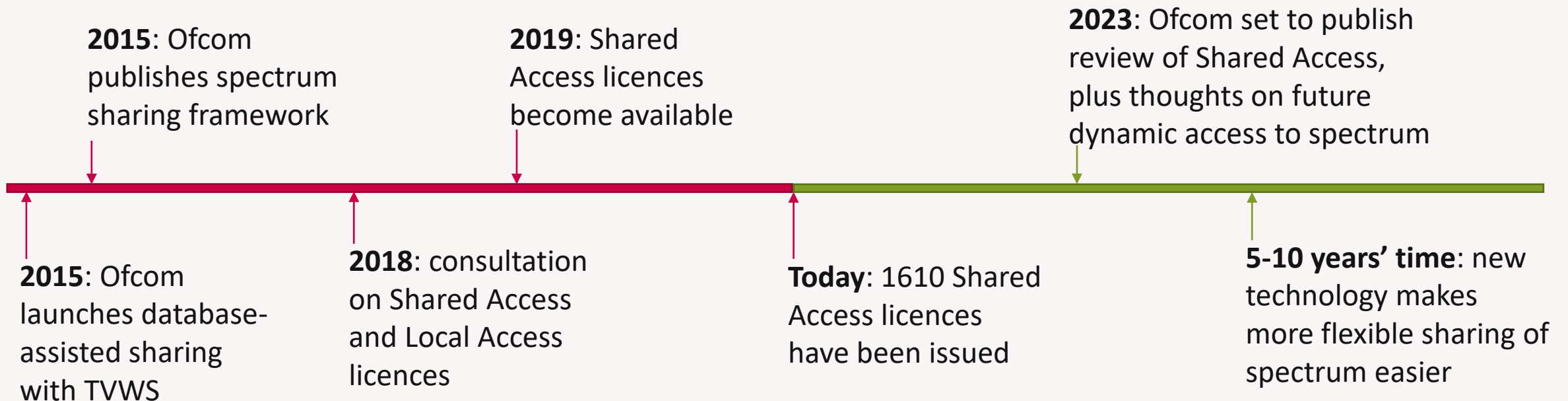# Spectrum Sharing
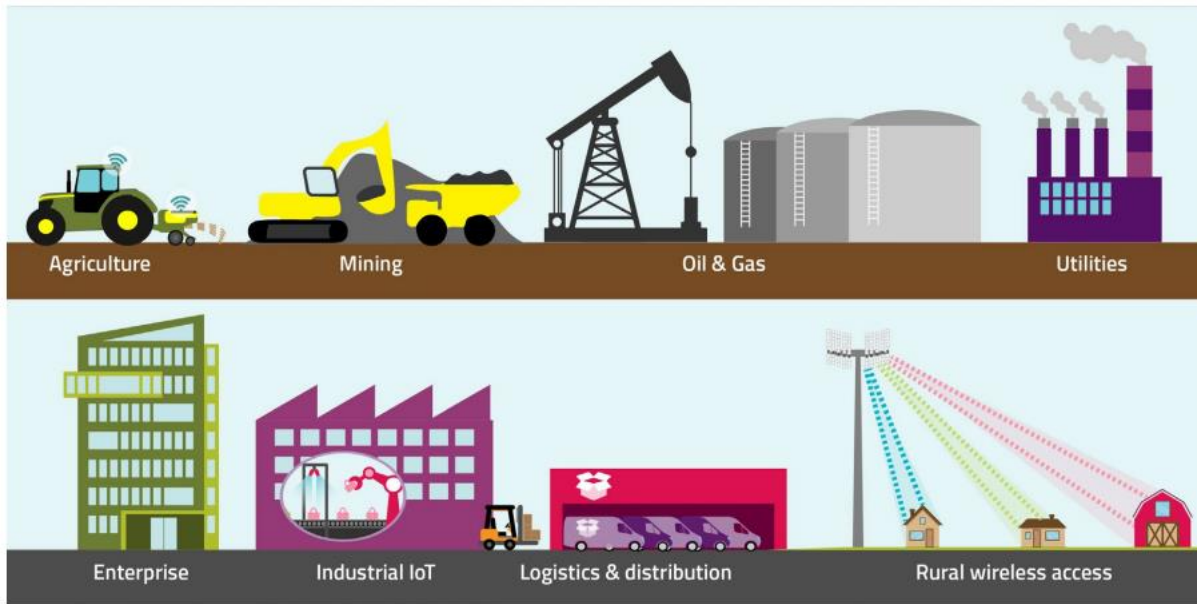
Helen Hearn, Spectrum Director, Ofcom

