

工業技術研究院

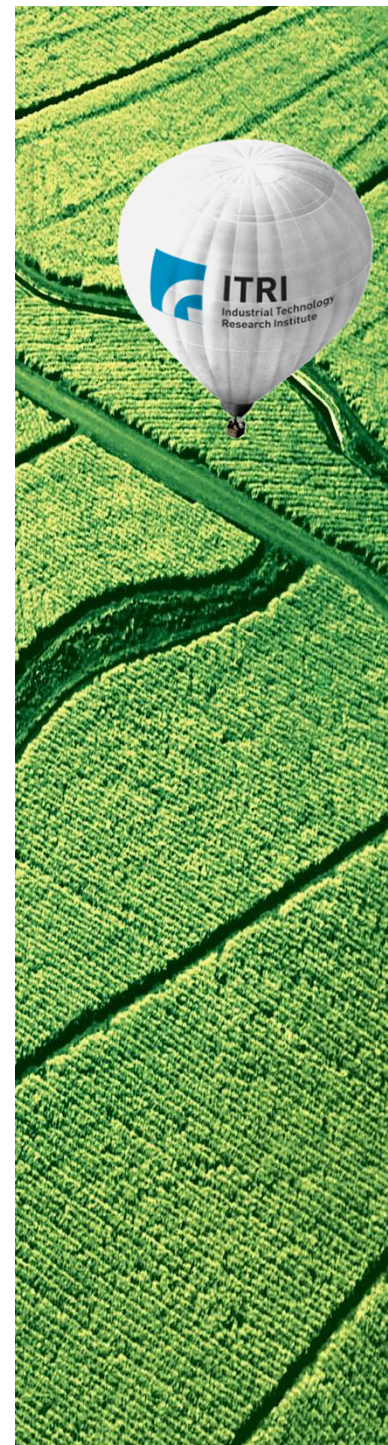
Industrial Technology
Research Institute

專網系統

陳俊儒

工業技術研究院
資訊與通訊研究所
寬頻網路與系統整合技術組

September 2019





Something about 5G

- 39 operators launched 5G service
 - 10 FMA, 15 mobile only, and 14 both
- 100 announced devices
 - 26 phones, 8 hotspots, 26 CPE
- 4 vendors announced chipsets
 - Huawei, MediaTek, Qualcomm, Samsung

