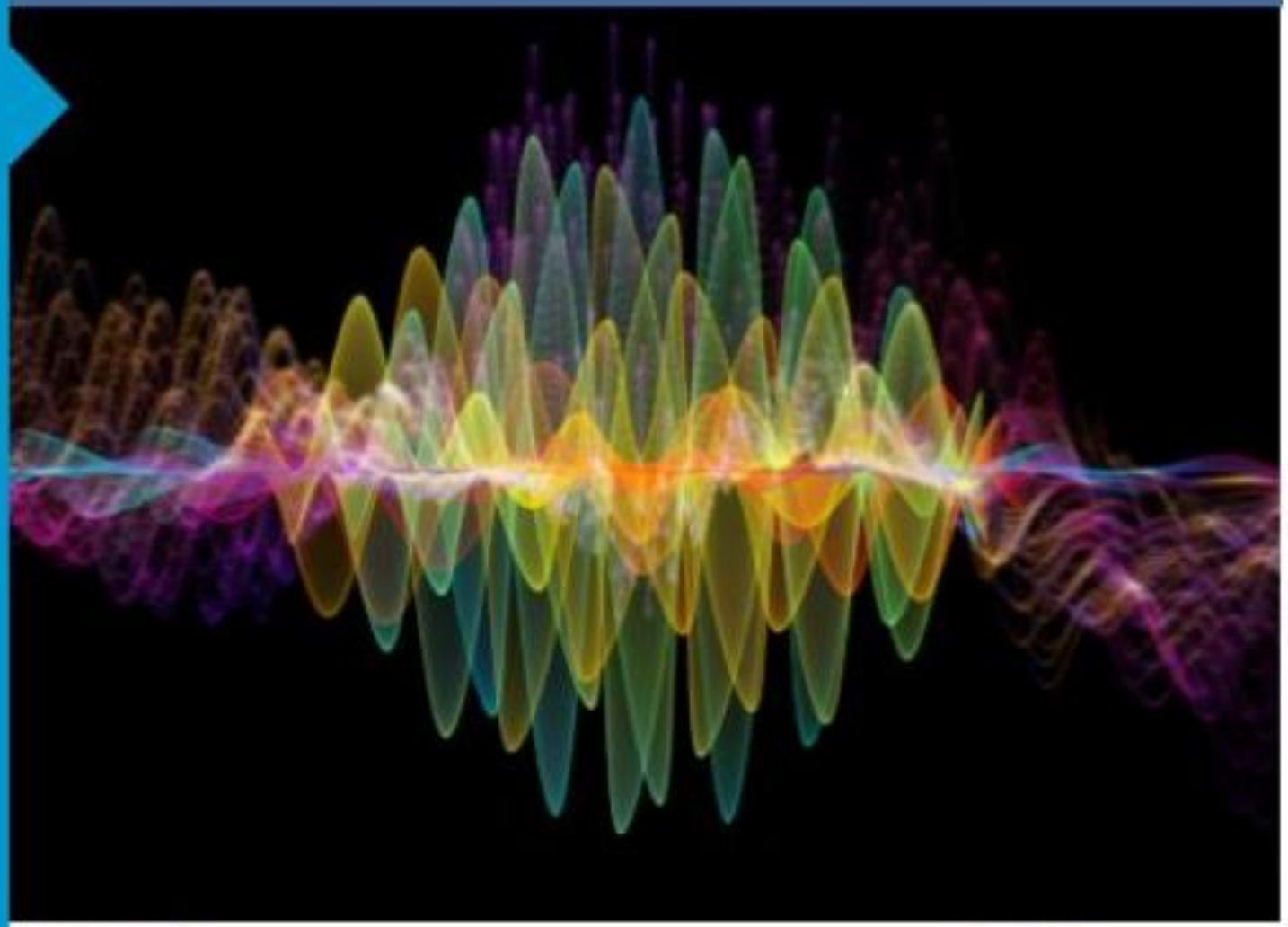
ITUEvents

BROADBAND CONNECTIVITY | 5G AND BEYOND | FREQUENCY MANAGEMENT | FROM WRC-19 TO WRC-23 | DIGITAL BROADCASTING

SHARING OF SPECTRUM AND INFRASTRUCTURE TO FACILITATE EFFICIENT 5G NETWORKS DEPLOYMENT



1-2 July 2020
Remote meeting

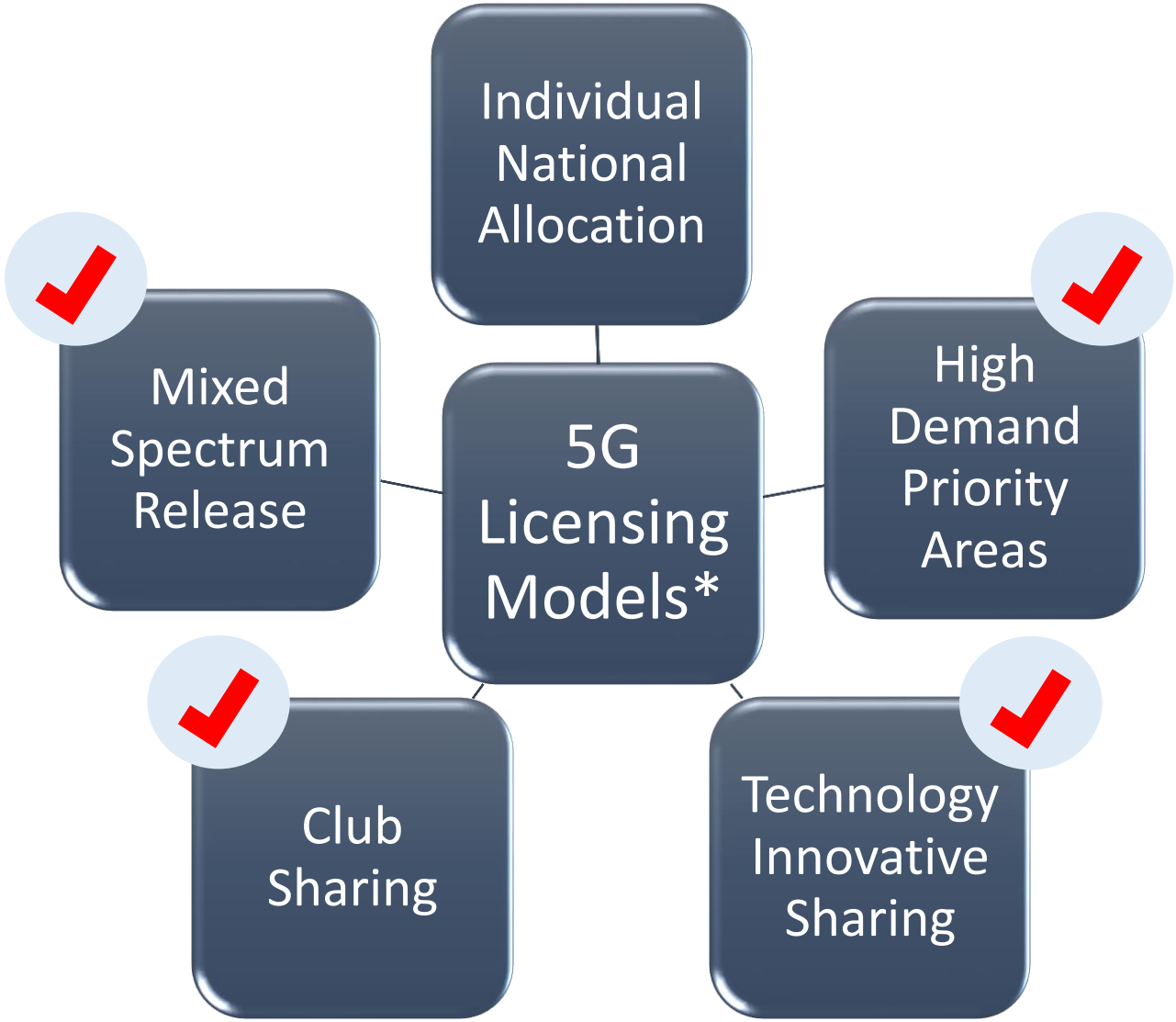
Pavel Mamchenkov

ITU Seminar for Europe and CIS on spectrum management and broadcasting

