MediaTek Proposal for 5G

FCC policy - 3.5GHz Band vs TVWB

- 3.5G Regulations : 3.5 GHz Citizens Broadband Service will be covered by a three-tier authorization mechanism and managed by a geolocation-enabled dynamic spectrum access database. ref

- SOF (Self-organized network)

- Backhaul Solution (Wireless or Fiber). ref

- TVWB： Devices which would operate in the TV white space band (TVWS) would be mainly of two types: Fixed and Personal/Portable. Fixed devices would have geolocation capability with an embedded GPS device. Fixed devices also communicate with the central database to identify other transmitters in the area operating in TVWS

- FCC在3.5GHz提出的DataBase概念是參考先前TVWB DataBase(目前有3個正式授權的DataBase)，Google & AT&T 覺得3-Tier 架構不夠開放也太複雜。

TVWB Regulation Comparison

Parameters	FCC	Ofcom	Singapore IDA
Is sensing required ?	Required for sensing only device, not required if having database access	Required	Required
Sensitivity assuming 0dBi gain antenna	-114dBm/6MHz (for sensing only TVBD)	-120dBm/8MHz (DTT), -126dBm/200kHz for wireless microphone	-120dBm/8MHz
Interval between sensing	<60 s (for sensing only TVBD)	<1 s	<1 s
Out of band performance	72.8dBc	<-46dBm	<-48dBm
Maximum continuous transmission	N/A	400 milliseconds	400 milliseconds
Minimum pause after transmission	N/A	100 milliseconds	100 milliseconds
Operation frequency range	Channels 21-36 (512-608MHz) and Chs 38-51 (614-698MHz), additional channels Ch2 (54-60MHz), Chs5-6 (76-88MHz) and Chs7-13 (174-216MHz) for fixed-to-fixed communication	Channels 31-37 (550-606 MHz) and channels 61-69 (790-862 MHz)	channels 41-49,51,53,54 with 8 MHz for each and covers range of 630-742 MHz
bandwidth	6MHz channel	unlimited	Multiple of 8 MHz channels
Transmit power	Fixed device: 12.2 dBm/100kHz Sensing-only devices: -0.8dBm/100kHz Personal/Portable with adjacent channel: -1.8dBm/100kHz All other Personal/Portable : 2.2dBm/100kHz	4 dBm (adjacent channels) and 17dBm	4 dBm (adjacent channels) and 17dBm
Is database access required ?	Required (except for sensing only TVBD)	Required	Optional but recommended
Geolocation accuracy	<50 meters	<100 meters	<50 meters
Interval between database access	24 hours for the fixed, Re-access is required for personal/mobile once moving more than 50 meters	24 hours	1 second

GSM band for LTE/WiMax

- amending Decision 2009/766/EC on the harmonisation of the 900 MHz and 1800 MHz frequency bands for terrestrial systems capable of providing pan-European electronic communications services in the Community. ref

- The results of the work carried out pursuant to the mandate issued to CEPT should be applied in the Union and Member States should be required to implement as soon as possible given the increasing market demand for the introduction of LTE and WiMAX in these bands.

- In addition, Member States should ensure that UMTS, LTE and WiMAX give appropriate protection to existing systems in adjacent bands.

- 基本上在不影響附近基地台的情況下，可以使用這個頻帶，我們認為這個頻帶在歐盟已經釋出。

Operation in ISM (NII) band 5GHz Band

- Coexist : Mechanisms for enabling an operation of IEEE 802.16 in spectrum shared with 802.11(a) have been proposed in this paper. Coexistence is enabled in partly blocking 802.11(a) out of the medium. This enables a guarantee of QoS in 802.16.

- LTE-A/5G advantages in small cell :

1. CCI interference(Dense BS without coordination)

2. Less Contention(Single BS)

- 在5GHz Band 不同的系統彼此干擾嚴重，在共存的情況下可能無法取得足夠的頻寬。

- 全部LTE或全部WiFi的架構各有優缺點，在單個基地台的情況下，LTE服務的人此次之間競爭較小，而在多個基地台(彼此之間沒有無合作)，WiFi(RTS/CTS)機制下表現較好

Carrier aggregation

- 不清楚老師指的跨 small cell & macro cell 的 Carrier aggregation 只的事哪方面的技術。

Reference

- Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band(FCC 12-148), December 12, 2012

- Re: Ex Parte Communication: Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band, GN Dkt. 12-354, August 6, 2013

- NICT, The Next Steps to Implementing the U.S. FCC's TV White Space Rules and Furthering Efforts Around the World to Cash in on the "Digital TV Dividend"

- Wireless backhaul can ease transition to fibre-Mobile operators can lower backhaul TCO by using wireless backhaul now, and invest in fibre later

- UNLICENSED OPERATION OF IEEE 802.16: COEXISTENCE WITH 802.11(A)IN SHARED FREQUENCY BANDS