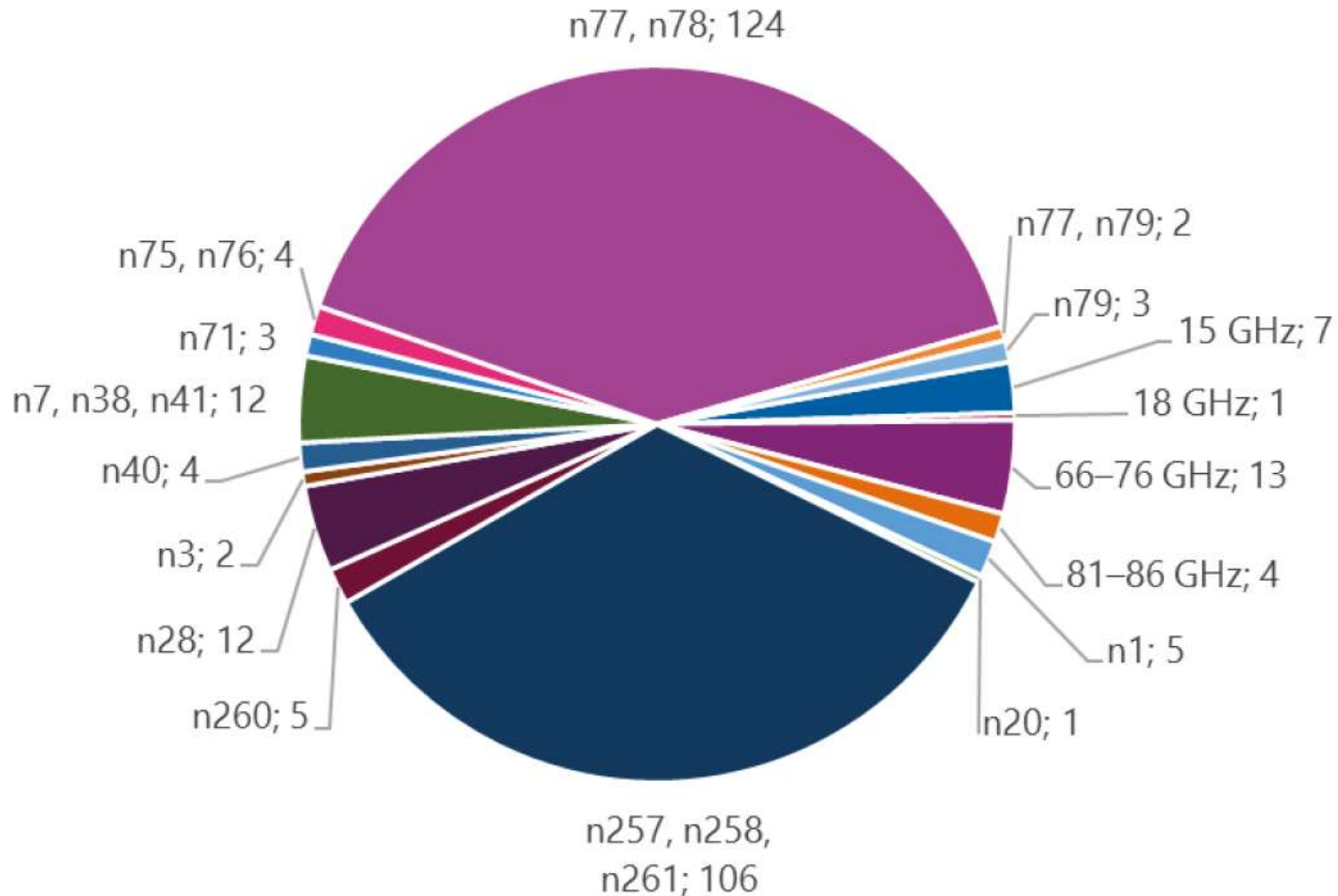
- Source: Global mobile Suppliers Association

Something about 5G

- 34 countries completed spectrum auction
 - APAC: 6, EU: 17, America: 2, MEA: 9
- 39 countries to auction before 2021:
 - APAC: 9, EU: 20, America: 9, MEA: 1
- Taiwan
 - 3.5GHz (270MHz), 28GHz (2500MHz), 1800MHz (20MHz)
 - Auction on 9 December, 2019

