

**Hong Kong 5G Industry Forum 2018**  
**5G Accelerating Smart City Innovation**

# Gearing Up for Ushering in the 5G Era

**Mr. Chaucer Leung**  
**Deputy Director-General (Telecommunications)**  
**Office of the Communications Authority**



**12 June 2018**

# Spectrum for 5G in the Pipeline

## Frequency Bands above 6 GHz

- 26 GHz Band (24.25 - 27.5 GHz)
- 28 GHz Band (27.5 - 28.35 GHz)

## Frequency Band below 6 GHz

- 3.5 GHz Band (3.4 - 3.6 GHz)



# 26 GHz and 28 GHz Bands (26/28 GHz Bands)

**Millimetre wave spectrum** is integral to the 5G candidate bands specifically for providing **extremely high speed mobile broadband**

**26 GHz band** is the lowest band amidst the 11 International Telecommunication Union (ITU) IMT-2020 (i.e. 5G) candidate bands in 24.25 - 86 GHz



**28 GHz band** is identified by advanced economies like the United States and South Korea for deployment of 5G services.

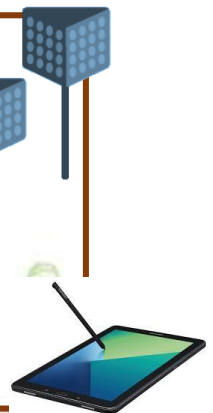
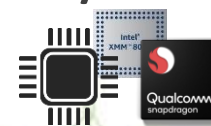


**3GPP** supports use of **26 GHz** and **28 GHz** bands in its 5G standards being developed



5G NR band	5G NR frequency range
n257	26.5 – 29.5 GHz
n258	24.25 – 27.5 GHz

Vendors are ready to produce network and customer equipment operating in **26/28 GHz bands**



# Assignment of Spectrum in the 26/28 GHz Bands

**April 2017**

Served notices on the relevant carrier licensees on **withdrawal of the assigned frequencies** in the 26 GHz band by 31 March 2019



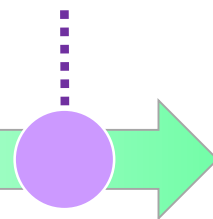
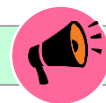
**July 2018**

Launch of **public consultation on frequency allocation and associated assignment arrangements** for the 26/28 GHz bands



**April 2019**

1<sup>st</sup> batch of spectrum (4,100 MHz) for use to deploy 5G services



**Dec 2017 – Jan 2018**

Invited interested parties to **express interest** in using the spectrum in the 26/28 GHz bands

**End of 2018**

**Announcement of the Decision**  
(End-2018 / Early 2019:  
spectrum assignment process)

**Assess likely demands for spectrum in the 26/28 GHz bands**

**Solicit views and comments on proposals for frequency allocation and assignment**

**Decide on assignment arrangements for the 26/28 GHz bands**

# Assignment of Spectrum in the 3.5 GHz Band

## Completed

2017

Jul

Aug

Sep

Public consultation on the proposed change in the allocation of the 3.4 – 3.7 GHz band from Fixed Satellite Service to **Mobile Service**

Consultancy study about assessments on recommendations to enable the **electromagnetic compatibility** between Fixed Satellite Service and Mobile Service operating in the C-Band (3.4 – 4.2 GHz)

2018

Jan

Mar

Statement of the Communications Authority (CA) on the change in the allocation of the 3.4 – 3.7 GHz band from Fixed Satellite Service to **Mobile Service**



通訊事務管理局辦公室  
OFFICE OF THE  
COMMUNICATIONS AUTHORITY

## In Progress

2018

May

June



Public consultation on arrangements for assignment of the spectrum in the **3.5 GHz band** for the provision of public mobile services and the related **spectrum utilisation fee**

## Way Forward

End

2018

Announcement of decision on the assignment arrangements for the spectrum in the **3.5 GHz band** and the spectrum utilisation fee

