华为5G研究及测试进展汇报

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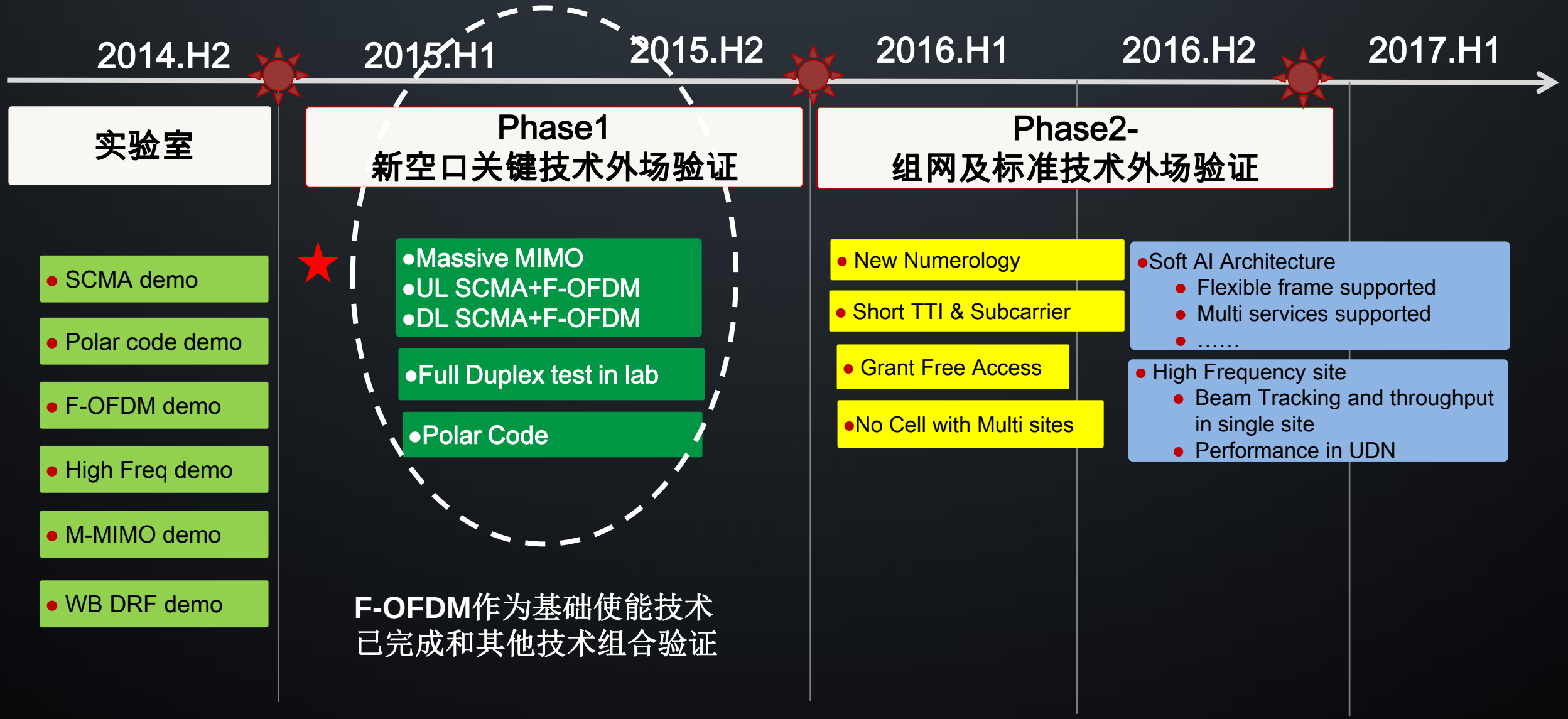
2016年1月