WinnComm, 15 December 2022

History

- Spectrum sharing has been a priority for Spectrum Group for many years

2015: Ofcom publishes spectrum sharing framework

2019: Shared Access licences become available

2023: Ofcom set to publish review of Shared Access, plus thoughts on future dynamic access to spectrum

2015: Ofcom launches database-assisted sharing with TVWS

2018: consultation on Shared Access and Local Access licences

Today: 1610 Shared Access licences have been issued

5-10 years' time: new technology makes more flexible sharing of spectrum easier

Shared spectrum and multi-usage applications

	1800 MHz (2x3.3 MHz) & 2390 MHz (10 MHz)	3.8-4.2 GHz (390MHz)	24.25-26.5 GHz (2.25 GHz) *indoor only*	Awarded mobile spectrum
Private 4G/5G networks	✓	✓	✓ In building	✓
Wireless Broadband (FWA)	✓	✓		✓
Coverage improvement Including rural and in-building	✓	✓ In building	✓ In building	✓

- We recognise that there is a growing demand for spectrum access from a range of players (new and old) supporting different applications;

- In 2019, we took steps to make mobile spectrum available with different usage rules and characteristics to suit different technical and business needs;

- We expect that in the future, we will continue to see growth in demand for:

  - private networks from industrial users;

  - existing and new communications providers

  - network integrators

Ofcom's spectrum sharing framework

|	Local Access licence (National mobile spectrum)	Shared Access licence (Shared spectrum)
Bands available	Spectrum licensed on a national basis to an MNO (700MHz, 800MHz, 900MHz, 1400MHz, 1800MHz, 2350-2390MHz, 2.6 GHz, 3.4-3.8 GHz)	1800 MHz (2x 3.3 MHz) 2.39-2.4 GHz (10 MHz) indoor only 3.8 – 4.2 GHz (10 – 100 MHz) 24.25-26.5 GHz (50, 100, 200 MHz) indoor only*
Technical conditions	Specified by applicant	Low power (24 dBm) 50m area Medium power (42 dBm) single transmitter in rural areas only.
Access type	Ofcom liaises with MNO to see if they have a reasonable objection whether it impacts their current and/or future deployment plans. Ofcom reviews evidence supplied and makes a decision.	Ofcom coordinates access for interference to/from other users on first come first served basis, deployment within 6 months
Licence duration	Finite period normally 3 years (but longer durations if agreement is reached with the MNO)	Indefinite subject to annual fee payment
Licence costs	£950 one-off cost	£80 per 10 MHz (all bands except 26 GHz) £320 flat fee (26 GHz)

* Proposals to extend Shared Access in 26 GHz as part of the upcoming award.

Shared Access licence: Low and Medium power

Low power (24 dBm) area licence

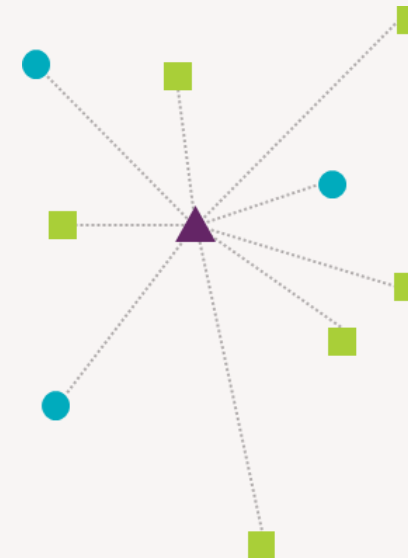50m

Medium power (42 dBm) base station licence
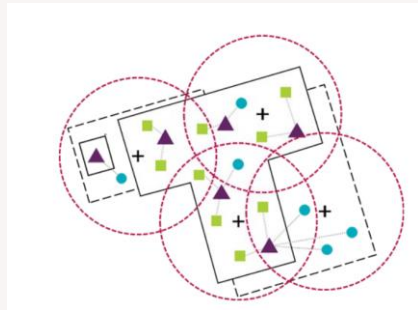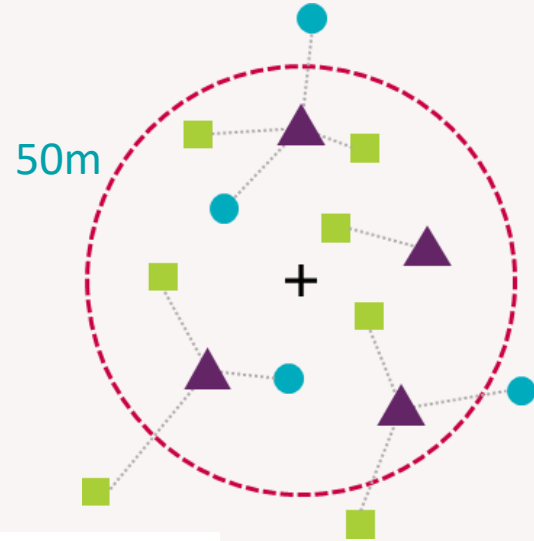
Multiple licensed areas to cover indoor and outdoor locations at a premises.
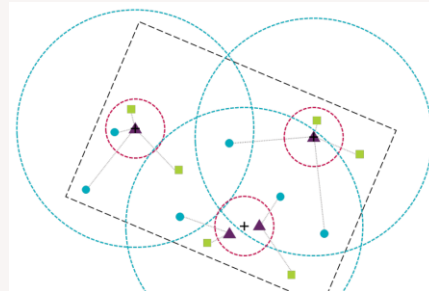
Multiple licensed areas to cover a large site. Terminals allowed to connect to base stations outside of licensed area.