2019

2nd Half  
2019

Assignment of the spectrum in the **3.5 GHz band**

2020

April

2nd batch of spectrum (200 MHz) for use to deploy 5G services

# Proposed Arrangements for Assignment of Spectrum in the 3.5 GHz Band

200 MHz spectrum (divided into 10 frequency blocks) is proposed to be put to auction

20 MHz	20 MHz	20 MHz	20 MHz	20 MHz	20 MHz	20 MHz	20 MHz	20 MHz	20 MHz
-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------	-----------

3400 MHz

3600 MHz

According to **Radio Spectrum Policy Framework**, a **market-based approach** will be used for spectrum management wherever CA considers that there are likely to be competing demands from providers of non-Government services, unless there are overriding public policy reasons to do otherwise.



**Auction:** the most commonly used market-based approach for spectrum assignment which is objective, fair, transparent

**Spectrum Cap:** 100 MHz for any bidder in this auction

**Open Network Access:** each successful bidder shall **open up at least 30% of its network capacity** for access by other non-affiliated mobile service providers

# Auction is the Most Common Practice Adopted by Advanced Economies for Spectrum Assignment



## North America

Canada  
United States

## Europe

Austria  
Denmark  
France  
Germany  
Greece  
Italy  
Ireland  
Netherlands  
Norway  
Portugal  
Spain  
Sweden  
Switzerland  
United Kingdom

## Asia

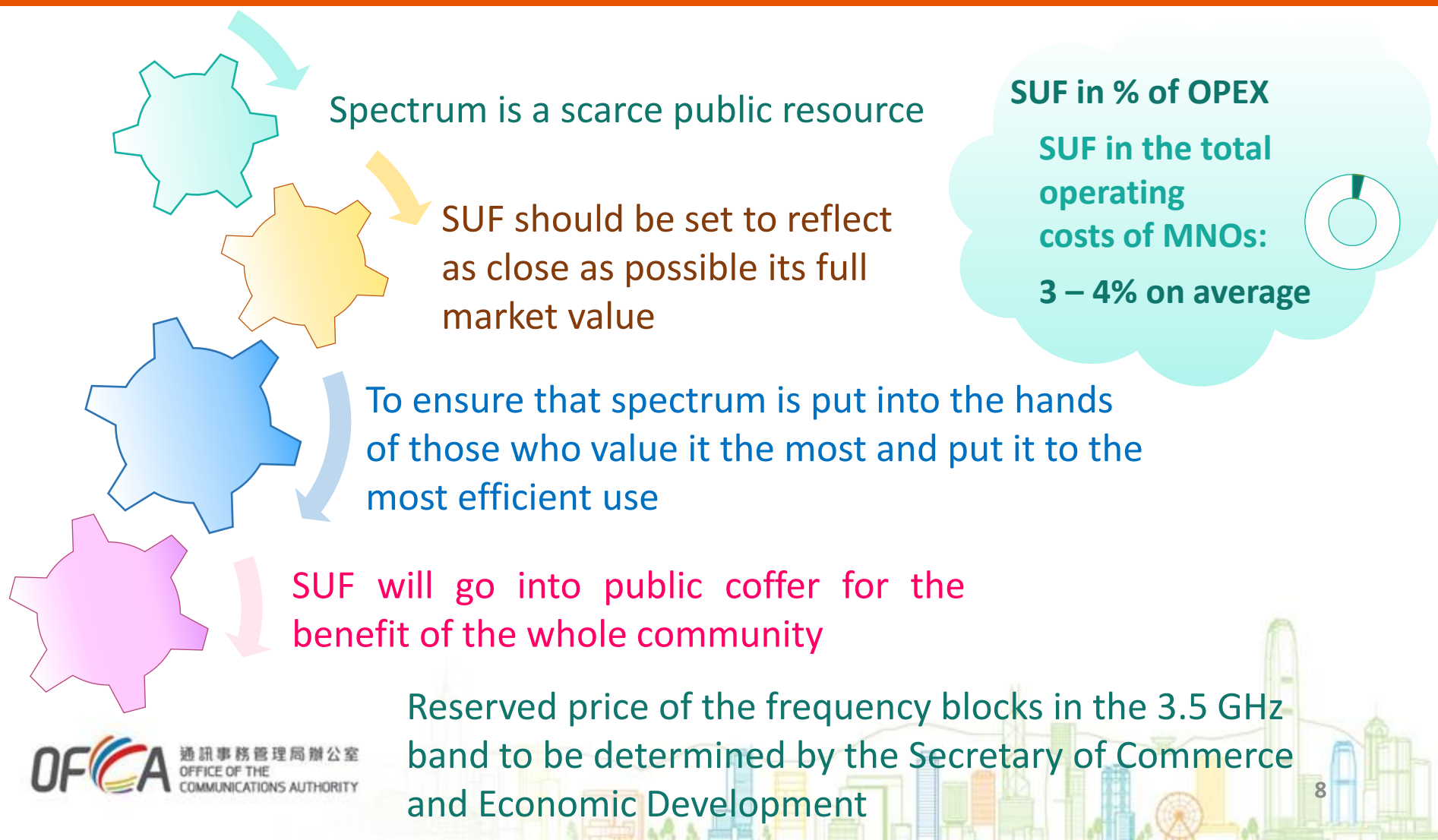
India  
Indonesia  
Singapore  
South Korea  
Taiwan  
Thailand