Supported by: NMHH National Media and Infocommunications Authority - Hungary

Organized by: ITU

Modern Spectrum Licensing Models in the Context of 5G

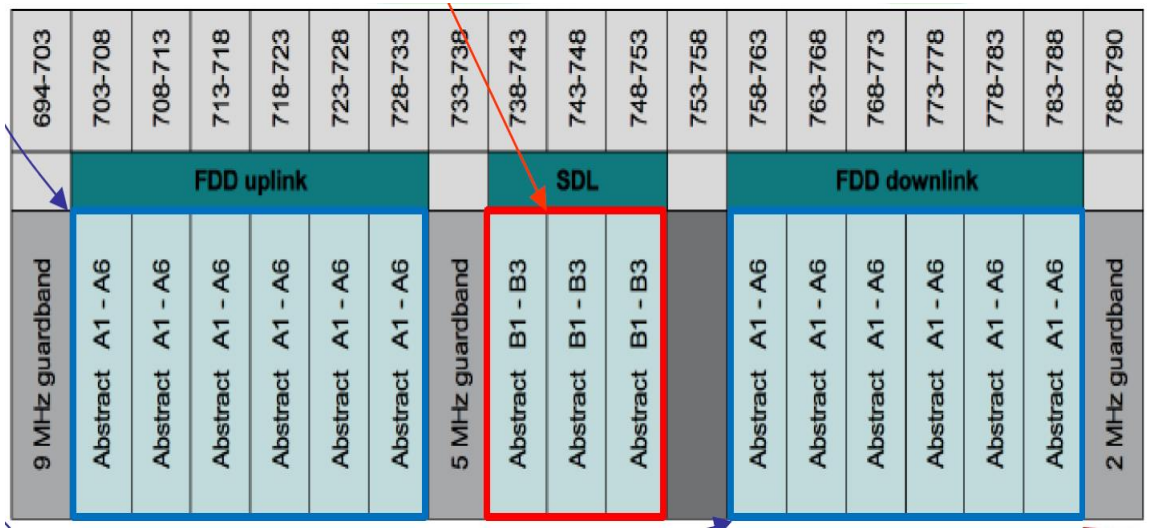


Due to extraordinary high total cost of ownership (TCO), 5G establishes spectrum sharing opportunities on a scale not feasible in previous generations of