华为5G关键技术框架SoftAI

用户为中心的网络 UCNC	统一空口框架 UAI	三倍频谱效率提升 3x SE	制式无关技术 RAT Agnostic
UDN 高低频 5G和4G	业务前向兼容 3类业务空口切片 低频高频，授权非授权 窄带宽带频谱 接入回传	新波形 新多址 新编码 Grant free 减少信令开销	频谱效率提升
No Cell	F-OFDM	F-OFDM SCMA Polar Code	Massive MIMO Full Duplex

华为5G实验室和外场验证计划 (2015-2017)



F-OFDM作为基础使能技术
已完成和其他技术组合验证

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华为5G外场测试局点（Chengdu，China）

- Fibers are deployed between Huawei Research Center and Field
  - Length of the fibers: 10 km
  - Number of the fibers: >500
  - Support Cloud BB in LAB to connect to RRUs in Field

- Site B: ~20 meters high
  - 8TRX
  - with a square nearby

- Site A: ~25 meters high
  - 64TRX
  - with several building around

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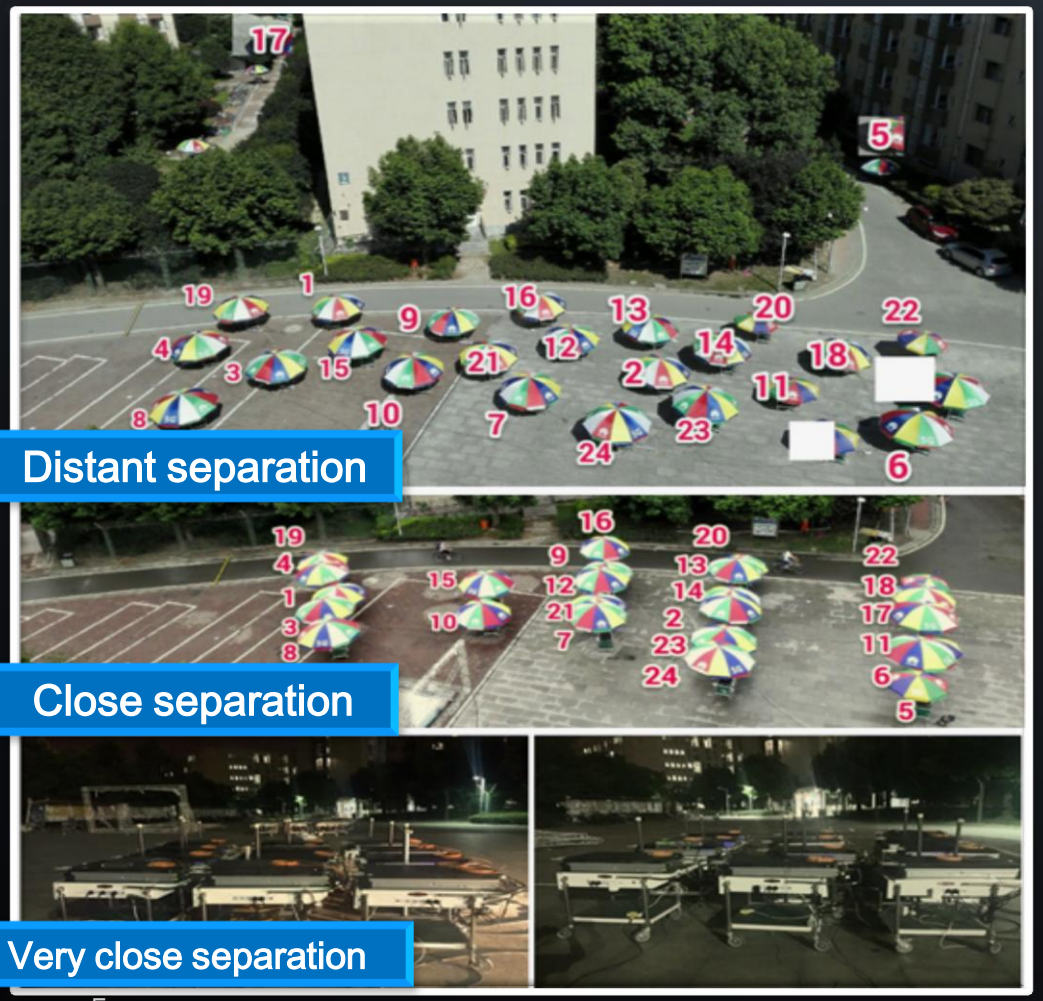
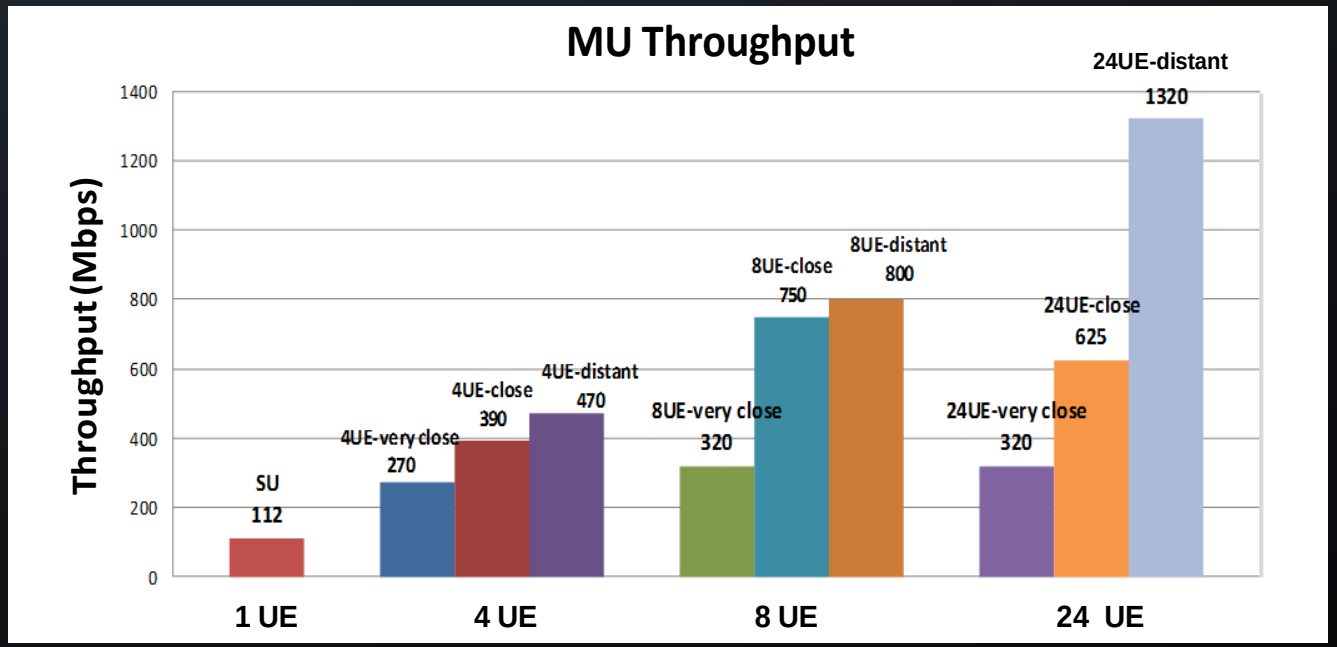
用例一：M-MIMO with 24 UEs@100MHz

(1.34 Gbps of average, 3.98 Gbps of max @ 100 MHz)



DL Throughput (100MHz)

- Average (mean/1s) 1344.60Mbps
- Maximum (sample/1ms) 3983.78Mbps
- Instant Value (sample/1s) 3595.10Mbps