## Oceania

Australia  
New Zealand

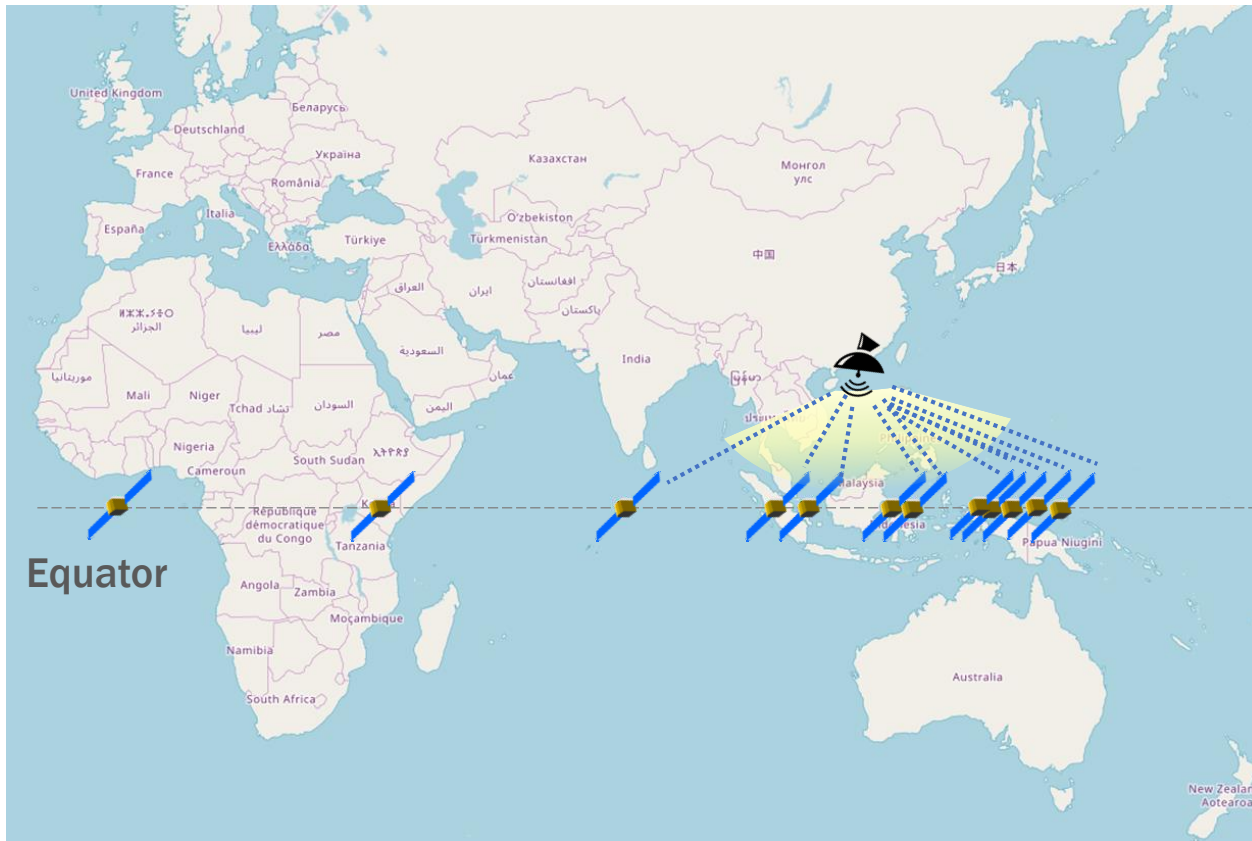


# Spectrum Utilisation Fee (SUF)





# Use of the C-Band (3.4 – 4.2 GHz) for Controlling Hong Kong Satellites in Orbits



**12 HK Satellites**  
operating in orbits

