

Spectrum management with a user-centric approach - Enterprises and Industry users

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DSA Global Summit

23 September 2024

Spectrum, Verticals, and Enterprises

- This session is about spectrum for verticals, spectrum sharing, and dynamic spectrum access.
- First of all, what is a vertical? A vertical is a company or public sector organisation operating in a specific sector, such as:

Manufacturing

Healthcare

Logistics

Construction

Events

Public transport

Retail

Hospitality

Public safety

Education

Utilities

and many more

- Enterprise networks address the connectivity needs of all these sectors.
- Key questions : What do enterprises need spectrum for, how much spectrum do they need, and how can they benefit from spectrum sharing?

Enterprise connectivity

- For wireless enterprise connectivity, there is a large number of very diverse use cases with very different needs and requirements.
- Enterprise wireless networks have traditionally been deployed by a variety of different companies and used a variety of technologies operating in licence-exempt and licensed spectrum bands.
- For indoor and low-mobility use cases, Wi-Fi has been the wireless connectivity technology of choice for the vast majority of enterprises.
- Complementing Wi-Fi networks by addressing outdoor and higher-mobility use cases, private mobile (P5G) networks have gained traction during the past years.
- The future will increasingly see hybrid Wi-Fi/P5G enterprise networks being deployed.

Enterprise spectrum needs: High-capacity enterprise use cases

- Where the full 6 GHz band is available for Wi-Fi, particularly in the U.S., we have seen a surge in deployments at:
 - **Universities**
 - High-speed downloads for each student, anytime, anywhere
 - Immersive, interactive learning
 - **Stadiums/arenas**
 - Tens of thousands of concurrent high-speed uploads and downloads
 - **Large hospitals**
 - Wide variety of services, from visitor voice and Internet access to high-speed high-resolution image transfer
- In all these deployments, site administration, operations, and other functions are also using Wi-Fi connectivity.

Why is spectrum sharing important for enterprises?

- Only by sharing, the spectrum resources that enterprises need can be provided in a technically and economically feasible way.
- Wi-Fi, the backbone of wireless enterprise connectivity is designed to share, and it does share spectrum with other users in all its active bands (2.4/5/6 GHz).
- Low Power Indoor (LPI) and Very Low Power (VLP) Wi-Fi can share spectrum with incumbents without further measures.
- Standard Power (SP) Wi-Fi can share with Fixed Links (FS) through Automated Frequency Coordination (AFC).
- The capacity delivered through “Wi-Fi spectrum” essentially comes for free.
- **There is no under-utilized or unused Wi-Fi band!**

Do enterprises need even more spectrum?

- The digitalization of industry and society overall drives the need for wireless connectivity.
- Spectrum that can be easily and affordably used is becoming increasingly scarce.
- Still, there are bands that are under-utilized or unused. This is the case with a considerable amount of spectrum licensed for exclusive use by IMT wide-area networks.
- Certain enterprise use cases can benefit from IMT, but spectrum is needed only locally.
- Anticipating the growing demand, many administrations have taken steps to provide more spectrum for enterprise use, albeit using different approaches.

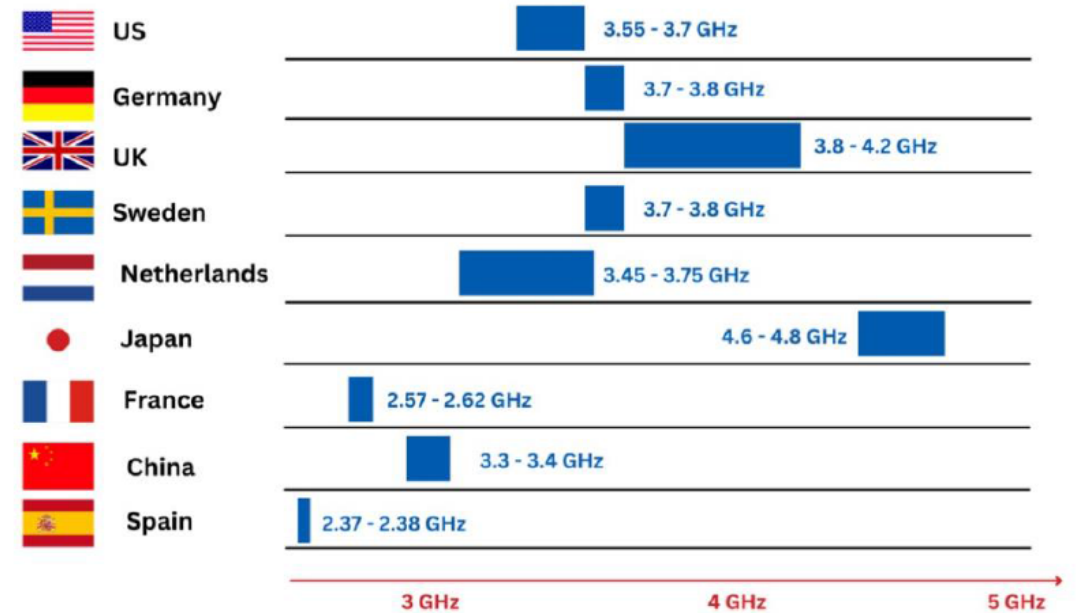
How is spectrum made available for enterprises/verticals?