- Source: Global mobile Suppliers Association

Something about 5G



- Source: Global mobile Suppliers Association

Why 5G



Why 5G



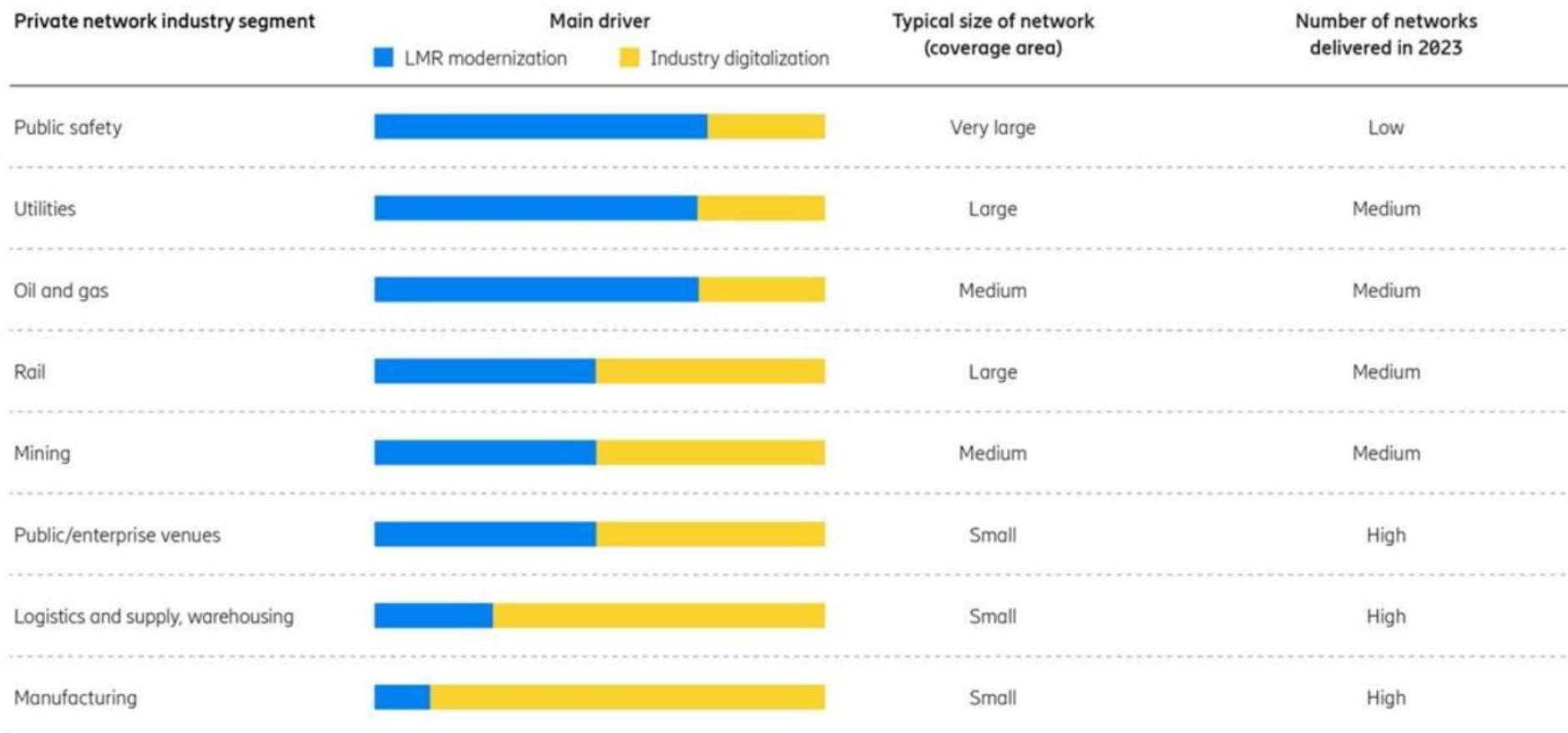
什麼是專網系統



什麼是專網系統

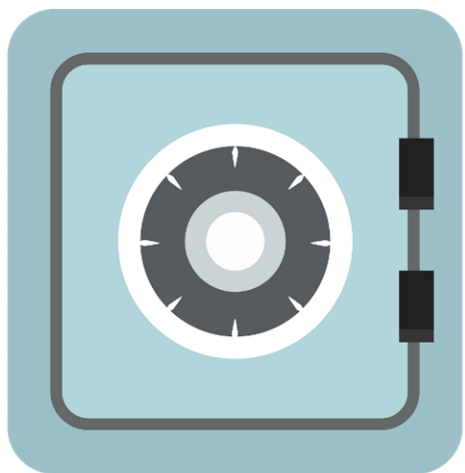


評估5G或LTE專網的部分



Source: Ericsson

專網系統的優勢



安全

資源分配



彈性



法人專網系統優勢

