econometrics can take account of these differences but it is difficult to get robust results



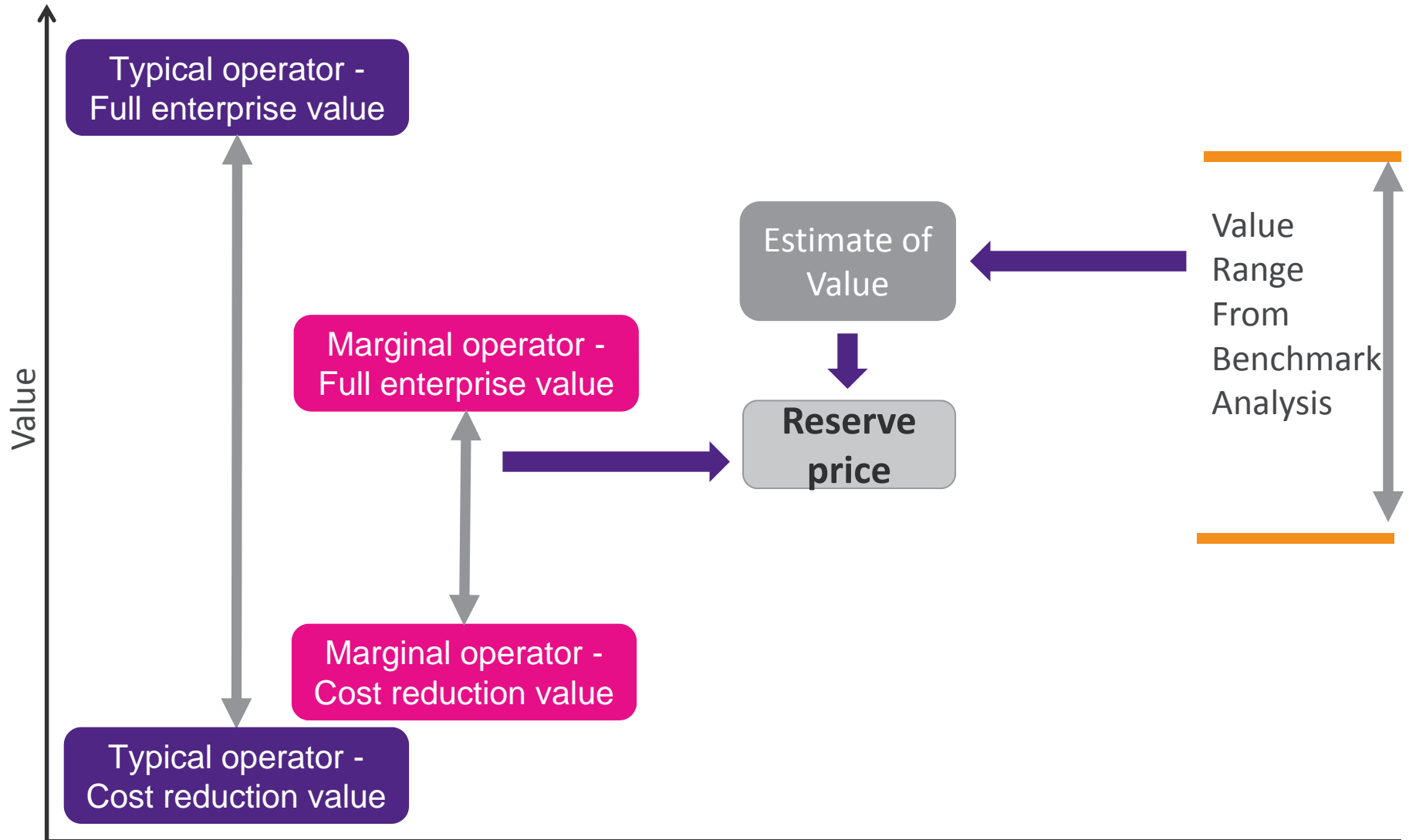
# Reserve price

- The various valuations inform setting the reserve price
- The reserve price sets the starting point for an auction – it is not an estimate of the value that might be achieved by an auction
  - Set the reserve price below the expected value as there will be a degree of uncertainty about markets and regulation over the licence period
- The reserve price should take account of the auction objectives
  - Efficiency would suggest a lower reserve price while revenue would suggest a higher reserve price
- Account should also be taken of lots/packaging
  - The utility of spectrum sold will influence willingness to pay
- If annual fees are to be charged these should be taken into account when setting the reserve price
- It's usual to set different reserve prices for each band if more than one band is being awarded

# Problems with setting the reserve price

- The reserve price should be realistic
  - Too high – bidders may be deterred from entering, reducing competition. Could leave unsold spectrum
  - Too low – too many bidders may be encouraged to enter into the auction. Inefficient
  - Both could lead to a suboptimal outcome – note that a low reserve price doesn't necessarily mean that auction values will be low
- Benchmarking the ratios of reserve price to auction price can provide an indicator of where to set the reserve price. However the ratio can vary greatly (e.g. from less than 0.1 to 1)
  - Use of regional benchmarks and benchmarks representative of a country's economic development can help to narrow the range

# Combining approaches



# Summary

- Being careful about setting the reserve price matters but it's not the only thing
  - Auction objectives
  - Utility of the spectrum
  - Influence of auction rules
- Use a combination of methods if possible to establish ranges
  - Look for commonality and differences
- Consider the risks
  - Will what is proposed lead to an efficient auction
- Ultimately there is a judgement call

Tony Lavender

[tony.lavender@plumconsulting.co.uk](mailto:tony.lavender@plumconsulting.co.uk)

+44 (0) 7047 1919