mobile technology as well as motivates cost sharing (e.g. infrastructure sharing) in order to make deployment economically viable.

- four out of five modern spectrum licensing models for 5G assume spectrum sharing

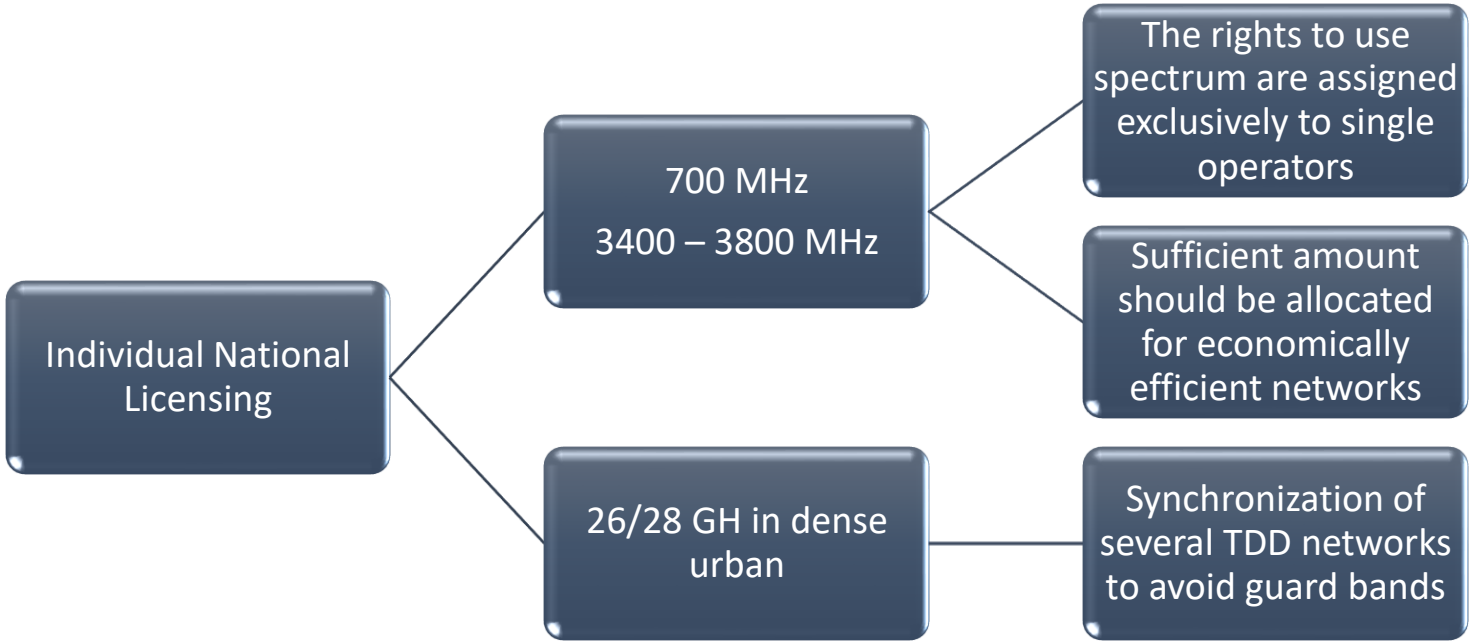
** - classification as proposed by UK Spectrum Policy Forum to form the basis of advice to DCMS and Ofcom on 26 GHz licensing*

