



# Smart 5G Integrated Multi-Operator Active Antenna Solution for Malls, Venues and Stadiums

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Comba





**Smart 5G Integrated Multi-  
Operator Active Antenna Solution  
for Malls, Venues and Stadiums**



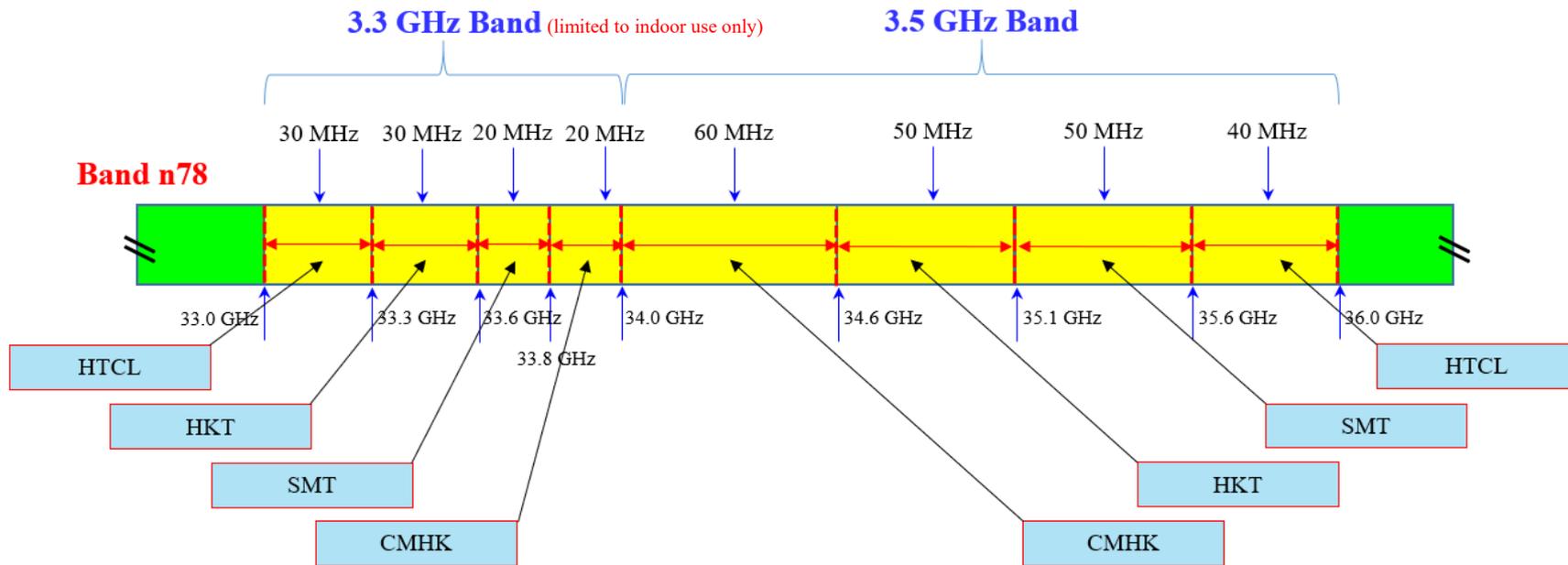
# Hong Kong 5G Development Progress?