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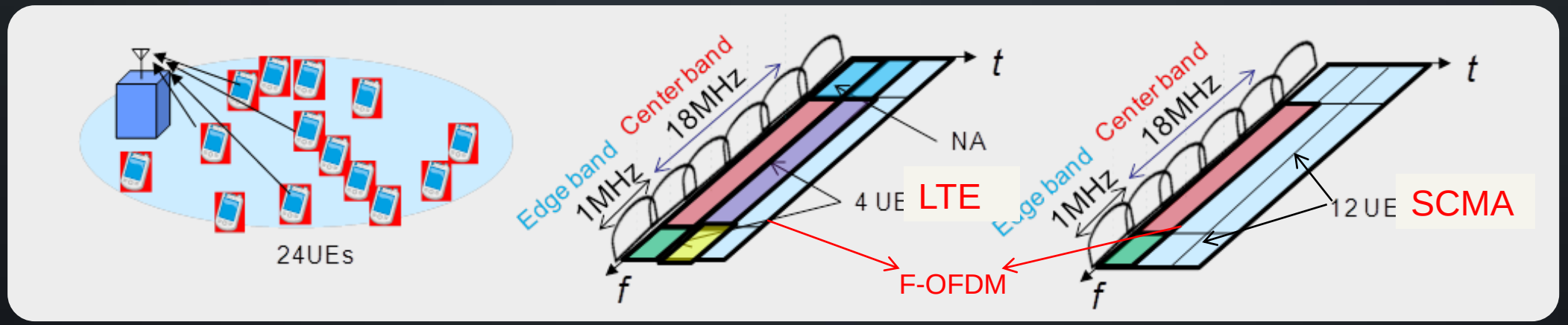
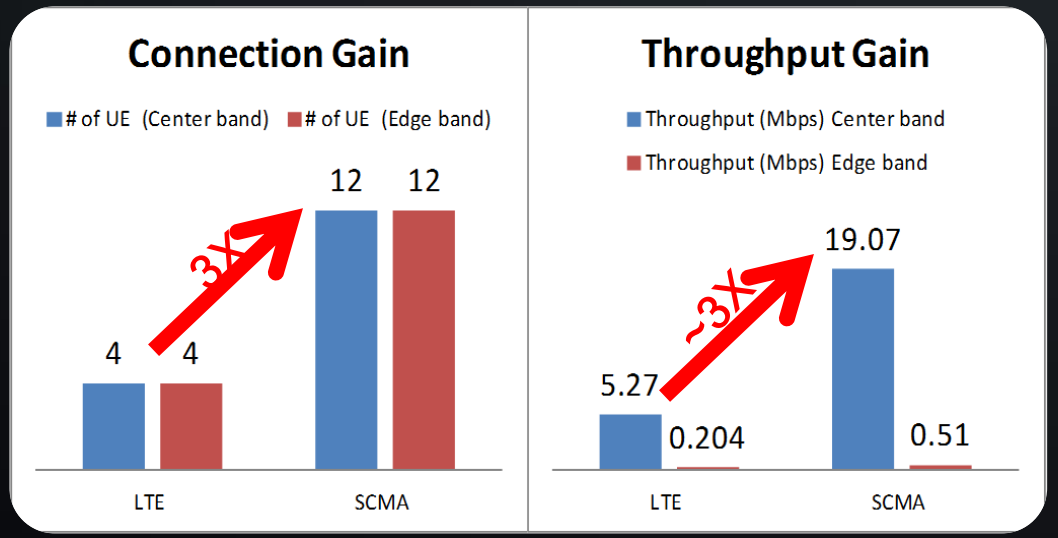
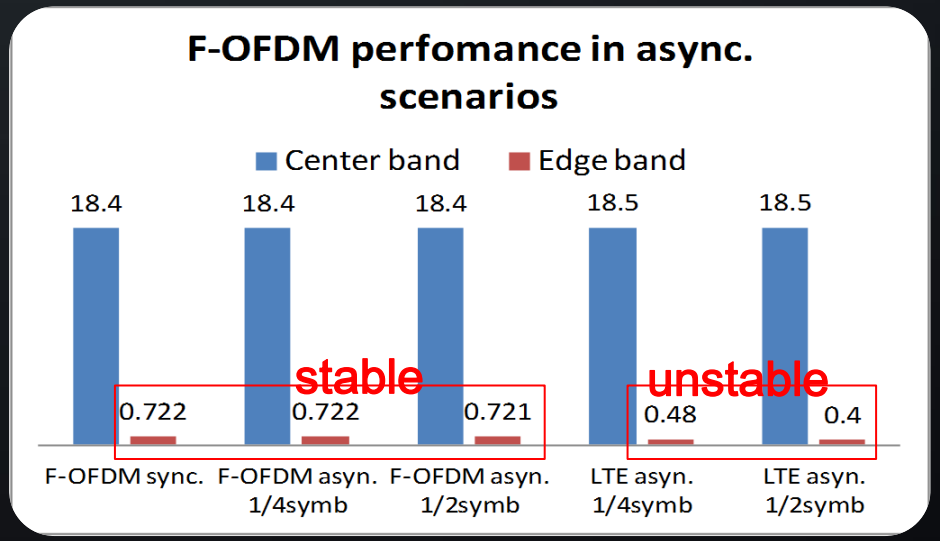
用例二: UL SCMA + F-OFDM