Individual National Spectrum Allocation



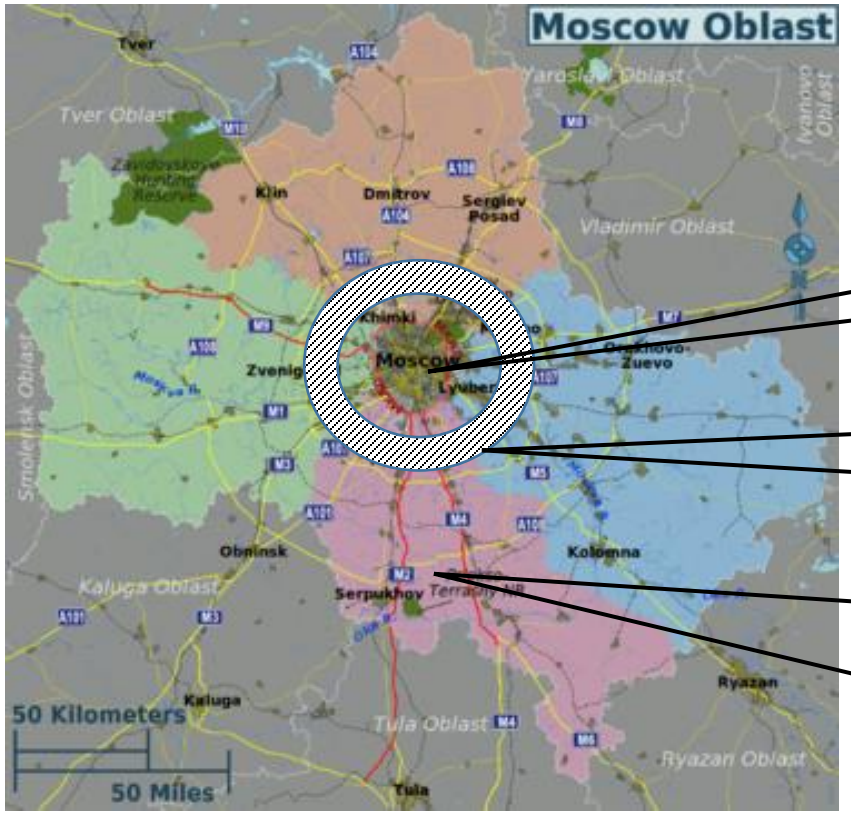
Individual (exclusive) national spectrum licensing is the 'conventional' model, which will remain of central importance in 5G as key enabler of:

- promoting competition;
- supporting significant investments in networks;
- development of a devices ecosystem;
- delivering guaranteed QoS to consumers.



Mixed Spectrum Release Model

5G mmWaves (26/28 GHz) are limiting range, increasing costs of wide-area coverage to unsupportable levels with significantly reduced or a total lack of indoor penetration. Simultaneously mmWaves are facilitating innovations in spectrum sharing by virtue of the greater radio isolation achieved between indoor and outdoor environments, and the more localized propagation when used outdoors. Scenario with two distinct components:



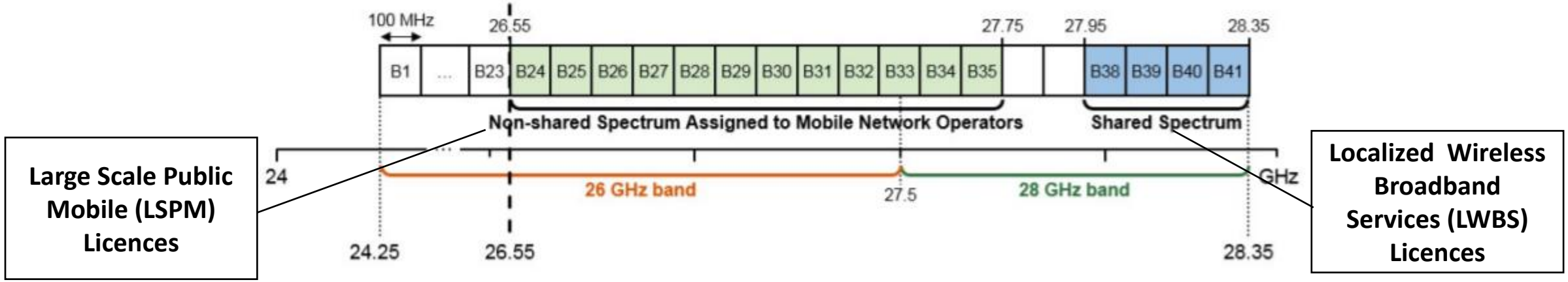
High Population Density Area with Exclusive Allocations where spectrum blocks are auctioned for exclusive use by individual MNOs. The exact boundary should be established through consultation by a regulator.

Buffer Area is desirable to be calculated by means of on-line access to a spectrum management tool/database

Non-Urban Model with Shared Access could be based on assignment principle “first come first served”. May be unsuitable for backhaul use cases with higher reliability and QoS requirements. May be restricted due to the need for TDD network synchronization leading to guard-bands between operators, or an acceptance of unpredictable interference.