# Hong Kong 5G Development



## 5G Spectrum Allocation

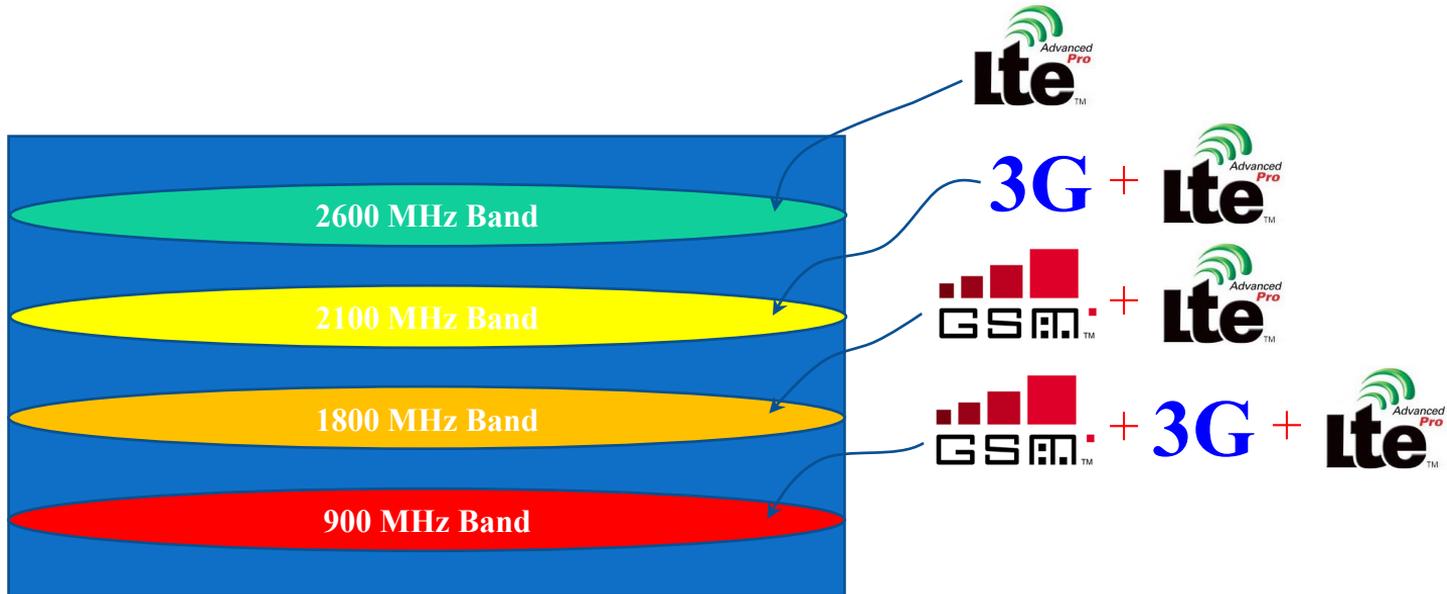


# Hong Kong 5G Development



## Existing Spectrum Allocation for 2G/3G/4G

*Basically, each mobile network operator in Hong Kong has multiple networks in different frequency bands:*