Important external  
telecommunications facilities  
of Hong Kong

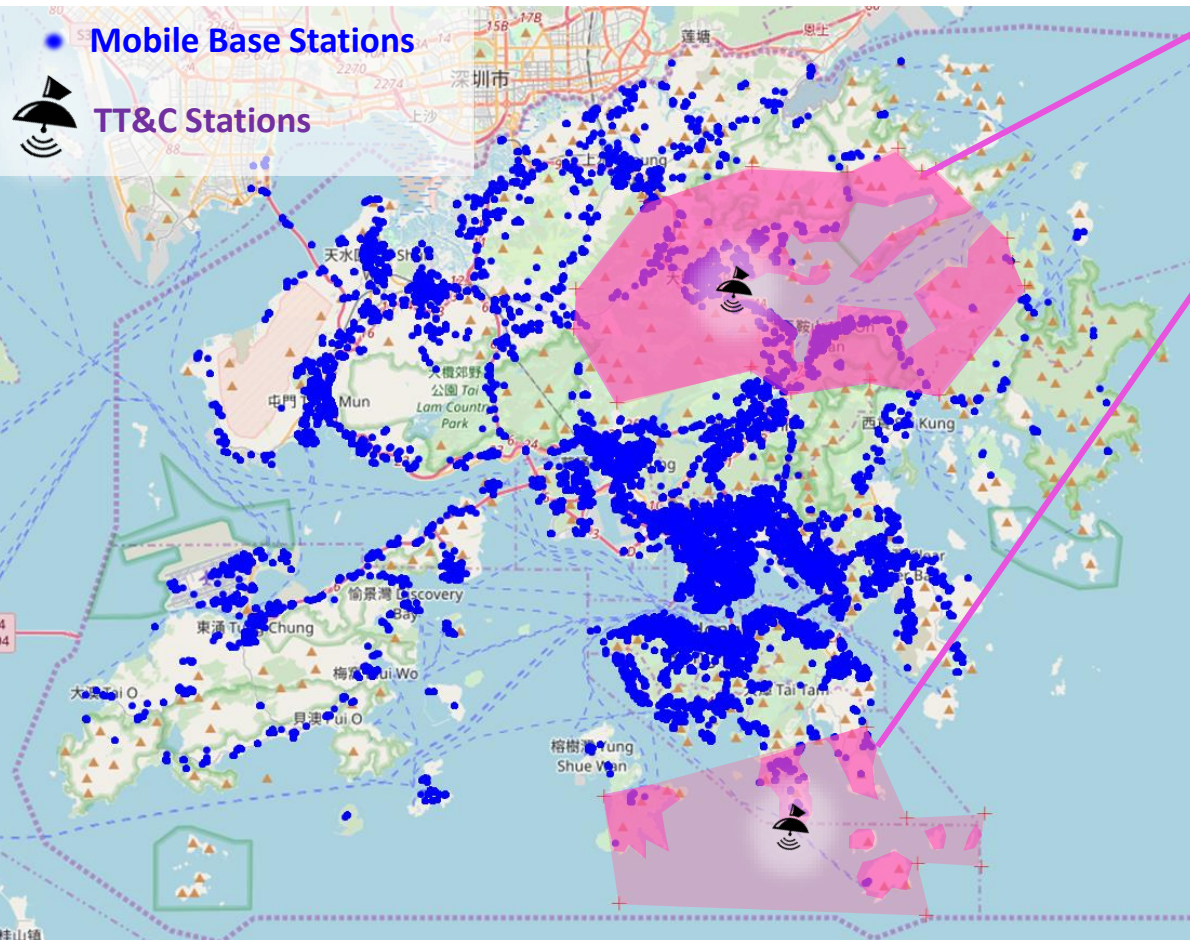
Under the international  
obligation to operate at the  
designated orbital positions