High Traffic Demand Priority Areas (Hong Kong Model)

The Communications Authority (CA) of Hong Kong has subdivided 26/28 GHz band into the non-shared and shared spectrum. 400 MHz (27,95 – 28,35 GHz) is allocated on a non-exclusive and geographically sharing basis (“Shared Spectrum”) for the provision of innovative wireless broadband services in the specified locations with high traffic demand.

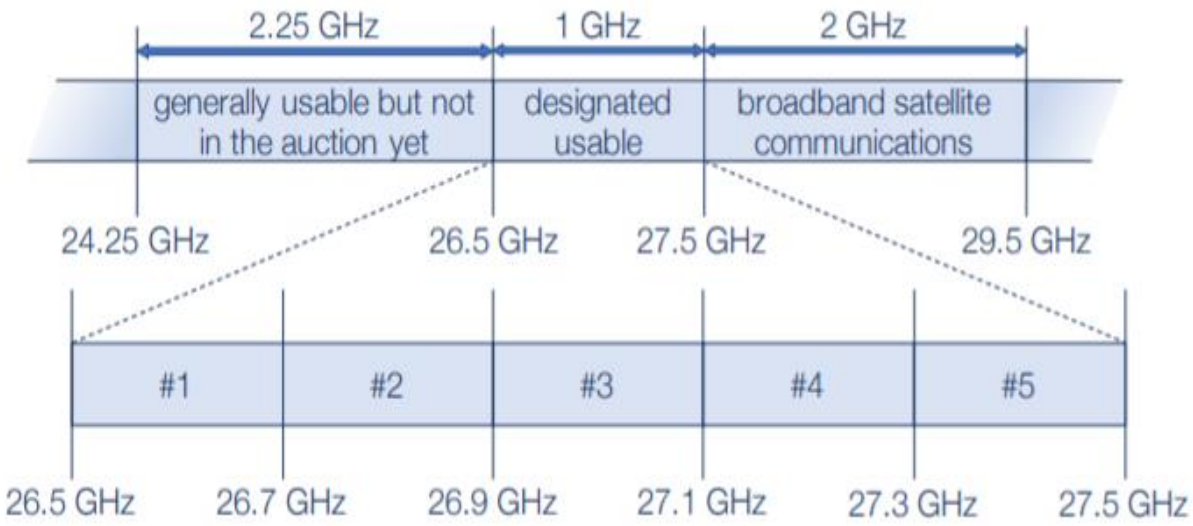


- LWBS are wireless data-centric communications provided to specific groups of users in specified locations subject to a limit on total network coverage of no greater than 50 square km.
- Assignees of the Shared Spectrum should not deploy the spectrum assigned on a wholesale or retail basis to provide conventional public mobile services (LSPM).

- More light-handed licensing approach is applied to encourage entry of a wider range of service providers into the new 5G market and to avoid disproportionate regulatory burdens for an assignee of limited geographic scope.
- LWBS are not the subject to network and service rollout obligations.

- Spectrum is assigned based on “first come first served” principle.
- Spectrum cap is 400 MHz per operator.
- LWBS licence duration is 5 years.
- CA encourages commercial agreements for the sharing of “bottleneck” facilities.