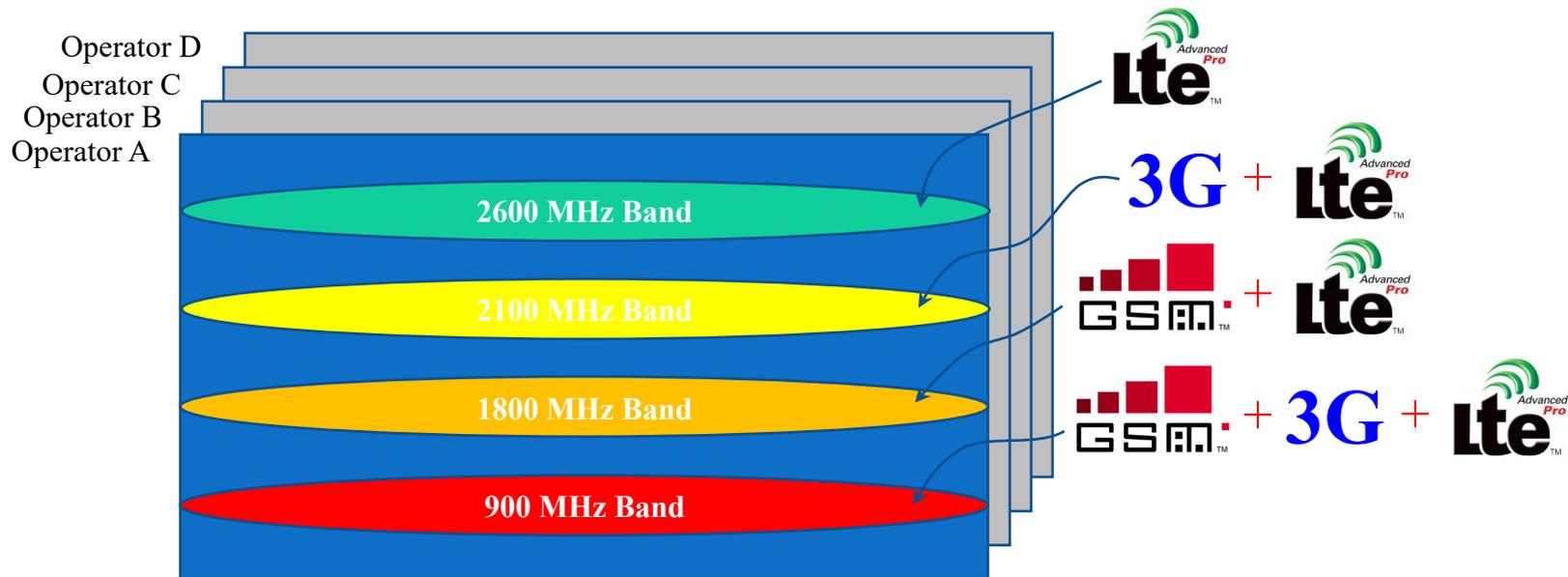


# Hong Kong 5G Development



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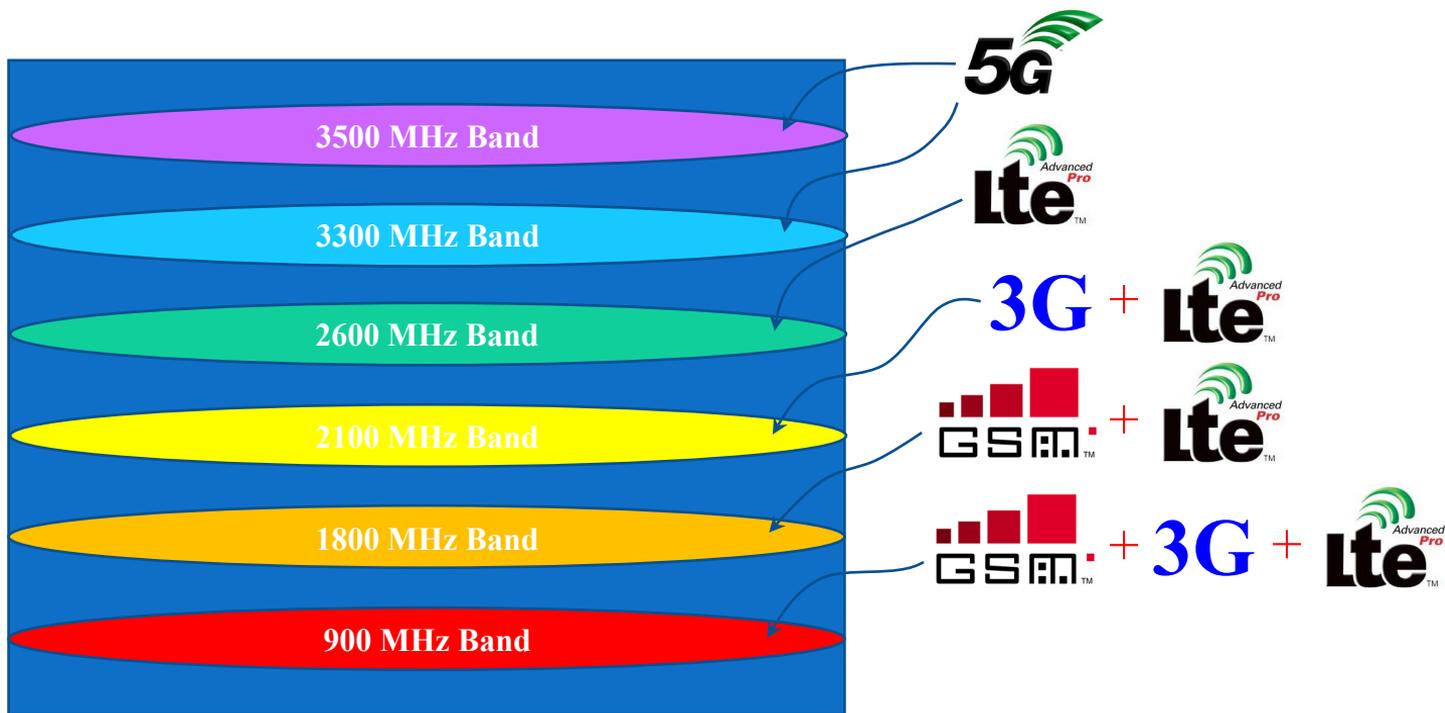
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# Hong Kong 5G Development



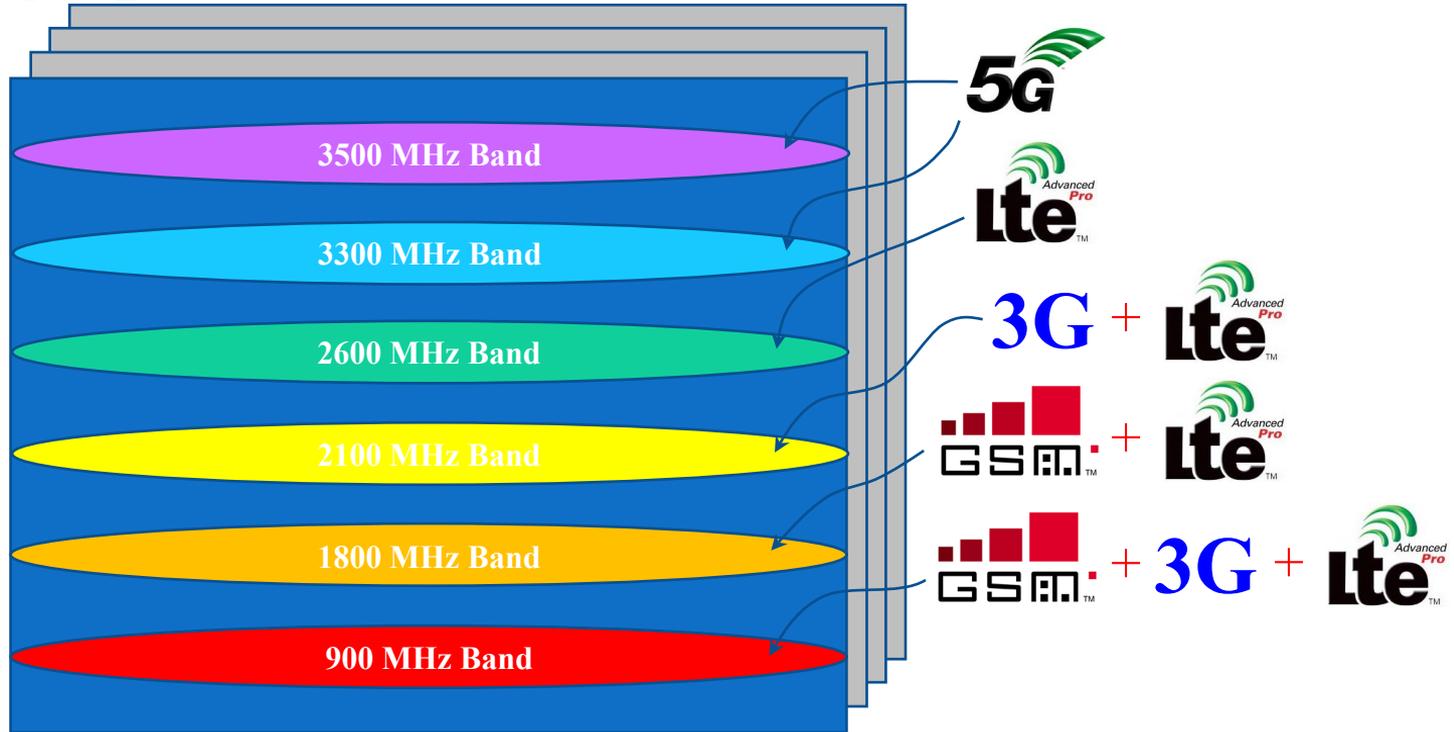
## Existing Spectrum Allocation for 2G/3G/4G