- 安全
- 彈性佈署
- 資源分配
- 公私混合
- 高性價比



kubernetes



法人專網系統優勢































mmWave



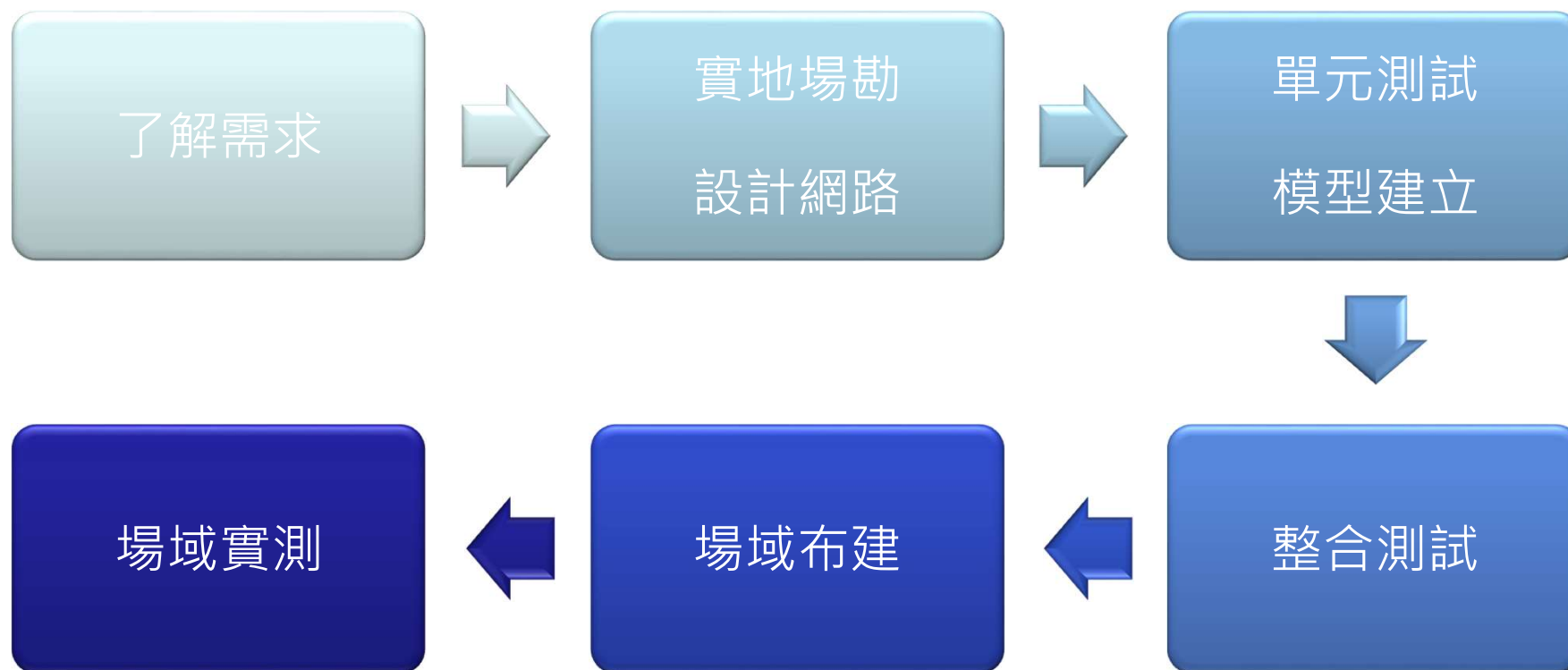
RAT comparision

	WiFi (5 or less)	WiFi 6	NB-IoT / Cat. M	LTE	5G	mmWave
throughput	1	2	0	1	3	3
latency	2*	2*	0	1	3	3
coverage	0	1	2	2	2	0
QoS	0	0	2	2	2	1
cost	2	2	1	1	0	2