Club Sharing



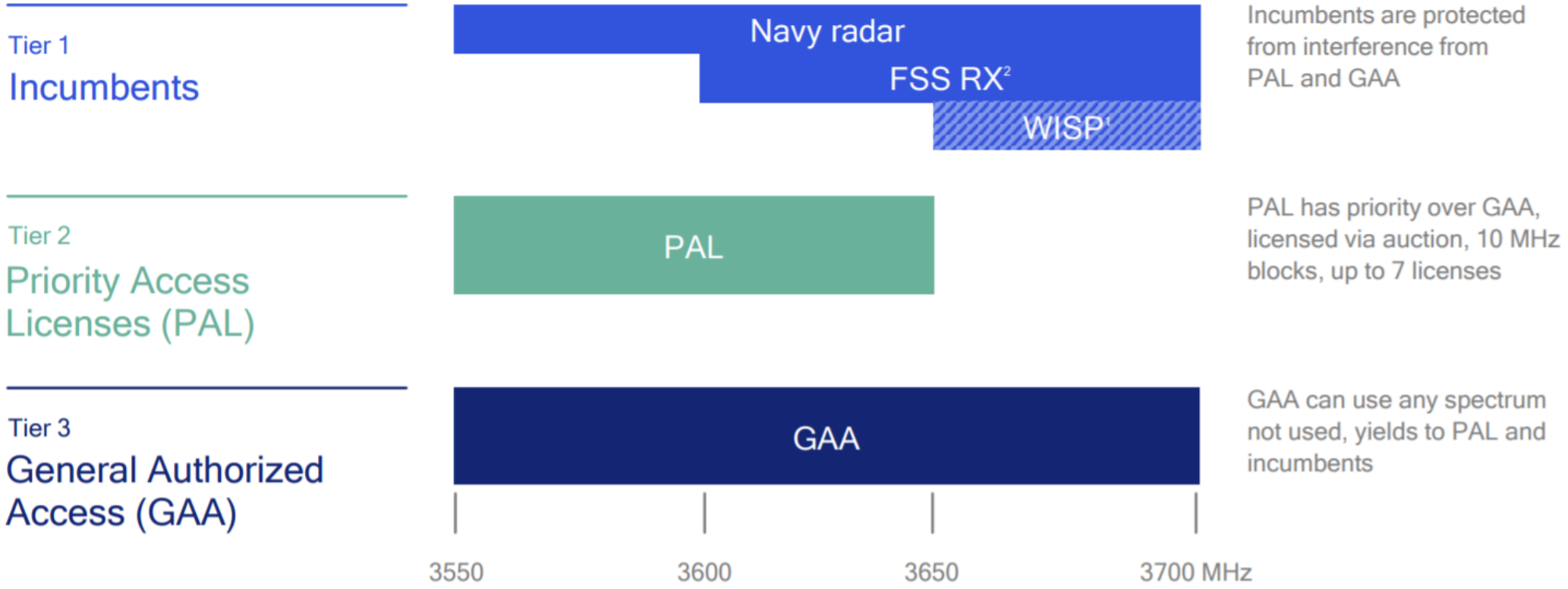
Italian Model - Club is comprised of MNOs with exclusive 200 MHz blocks. Where a MNO is the sole 5G provider at a particular location, it is entitled to use the whole bandwidth of the club. When another MNO appears at the same location, the club spectrum is shared on some agreed basis. Every MNO always has priority over their own assigned block of 200 MHz.

Dynamic Abandoning Italian Model – a MNO being the sole 5G provider at a particular location, could use the entire band on an opportunistic basis. However, it must dynamically release any exclusive spectrum belonging to another mobile operator, should that operator turn up to run a competitive service in the same location. How fast is “dynamic” is a matter of definition and could include a period of notice to vacate the borrowed spectrum.

With both models, a regulator should create a fair sharing framework allowing flexibility, when assignments are turned into working systems yet having the powers to deter squatters and hoarding.

Technology Innovation Driven Sharing

Tiered Model

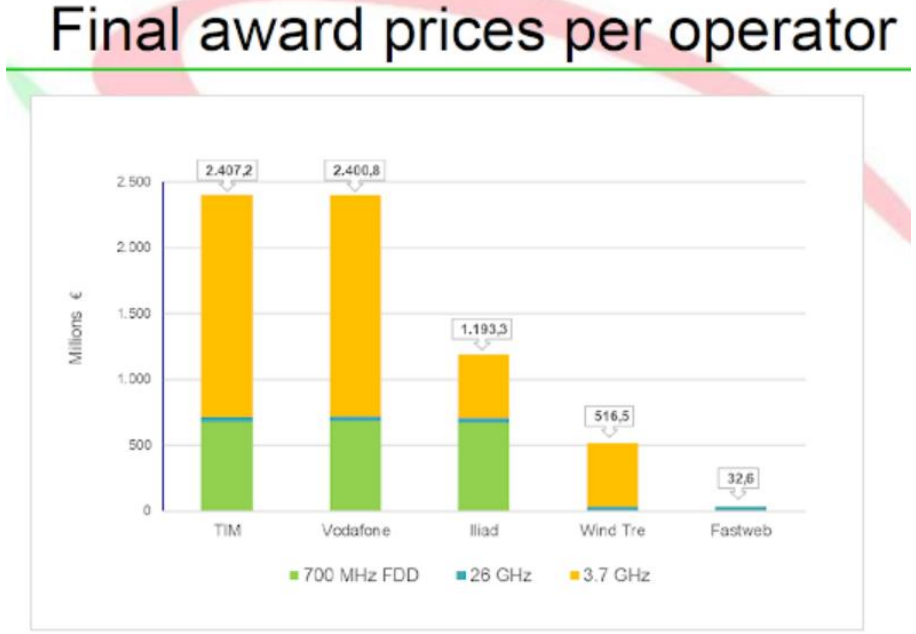


AI Technologies

In the longer term, advances in AI technologies will enable spectrum resources to be flexibly linked, in real time, to instantaneous local demand. When it becomes feasible, it could be more readily applied to the Club Spectrum. It could become an option for exclusive spectrum holders where, when and if spectrum owners decide to pool spectrum for any purpose.