Telemetry, Tracking  
and Control Stations  
(TT&C Stations) at Tai  
Po and Stanley



The telemetry, tracking and control signals between the Satellites in orbits and the TT&C Stations have to be free from any disturbance

# Restriction Zones of the 3.5 GHz Band to Protect TT&C Stations



## Restriction Zones

- For co-existence of existing satellite services and incoming public mobile services, necessary to set up restriction zones to protect existing TT&C stations

## 5G Coverage within the restriction zones

Use of other new spectrum (e.g. 26/28 GHz bands) and re-farming of existing spectrum being used for 2G/3G/4G for the provision of 5G services

# Extent of Use of the Spectrum in the 3.5 GHz Band for the Provision of the Public Mobile Services

Mobile network operators proposed to Office of Communications Authority (OFCA) in late May 2018 a **few mitigating measures for reducing the size of the restriction zones**



Feasibility of these measures **to be reviewed among relevant stakeholders, through in-depth technical analysis and if necessary, on-site testing**

OFCA has set up a **working group** with a view to **identifying technically feasible measures acceptable to both mobile network operators and satellite operators**



1<sup>st</sup> working group meeting convened on 8 June 2018

# Spectrum for the Provision of Public Mobile (including 5G) Services in Hong Kong

April 2018



552 MHz

Total amount of assigned spectrum today

NOW

552 MHz



580 MHz  
(Shared Spectrum)

Additional spectrum in 5 GHz band available for use on a shared basis

April 2019

552 MHz



580 MHz  
(Shared Spectrum)

New spectrum in 26/28 GHz bands

4,100 MHz

4,652 MHz + 580 MHz (Shared Spectrum)

April 2020

552 MHz



580 MHz  
(Shared Spectrum)

New spectrum in 3.5 GHz band

4,100 MHz

200\*  
MHz

4,852 MHz + 580 MHz (Shared Spectrum)

\* Only 200 MHz of spectrum is subject to the two specified restriction zones



# Further Supply of Additional Spectrum for 5G

OFCA is working with a view to making **more spectrum supply** for 5G among the ITU candidate bands **in the range of 24.25 – 86 GHz**, plus other **potential spectrum below 6 GHz**

Industry will be kept informed through update of the **Spectrum Release Plan (SRP)**, which covers spectrum release in coming 3 years

SRP 2018 covers 3.5 GHz, 26 GHz and 28 GHz bands

MNOs may **refarm their existing spectrum assigned** under the technology neutral principle for 5G based on their commercial considerations