- Example: United States
 - Licence-exempt/Wi-Fi in the 2.4, 5, and full 6 GHz (5925-7125 MHz) bands
 - CBRS in the 3550–3700 MHz band
 - Tiered sharing, Spectrum Access System (database, sensing)
- Example: United Kingdom
 - Licence-exempt/Wi-Fi in the 2.4, 5, and lower 6 GHz (5925-6425 MHz) bands
 - Licensed Shared Access in the 1800 MHz, 2300 MHz, 3.8-4.2 GHz and lower 26 GHz bands. Low-and medium power licenses.
 - Licensed Local Access in various unused mobile bands.
 - Individual assessment and licensing.
- Example: Germany
 - Licence-exempt/Wi-Fi in the 2.4, 5, and reduced lower 6 GHz (5945-6425 MHz) bands
 - Dedicated spectrum for licensed local networks in the 3.7-3.8 GHz and 26 GHz bands
 - Individual assessment and licensing.

Bands available for private/local mobile networks in EMEA

- **In Europe**, an increasing number of countries are adopting a local licensing model that uses dedicated spectrum for 5G verticals.
- In total, 14 European countries have proposed or implemented a local licensing model.
- The exact portions of spectrum used for these licences vary across Europe.
- The 3.8-4.2 GHz band is emerging as a potential harmonized band for Europe.
- **In MEA**, Bahrain is the only country that allows private local networks operating in the 3.8-4.2 GHz band.
- KSA is expected to publish a regulation later this year and UAE is studying the subject.
- Qatar allows local mobile networks that are run by the country's two MNOs. Exceptionally, private mobile networks may be authorized.

Variation of spectrum bands for 5G verticals in different countries



Source: EY - 5G Observatory Biannual Report, Report of June 2024

Sharing in the upper 6 GHz band (6425-7125 MHz) between IMT and Wi-Fi

Objective: Make the upper 6 GHz band usable by both Wi-Fi and IMT in a way that both technologies can perform as intended.

Is it feasible? Studies being conducted by CEPT will show. Various sharing options are being discussed. Equal treatment of IMT and Wi-Fi must be a pre-requisite. IMT does not have priority.

Does it make sense? This remains to be determined. Sharing should not be an aim in itself but provide tangible benefits. Providing indoor broadband connectivity from outdoor high-power macro base stations in urban areas already covered by more efficient FTTH plus Wi-Fi is not a prudent idea.

To be considered: Enterprises need predictability, in technical and financial terms. Enterprise networks are meticulously engineered to support a large variety of services and meet stringent QoS requirements.

Deploying a large enterprise Wi-Fi network, for instance in a large arena, requires significant investment which is intended to cover a period of 7-10 years and must be protected.

Summary and Conclusion

- Sharing as a means to use scarce spectrum resources more efficiently has its merits but each scenario has to be assessed carefully.
- Harmonisation of licensed spectrum for enterprise use is complicated, at least in Europe.
- Licence-exempt spectrum (6 GHz) may be easier to harmonize.
- Regulators should focus on exploiting the strengths of complementary technologies.
 - Example: IMT and Wi-Fi
 - Encourage adoption of innovative mechanisms such as seamless handover from cellular to Wi-Fi and vice versa.
 - Discourage the establishment of redundant and inefficient networks.

Thank You


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