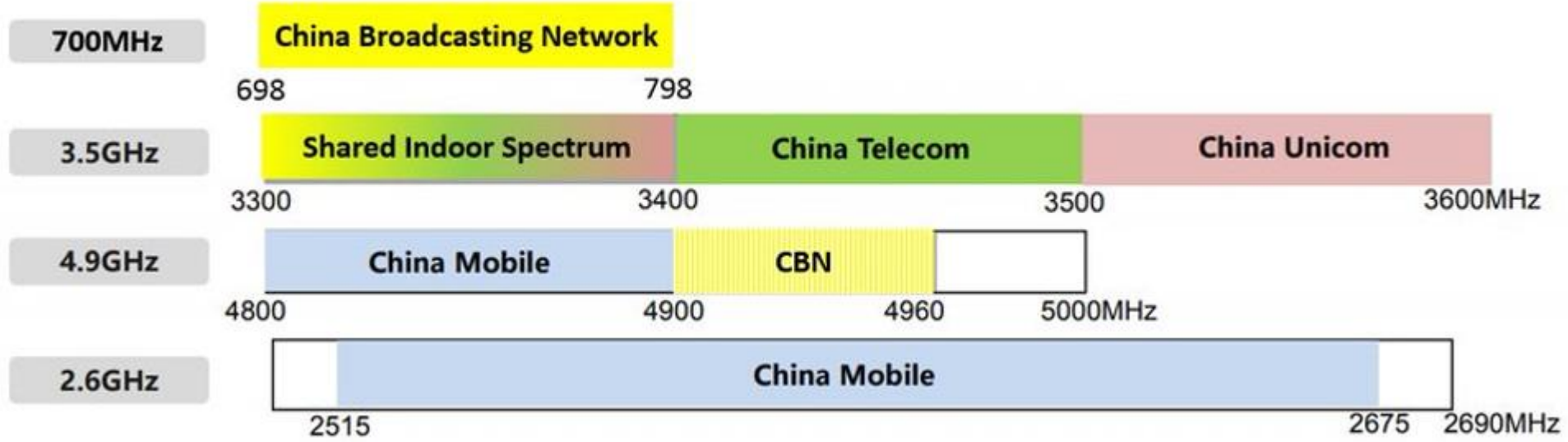
5G mmWaves Club Sharing in Italy

Italy has auctioned 26 GHz band in October 2018. The regulator proposed a club licensing model, which is a form of concurrent shared access enabling licensees to share any unused spectrum from other licensees. Each licensee can dynamically use all the awarded spectrum (up to 1GHz) in areas, where frequencies are not used by other licensees. Licensees can stipulate commercial nondiscriminatory agreements, proportionally sharing the costs of the infrastructure.



Each license holder has the preemptive right of its assigned lot of 200MHz. Licensees can assign a third party the task of managing the use of the spectrum to prevent any harmful interference. Under the Italian regime, other players are also allowed to have access to develop 5G services. If the requester asks for access in areas already covered, then the access is provided by the existing operator, whereas in areas not yet covered, licensees handle the request collectively or through the trusted third party.

Three Sharing Parties of MNOs in China



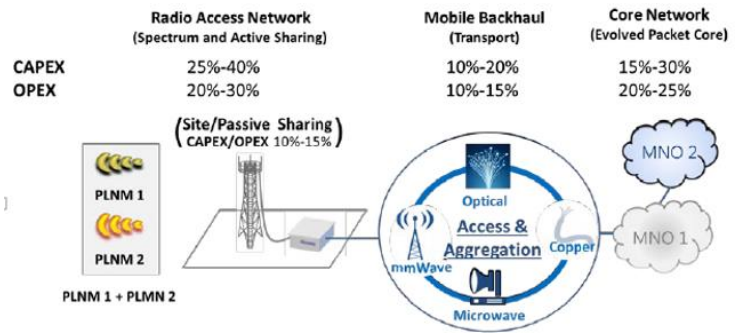
China Mobile - CBN	China Telecom – China Unicom	CBN – China Telecom – China Unicom
• May, 2020. Collaborative framework agreement in relation to 5G co-construction and sharing • To carry out 5G co-construction and sharing as well as content and platform collaboration. • Jointly invest in the construction of the 700MHz 5G wireless network, jointly own and have the right to use the 700MHz 5G wireless network assets • CBN may share China Mobile's 2G/4G/5G networks on a paid basis	• September, 2019. Framework Agreement on Co-building and Co-sharing 5G Networks. • By sharing their spectrum allocations the companies will build together and share together one 5G radio access network in 15 major cities, including Beijing, Shanghai, Shenzhen, Guangzhou, etc. • Two companies will build their own separate 5G networks in other parts of the country. • The 5G core networks will be built separately.	• February, 2020. Three Chinese MNOs signed agreement to share 3300 – 3400 MHz spectrum for indoor 5G coverage. • The companies will leverage the co-development and sharing of 5G indoor access networks to cut costs and boost efficiency.