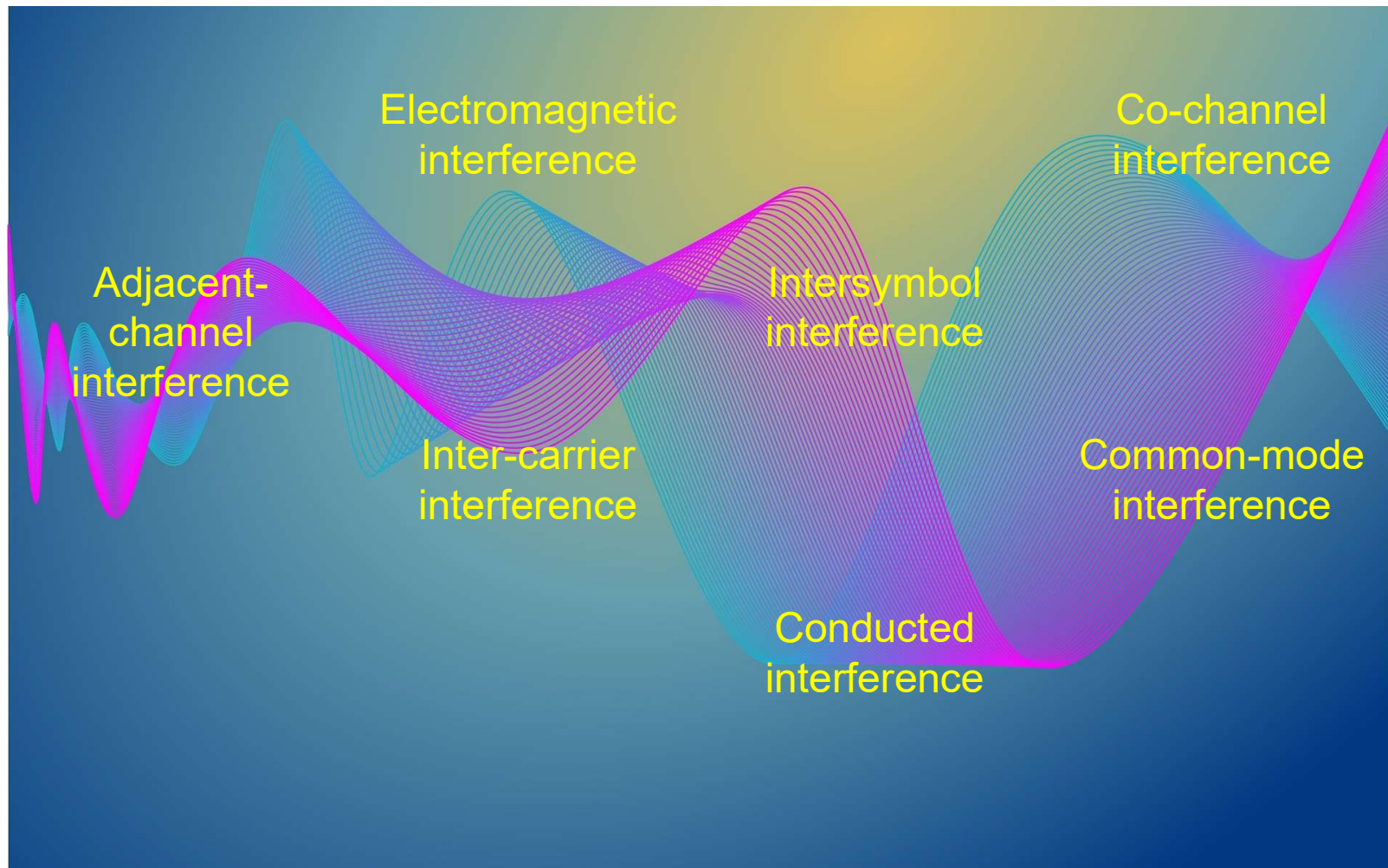
傳輸技術比較

	 5 or earlier	 6				mmWave
throughput						
latency						
coverage						
QoS						
cost						