# Hong Kong 5G Development



## Existing Spectrum Allocation for 2G/3G/4G





# 5G Enabling Technologies?



# 5G Enabling Technologies



## Large Contiguous Bandwidth in Higher Frequency Bands

*According to the Shannon-Hartley theorem, the channel capacity is directly proportional to the channel width. Thus, the channel bandwidth of 5G is much larger than the previous 2G, 3G and 4G. In particular, 80~100 MHz bandwidth is recommended for the 5G network which is available only above 3 GHz.*



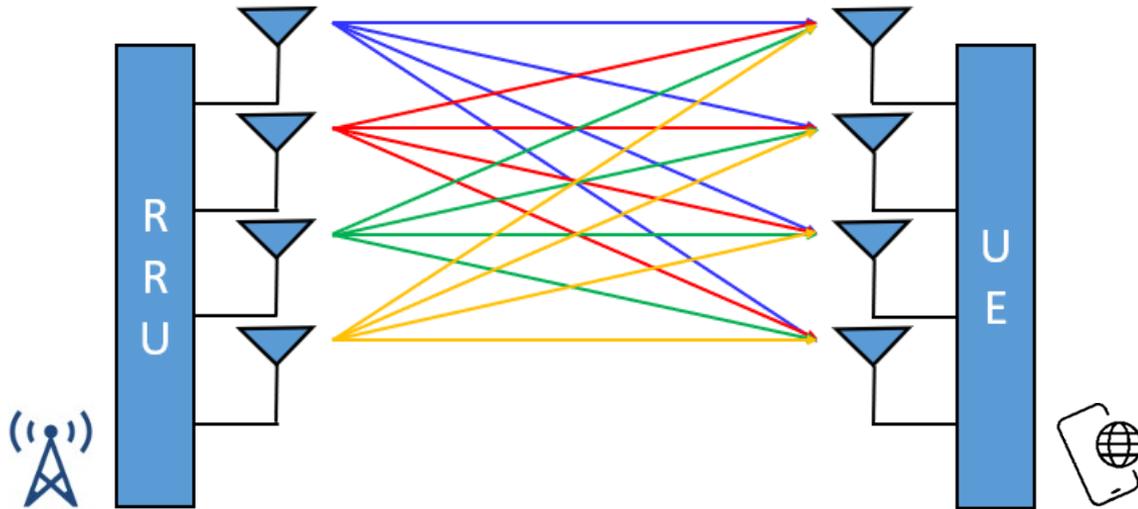
More contiguous bandwidth will be available as the frequency increases!

# 5G Enabling Technologies



## Higher Order Multiple Input Multiple Output (MIMO)

*The MIMO technology allows multiple data streams to be transmitted and received between the network and the user equipment (UE) such as a smart phone or a laptop, thus increasing the data throughput dramatically.*