Legend

+ Registered location

- - - - 50m radius from registered location

——— Wall of building

— — · Perimeter of outdoor yard area

▲ Base station

■ Fixed/installed terminal

● Mobile/nomadic terminal

········· Base station/terminal connection

How many licences are on issue

<u>Local Access</u>
Currently we have 30 licences on issue to 9 different companies. Almost all in the 2.6 GHz band.

<u>Shared Access</u>
1610 licences on issue to over 70 different companies.

	1800 MHz	2.3 GHz	3.8-4.2 GHz	26 GHz	Total
Low Power	894	34	184	1	**1113**
Medium Power	89	-	408	-	**497**
Total	**983**	**34**	**592**	**1**	**1610**

Shared Access Licences issued by month
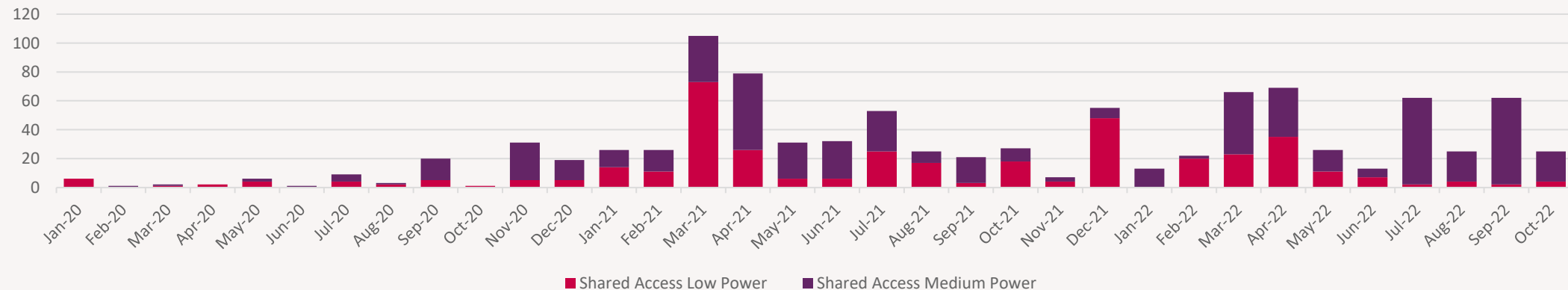
Automation

- Currently in the process of a major upgrade of our spectrum management licensing platform.

- New platform will provide a better online process for our stakeholders and enable us to continue to deliver an efficient spectrum licensing service into the future.

- Aim to is automate much of the Shared Access licensing process to allow users to better serve themselves.

- Automation should significantly reduce the time taken for licensees to receive their licences from weeks to a matter of hours or even minutes.

- The question is do licensees want faster access based on the traditional licensing model or a more dynamic and adaptive approach to accessing spectrum?

Adaptive spectrum allocation: what we're looking at

- In our 2022/23 plan of work, we said:

  "We will set out our thinking on the potential role automated assignment databases could play in meeting future spectrum management challenges. We will seek input on the range of solutions, challenges and benefits our approach might encounter alongside traditional spectrum management authorisation options."

- Following on from stakeholder engagement in Spring, including a stakeholder workshop in May, where we sought input on the problems a more adaptive spectrum allocation might fix.

- A database approach is part of our consideration, but we are also considering a range of ways in which users can share spectrum, and triggers for further steps over the next ~10 years.

