

Radio Spectrum and Technical Standards Advisory Committee

SSAC Paper 1/2020 for Information:

**Update on the Use of Sub-6 GHz Spectrum for
Public Mobile Services in Hong Kong (II)**

**Office of the Communications Authority
14 January 2020**



Introduction

- Subsequent to the presentation of SSAC Paper No. 4/2019 entitled “Update on the Use of Sub-6 GHz Spectrum for Public Mobile Services in Hong Kong” at the 21st SSAC meeting held on 30 September 2019
 - OFCA met with the incumbent mobile network operators (“MNOs”) in November 2019 to solicit their views on, among other things, the need to revise the band plan of the 2.6 GHz band where the licence term for part of the spectrum will expire in 2024 for re-assignment
- This paper summarises MNOs’ preliminary views on the matter and proposes the way forward in relation to the review of the 2.6 GHz band plan



Considerations - Spectrum efficiency (I)

- The 2.6 GHz band currently adopts frequency division duplex (FDD) mode of operation (i.e. paired-channels for uplink and downlink) that
 - allocates equal bandwidth for downlink and uplink
 - might not have optimal spectral efficiency in handling asymmetrical downlink and uplink traffic of users
- Time division duplex (TDD) can flexibly cope with such asymmetrical traffic to achieve better spectrum efficiency
- While the current uplink traffic in Hong Kong is much lower than that of downlink, the local mobile industry reflects that the uplink traffic has indeed been increasing over the years

Considerations - Spectrum efficiency (II)

- With the emergence of forthcoming new mobile applications, uplink traffic is likely to continue its rising trend in future
- MNOs generally considered that
 - more time is needed to observe market development before the benefit for migration to TDD systems in the 2.6 GHz band, if any, can be assessed
 - other factors including investments and impacts to users during the transition period will need to be further evaluated

Considerations - Radio interference (I)

- In the Mainland, the 2515 – 2675 MHz band is assigned for 5G TDD systems
- In Hong Kong, the 2500 – 2570 MHz band (uplink) paired with the 2620 – 2690 MHz band (downlink) have been deployed for incumbent MNOs' 4G FDD networks for years
- Since FDD networks of Hong Kong and TDD networks of the Mainland operate in overlapping frequency bands, mobile networks of both sides suffer from mutual radio interference in the boundary areas of Hong Kong and Shenzhen



Considerations - Radio interference (II)

- The interference problem might be worsened in the near future as both sides continue to roll out networks (i.e. establishing more radio base stations) operating in the 2.6 GHz band in the boundary areas
- To tackle the problem on potential mutual radio interference, Hong Kong and the Mainland have established arrangements for controlling overspill signals of public mobile networks of both sides
 - MNOs of both sides are required to confine overspill signals to a prescribed level



Considerations - Radio interference (III)

- Although the aforesaid arrangement could keep the problem under control, both sides could not have optimal efficient use of spectrum of the 2.6 GHz band in the boundary areas due to the need to control overspill signals
- The situation might be improved and would be conducive to the achievement of higher spectrum efficiency if both sides would
 - Align the mode of operation (i.e. all TDD), and
 - Synchronise network transmissions

Considerations - Radio interference (IV)

- **MNOs considered that**
 - **The current control arrangement on overspill signals is generally effective, notwithstanding the Mainland's recent allocation of 160 MHz bandwidth in the 2.6 GHz band to 5G TDD systems**
 - **Compliance with the aforesaid requirements could be achieved by optimising antenna transmission direction of radio base stations in the boundary areas**
 - **Even if the 2.6 GHz band might not be deployed at some particular radio base stations due to, say, mutual radio interference to/from the Mainland, they could deploy their assigned spectrum in other frequency bands to serve users covered by those affected radio base stations**



Considerations - Network transition

- **MNOs pointed out that transition from FDD to TDD involves substantial investment and large-scale engineering work**
 - **substantial replacement of equipment is required in re-configuration of all radio base stations operating in the 2.6 GHz band**
 - **re-configuration will take a long time (in the order of 2 years) to complete**
 - **modification of common antenna systems at indoor premises, in particular that of the Mass Transit Railway, might require even longer time due to the need to coordinate work schedules with property management**
 - **quality of their mobile services might therefore be adversely affected during the transition period**

Considerations - Future band planning (I)

- MNOs considered that any change in the mode of operation (i.e. from FDD to TDD) of the 2.6 GHz band should have consensus among all MNOs
- The entire 2.6 GHz band (including the 2575 – 2615 MHz band currently assigned for government use) would preferably be reconfigured for provision of public mobile services and adopt the same mode of operation (i.e. adopting TDD)

Considerations - Future band planning (II)

- MNOs did not support re-farming the assigned spectrum of the 2.6 GHz band using a hybrid band plan incorporating both paired-channels (for FDD) and unpaired-channels (for TDD)
 - It would necessarily introduce additional guard bands in order to avoid adjacent channel interference between FDD and TDD systems and hence result in even worse spectrum efficiency
- MNOs opined that FDD should be continued in the assigned spectrum of the 2.6 GHz band until expiry of the first assignment period in 2024 or the second assignment period in 2028

Summary of MNOs' views

- In gist, in respect of future planning of the 2.6 GHz band, all MNOs considered that
 - FDD mode of operation should be continued at the assigned spectrum of the 2.6 GHz band until expiry of the first assignment period in 2024 or the second assignment period in 2028
 - Re-planning of the band, if any, should take into account the future market development
 - Any change to the mode of operation of the 2.6 GHz band must have consensus among all MNOs
 - Subject to any future decision to change the band plan, there may be a need to review the 2575 – 2615 MHz band currently assigned for government use

Way forward

- OFCA will take into account the expressed views of MNOs in making its recommendation to the CA for the coming public consultation on the proposed re-assignment arrangements for the spectrum in the 2.6 GHz band to be expired in 2024
- Members and industry players are welcome to give further views in response to the public consultation to be launched around the second quarter of this year



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