4x4 MIMO will be the minimum configuration for 5G





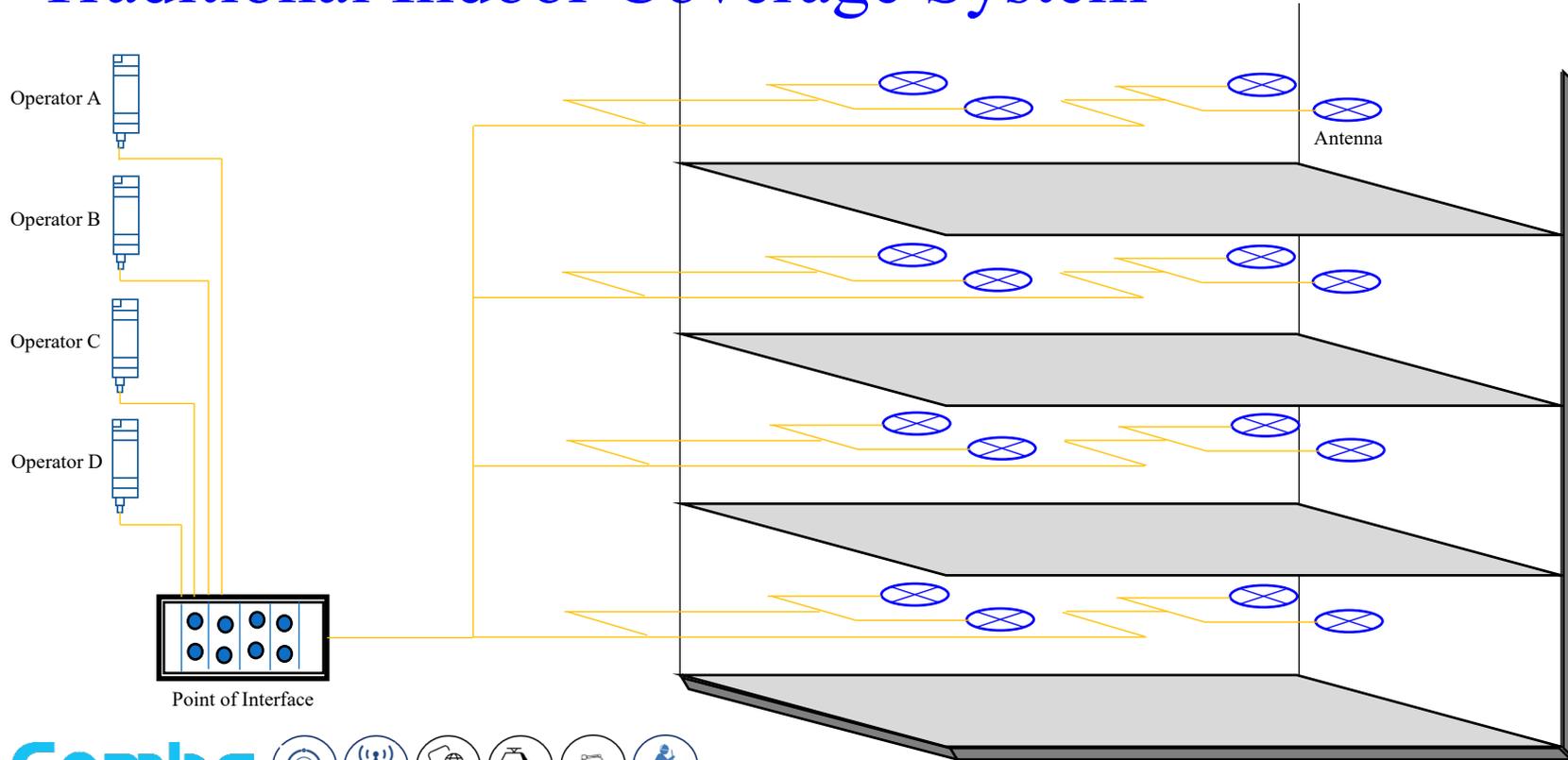
# 5G Deployment Challenges?



# 5G Deployment Challenges



## Traditional Indoor Coverage System

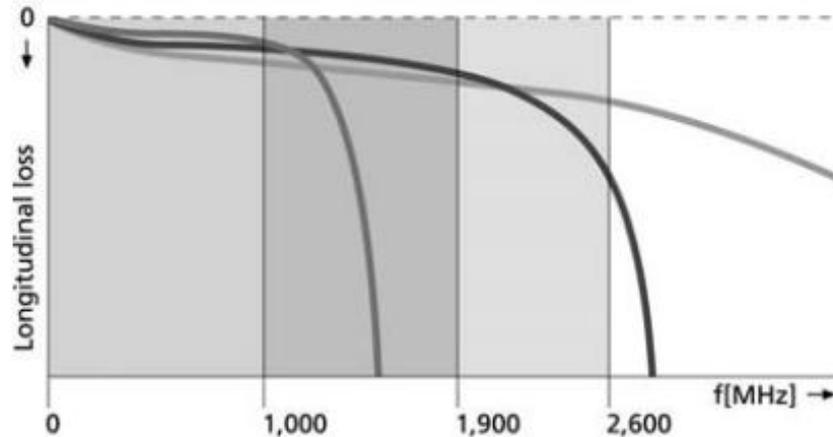


# 5G Deployment Challenges



## Leaky Cable Cut-off Frequency at the New 5G Bands

*The signal attenuation (i.e. power loss) along the existing 1-5/8" leaky radiating cable is tremendous at the new 5G frequency bands such as 3.3 GHz and 3.5 GHz, making it impossible to set up an indoor 5G system with the leaky radiating cable. Similarly, the signal attenuation of the RF coaxial cable is substantial at the new 5G frequency bands, leading to very poor 5G coverage for an indoor 5G system built with the RF coaxial cable.*