5G Joint Venture in Russia

Spectrum and Infrastructure Sharing

Spectrum Reallocation

Efficient deployment of 5G networks with shared infrastructure to contribute in economic growth



5G JV

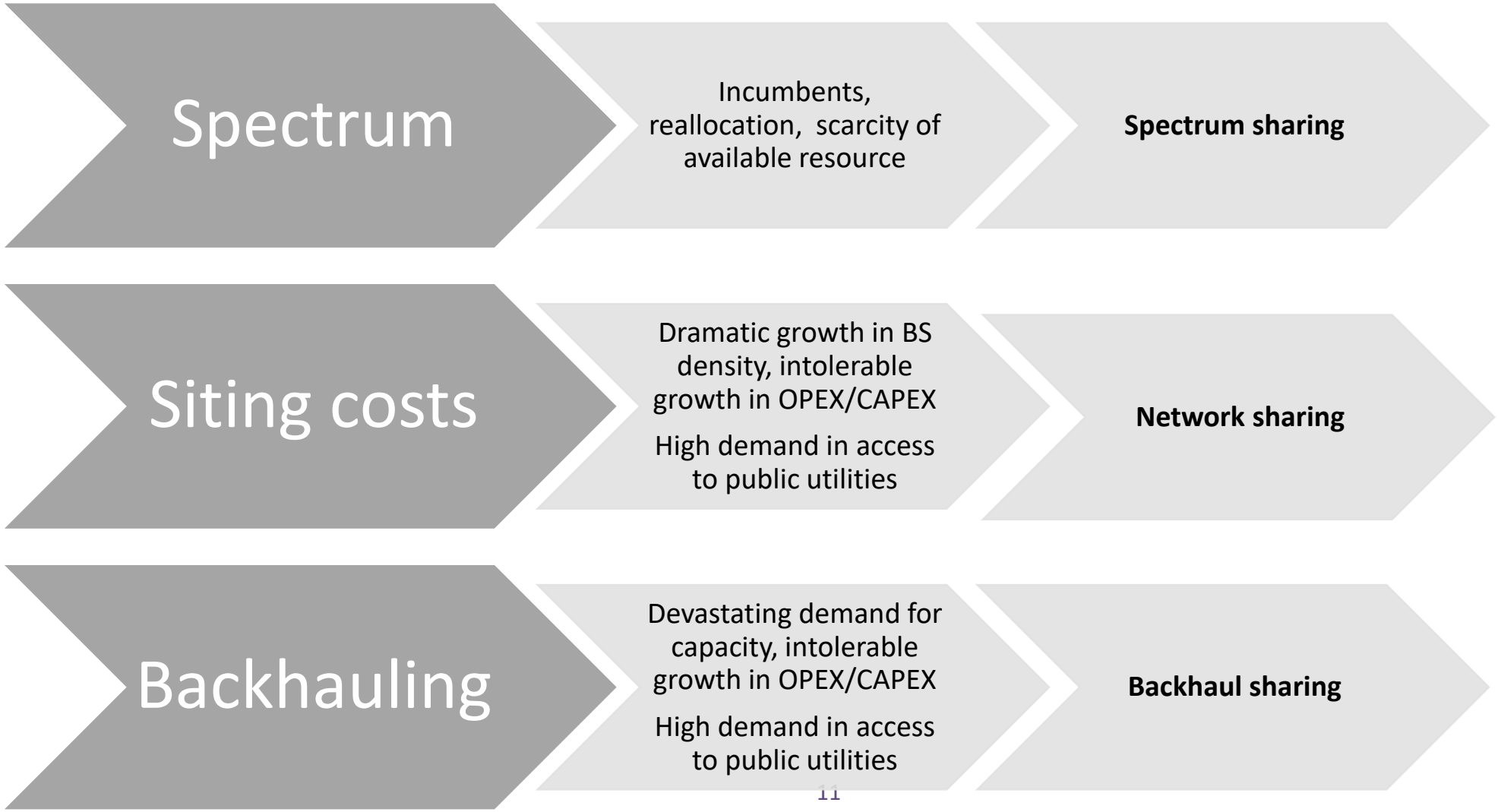
Authorized negotiator with incumbent users on timescale and conditions of spectrum release

Development of agreements between MNOs on the shared usage of scarce spectrum available

Practical undertakings in spectrum/geographical redeployment of incumbent uses

Conclusions

Key challenges could be overcome by consolidated sharing efforts of MNOs



Thank You For Attention