場域是如何煉成的

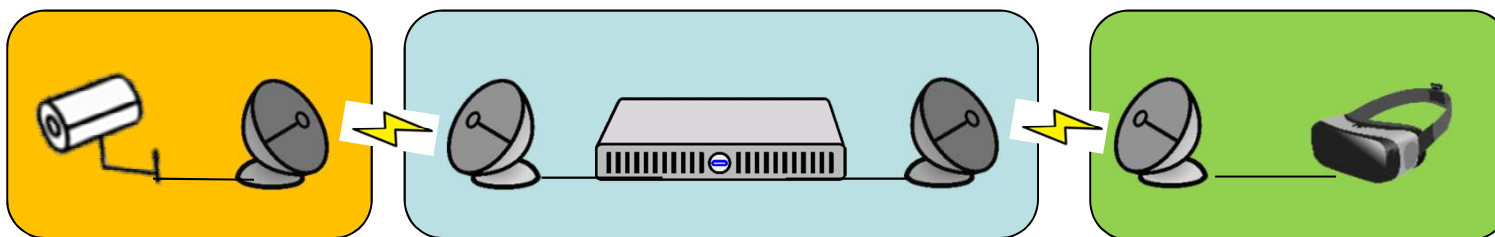


挑戰

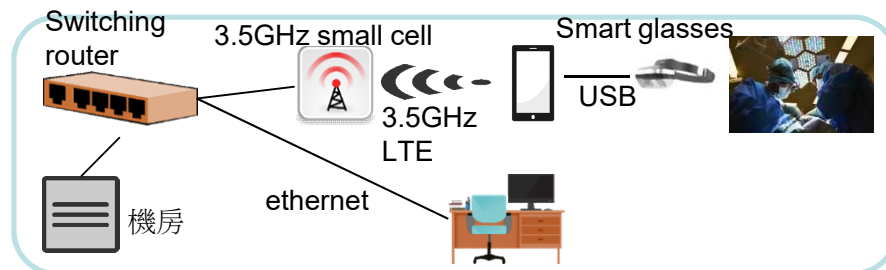


專網場域 - 台北流行音樂中心

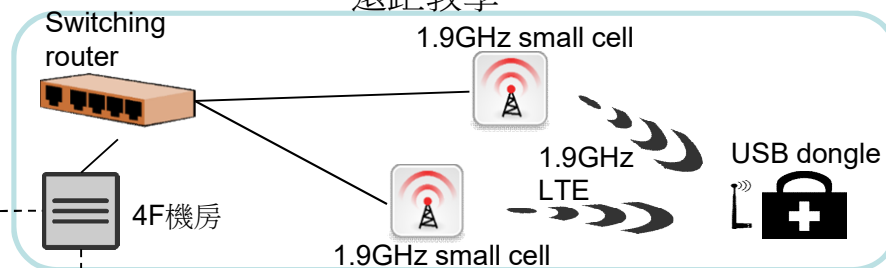
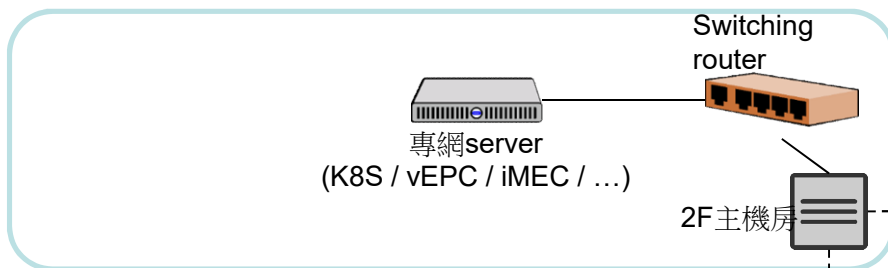
- 360° VR
 - 8K / 200Mbps / 0.4s