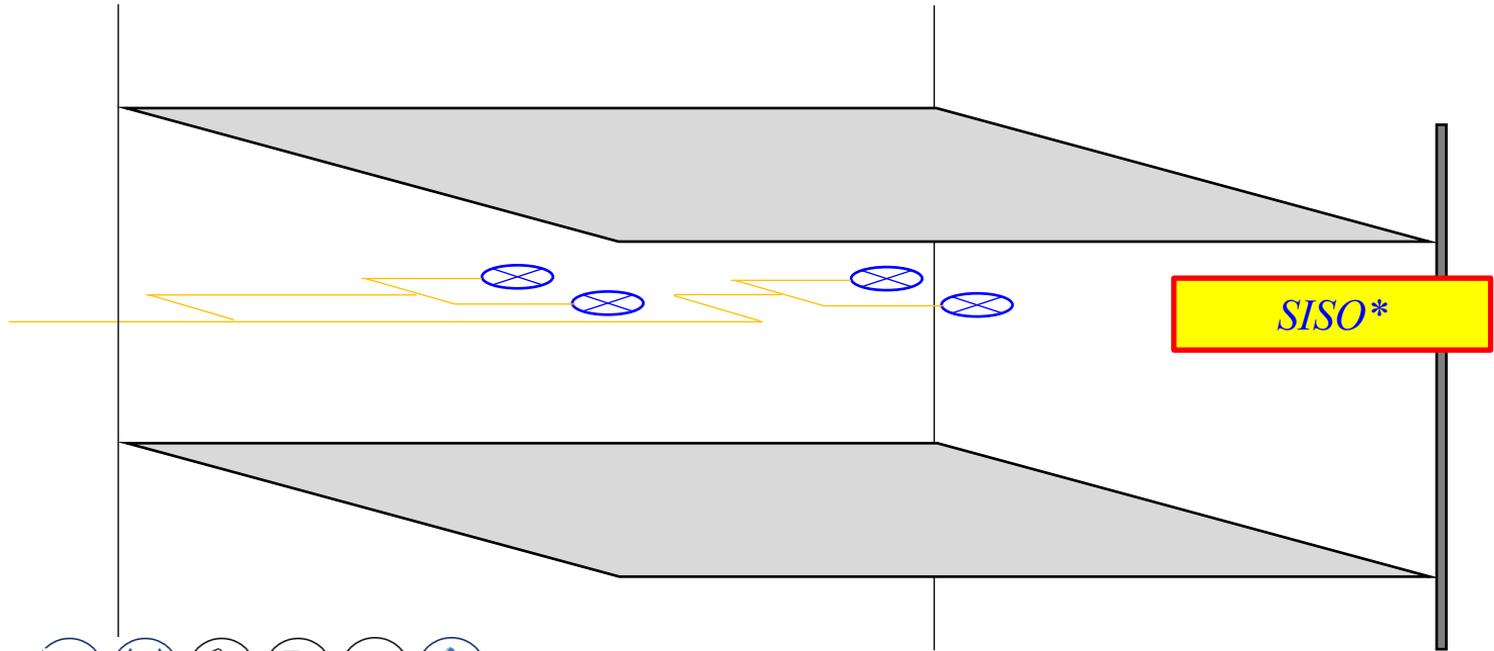


# 5G Deployment Challenges



## Additional Equipment, Cable and Antenna for Higher Order MIMO

*In order to support the higher order MIMO, the distributed antenna system of an indoor 5G system needs to be multiplied, thus requiring additional equipment, cable, antennae and most importantly power consumption and space.*