## 11 ITU candidate bands for 5G :

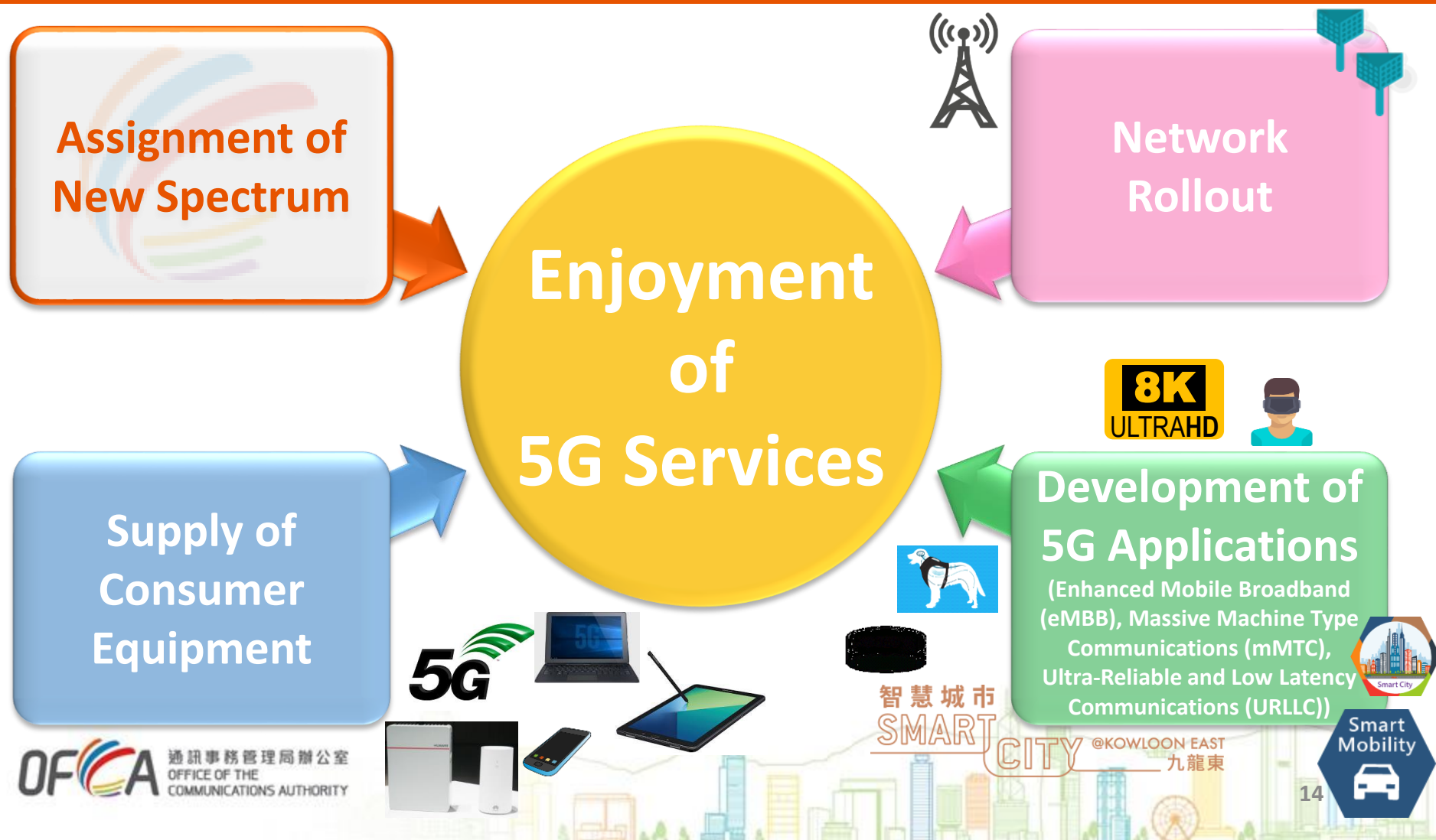


Frequency Bands (GHz)	Bandwidth (GHz)
24.25 – 27.50	3.25
31.8 – 33.4	1.6
37.0 – 40.5	6.5
40.5 – 42.5	
42.5 – 43.5	
45.5 – 47.0	4.7
47.0 – 47.2	
47.2 – 50.2	
50.4 – 52.6	2.2
66.0 – 76.0	10
81.0 – 86.0	5

← 26 GHz band

33.25 GHz in total

# Collaboration for Introduction of 5G Services



# Thank You



Disclaimer: The content of the slides is simplified and adapted for the purpose of presentation. Please refer to the relevant official documents of the Communications Authority and the Office of the Communications Authority for details. Nothing in the slides prejudices the exercise of the powers by the Communications Authority and Government under the Telecommunications Ordinance (Cap. 106) or any subsidiary legislation thereunder.