- MOD has expressed interest in the potential for greater sharing of spectrum

- Not currently focusing on specific bands, but trade-offs for a range of scenarios, including:
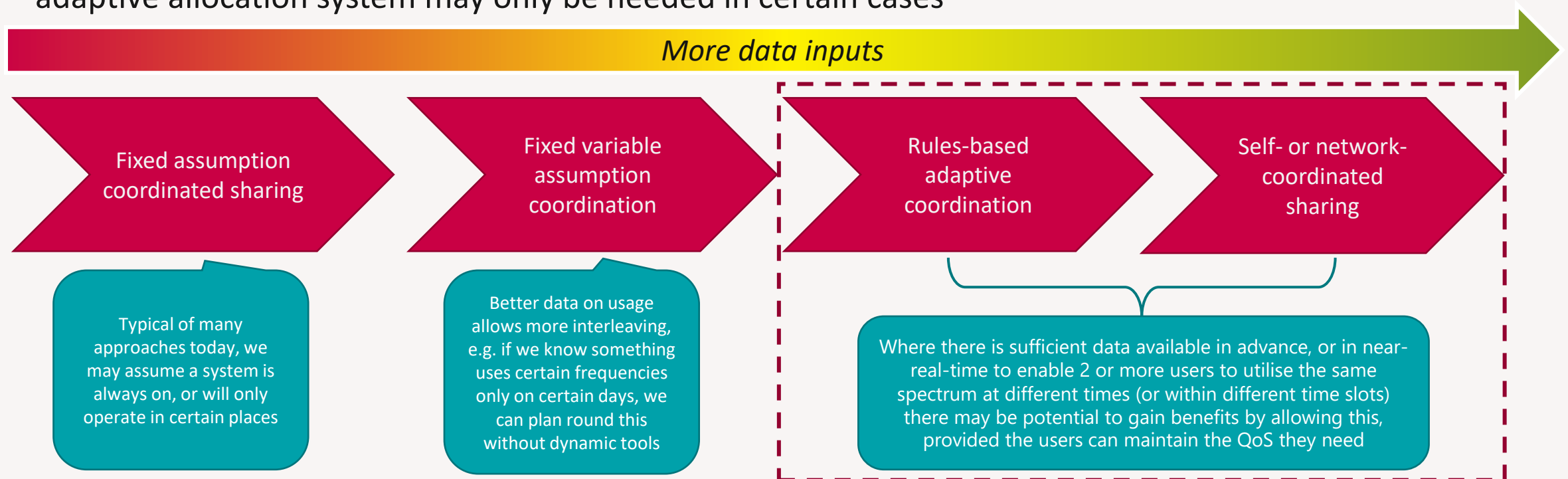
Centralised - Decentralised	Tiered - Co-primary	Static users - Moving users	Data from devices - Modelled assumptions

Better data can enable more sharing, but whether dynamic or adaptive allocation is needed depends on the situation

- Some of the opportunities stakeholders identify for dynamic management actually just require more information for better static sharing, whilst more radical opportunities are likely to require intra network management, and industry investment;

- Better data on usage will invariably help us make the best and tightest sharing decisions, though adaptive allocation system may only be needed in certain cases

More data inputs

Fixed assumption coordinated sharing

Fixed variable assumption coordination

Rules-based adaptive coordination

Self- or network-coordinated sharing

Typical of many approaches today, we may assume a system is always on, or will only operate in certain places

Better data on usage allows more interleaving, e.g. if we know something uses certain frequencies only on certain days, we can plan round this without dynamic tools

Where there is sufficient data available in advance, or in near-real-time to enable 2 or more users to utilise the same spectrum at different times (or within different time slots) there may be potential to gain benefits by allowing this, provided the users can maintain the QoS they need

Some use cases will prioritise certainty, but opportunistic access could provide "top-up" capacity for others

- Conversations with stakeholders, academics, other regulators have identified some key questions:

  - *Does dynamic/opportunistic access to spectrum give users enough **certainty** to invest in equipment?*

  - *Could users with existing spectrum holdings benefit from opportunistic **"top-up" capacity**?*

  - *What are the key **use cases** which could build a business model on opportunistic/flexible access to spectrum? Transmission of data at flexible times? Using spectrum at off-peak hours?*

  - *Is there an **equipment ecosystem** developing which will sufficiently support this?*

  - ***CBRS** viewed as a success by many but also acknowledged as a specific solution to a specific problem – are there similar problems on the horizon that may require a flexible solution in the UK in the future?*

  - *Which band user mix would stakeholders **prioritise** for shared/flexible access with incumbent users? For example, MOD has expressed interest in exploring more adaptive sharing, but there may be a range of user scenarios.*

  - *What **international coordination** would be needed to enable more flexible sharing of spectrum?*

- We expect to publish our position on all of this in the coming months and will invite stakeholder comments