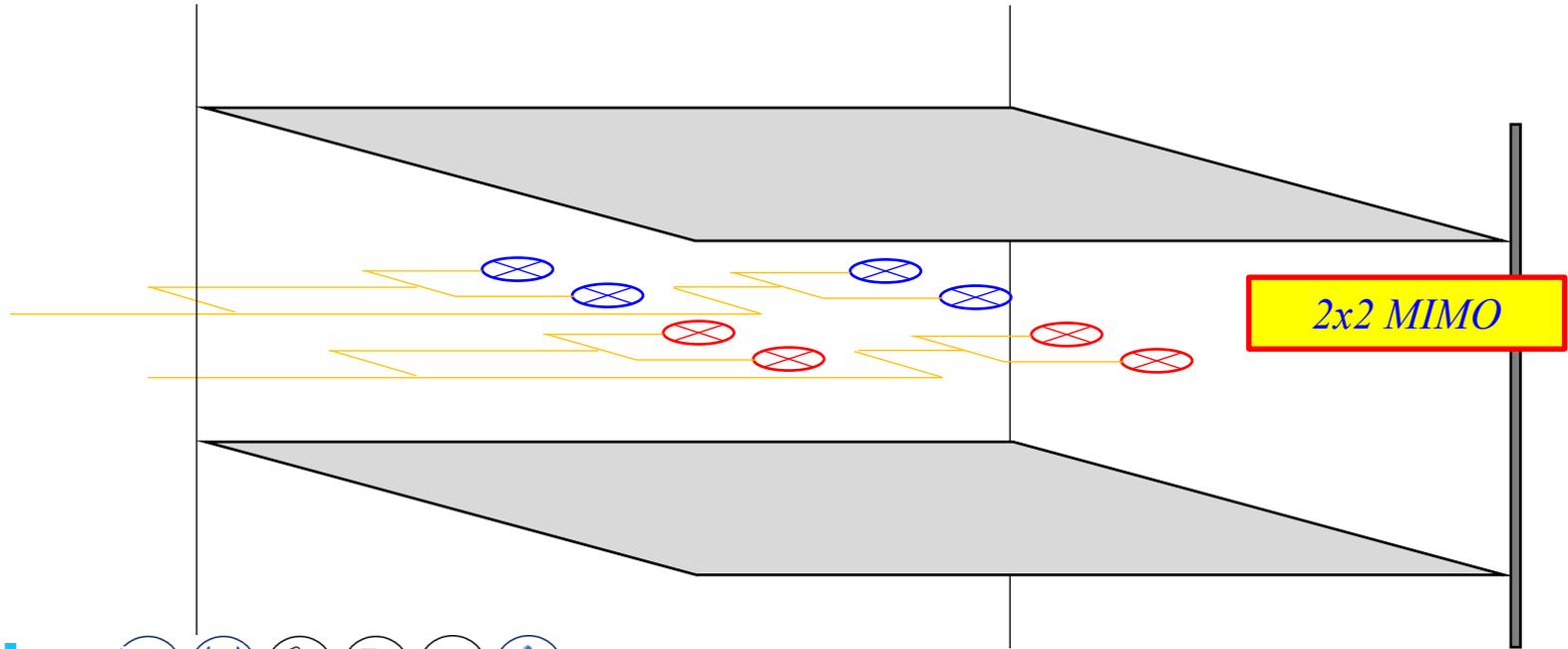


# 5G Deployment Challenges



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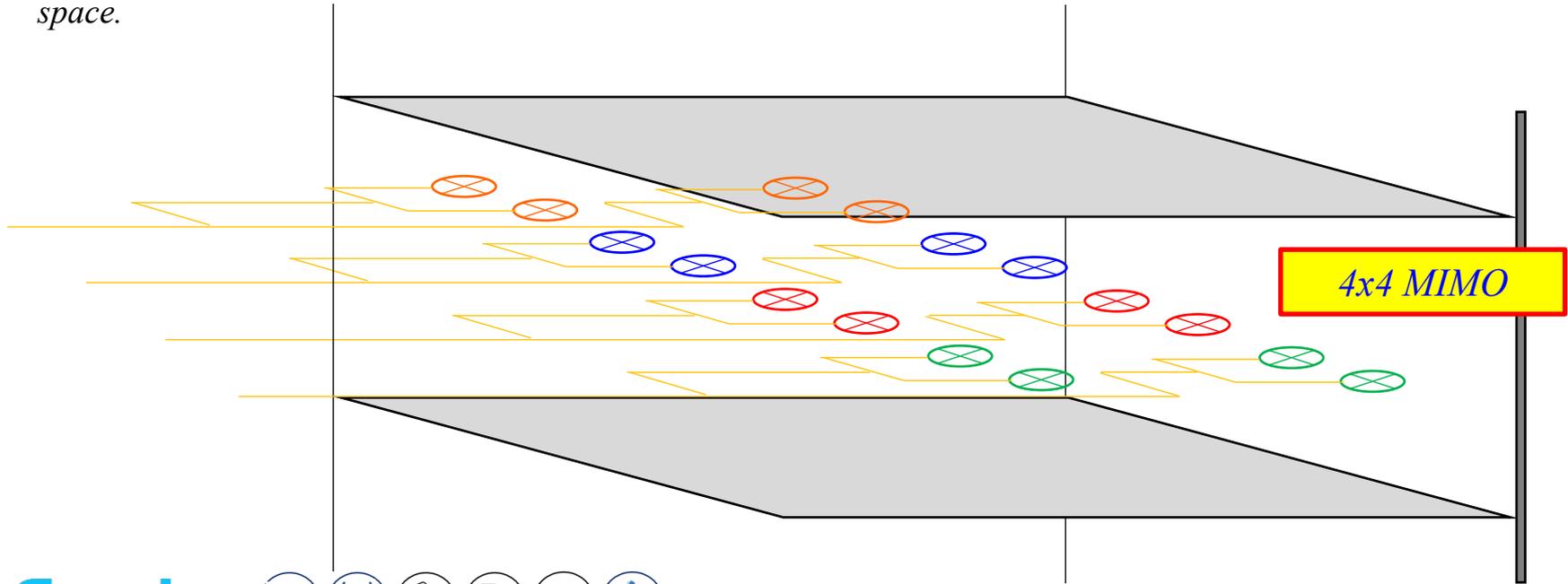