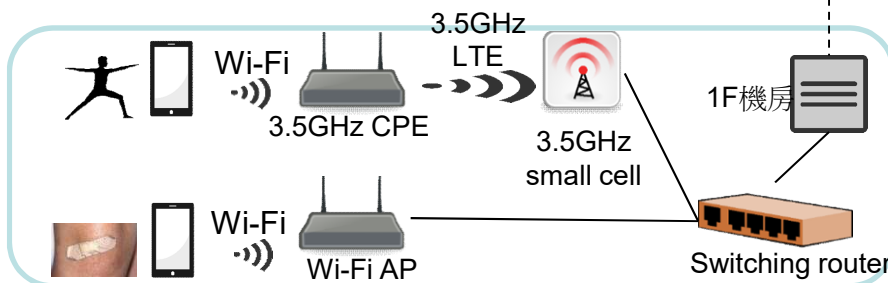
專網場域 – 三軍總醫院



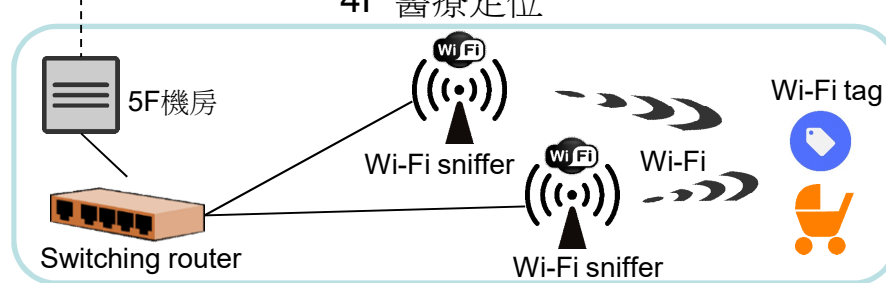
遠距教學



4F 醫療定位



1F 復健/傷口照護



5F 嬰兒車定位

Wideband FieldFox MW analyzer

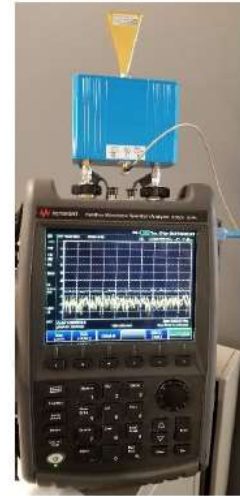


- Combo analyzer N9913/14/15/16/17/18B
- Spectrum analyzer N9933/34/35/36/37/38B
- Frequency range: 5kHz/30kHz to 26.5GHz
- Real time bandwidth: 10MHz (standard), 40 MHz and 100 MHz
- Functions: SA, VNA, RTSA, PM, independent CW source, CAT, TDR, channel scanner, NF, IQA, OTA, GNSS and many more;
- No vents and removable fan (no water or dust will get into FieldFox)
- LAN, USB and SD card
- High capacity battery: 4 to 5 hr operation
- Meets Mil PRE 28800 F class

FieldFox mmWave solutions

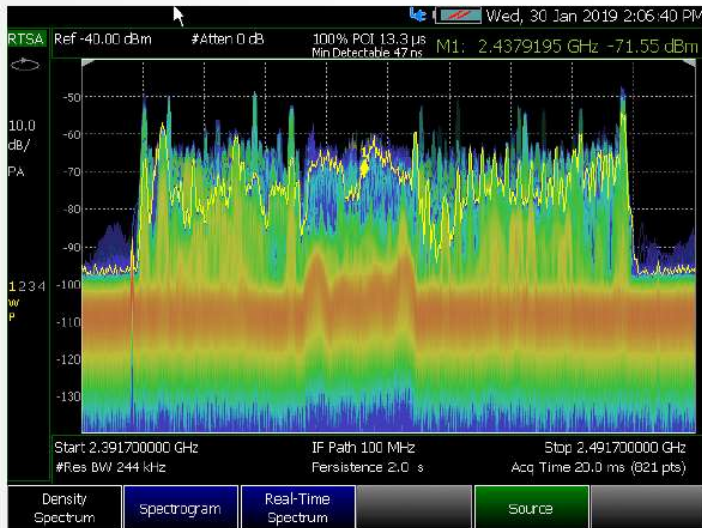


- N995X/6X:
 - 32, 44, 50 GHz
 - 10 MHz bandwidth
 - LTE and 5G TF demodulation
 - 5G NR FR1 control channel demodulation with VSA