# 5G Deployment Challenges



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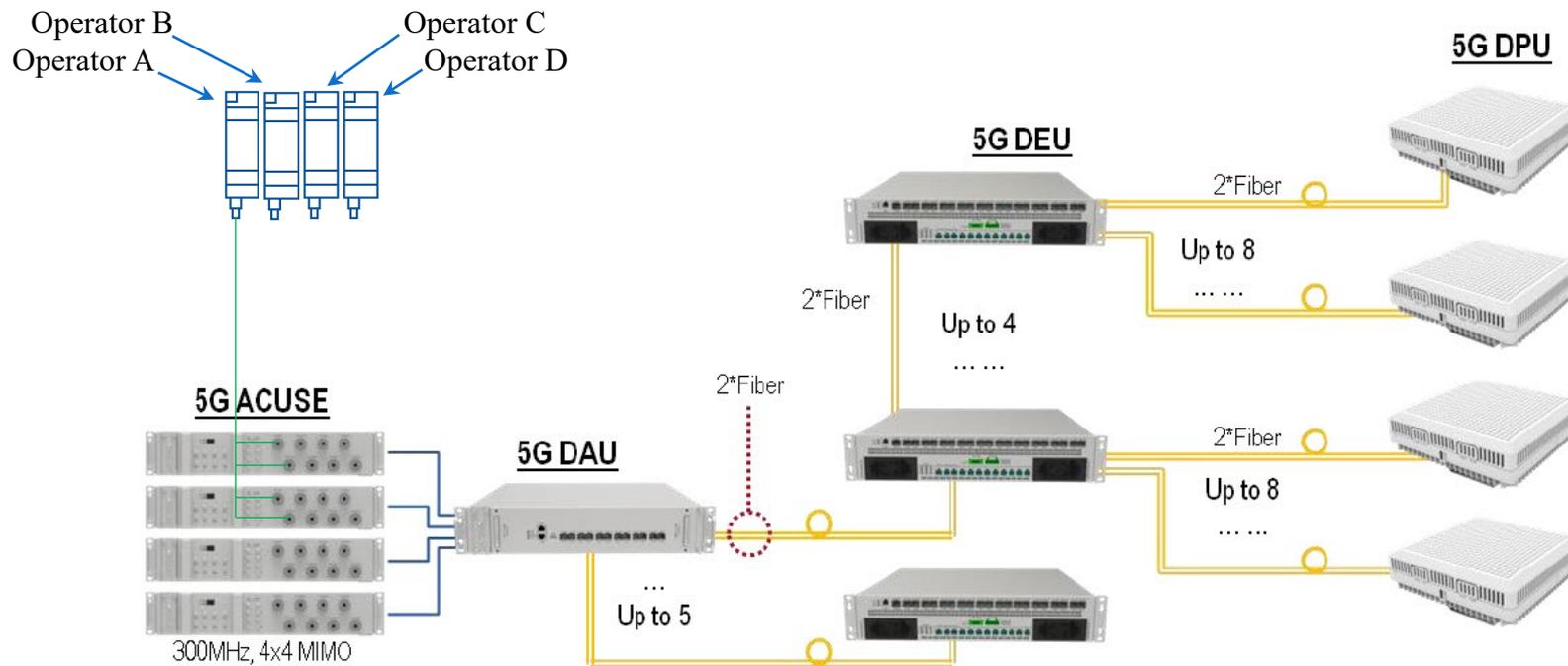
# How can we overcome those challenges?



# ComFlex Pro 5G DAS System



## System Architecture



# ComFlex Pro 5G DAS System



## Feature Highlights

- Support 2G/3G/4G/5G simultaneously in 1 system
- Support both FDD and TDD modes
- Support all frequency bands in HK including 850/900/1800/2100/2300/2600/3300/3500 bands
- Support all 4 Hong Kong mobile network operators in 1 system
- 2x2, 4x4, 8x8 MIMO in 1 box
- Full fibre optical system



*All operators in a single system!*

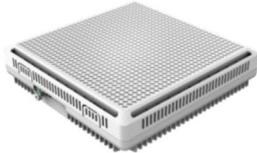
# ComFlex Pro 5G DAS System

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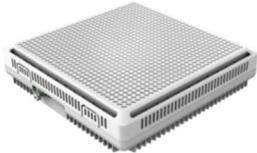
## DPU Type 2

- Support 850+2100+2300 Bands



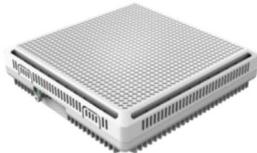
## DPU Type 3

- Support 900+1800+2100+2600 Bands



## DPU Type 6

- Support 3300-3600 Bands



## DPU Type 13

- Support 1800+2100+3300-3600 Bands





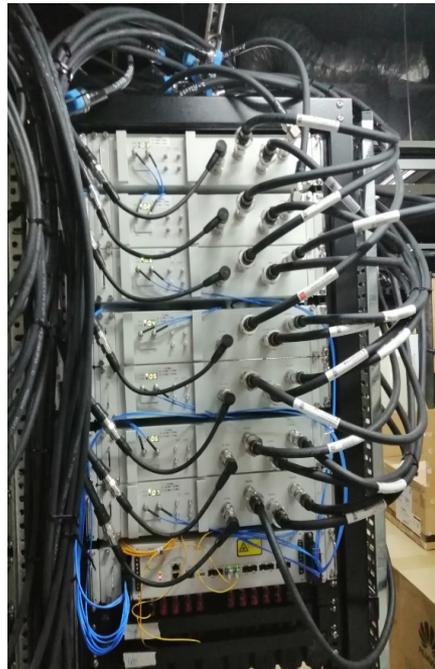
**Any actual  
deployments?**



# Live ComFlex Pro Systems in Hong Kong



## Deployments in Large Commercial Complex



# Live ComFlex Pro Systems in Hong Kong



## Deployments in Large Commercial Complex



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## Deployments in Large Commercial Complex





# Questions & Answers