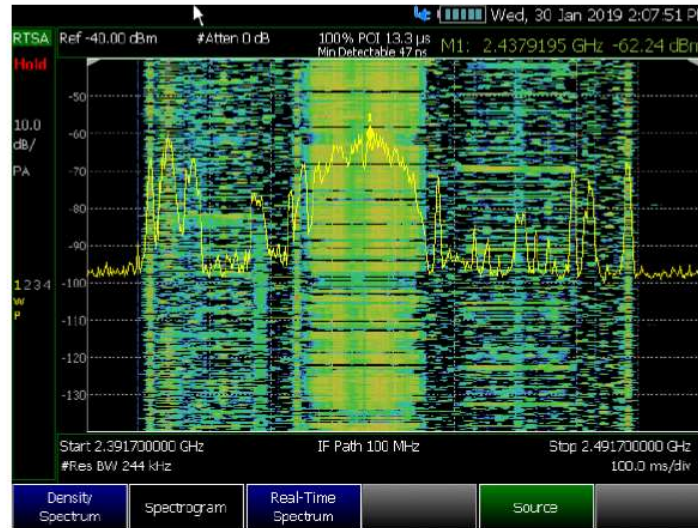


- N991x/3xB + OML downconverter
 - WR 28 (24 to 40 GHz); WR15 (50 to 75 GHz); WR12 (60 to 90 GHz); WR 10 (75 to 110 GHz)
 - Wideband support: 40 / 100 MHz
 - LTE and 5G NR 100 MHz
 - 5G NR FR1 and FR2 demodulation with VSA

RTSA 100 MHz

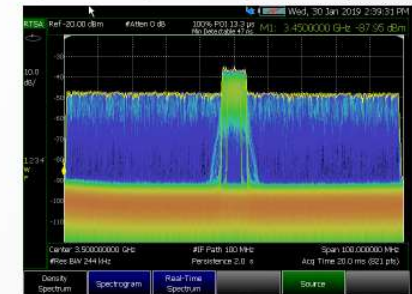


Density display: full WiFi 2.4 GHz spectrum



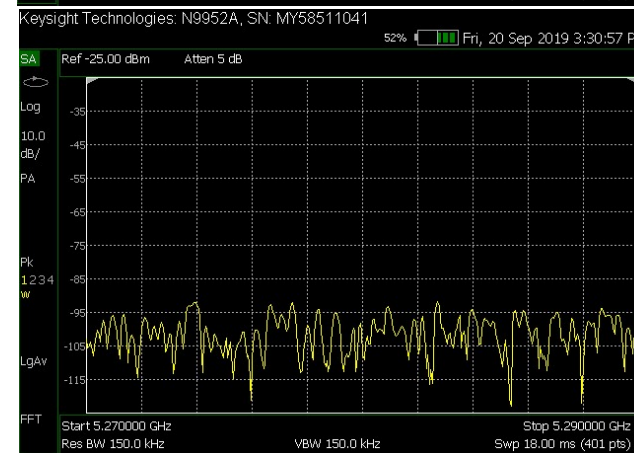
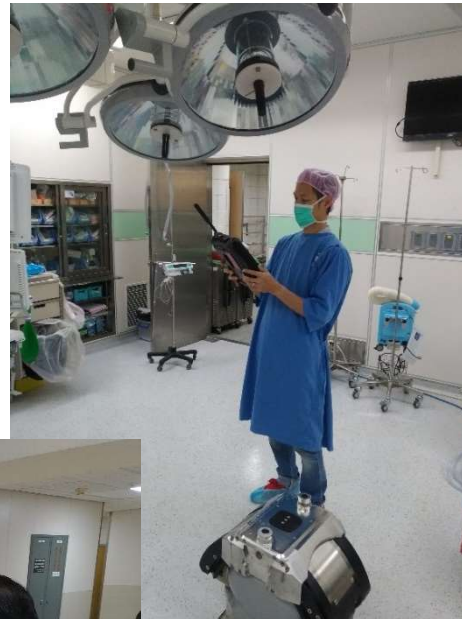
Spectrogram: 2.4 GHz band

- Real time bandwidth: 100 MHz
- 100% POI: 5.5us (100MHz)
- MDS: 47ns



How FieldFox helped TSGH project

- Ensure there is no other signal source



**Thank
You**

Danke

謝謝

Gracias

Grazie

ありがとう

감사합니다

Salamat

Kiitos

Merci

Richard Chen
+886912454555
richardchen1976@gmail.com
<https://www.linkedin.com/in/richardchentw/>