SCMA



F-OFDM



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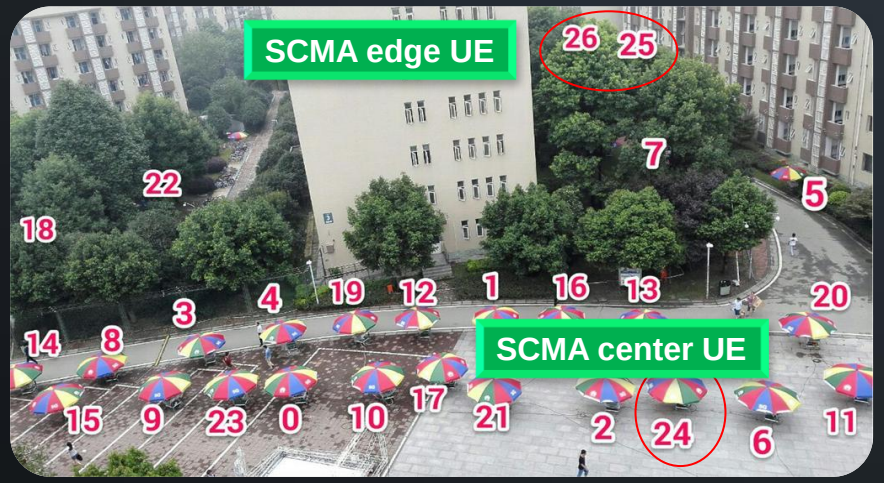
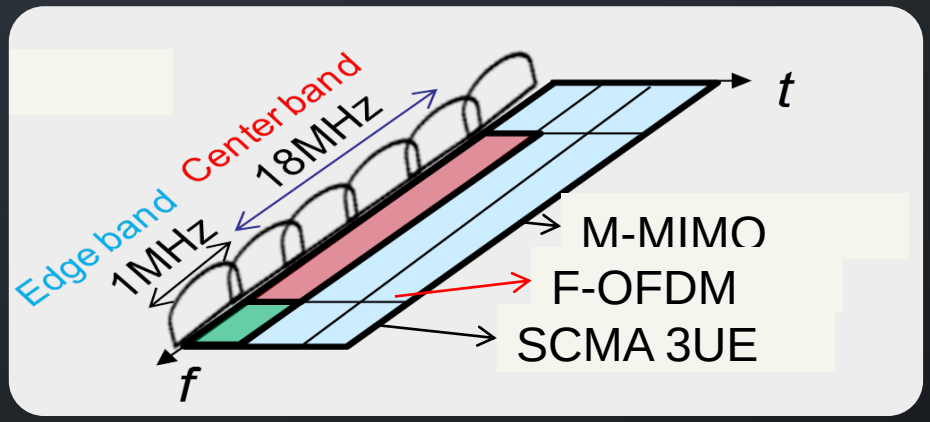
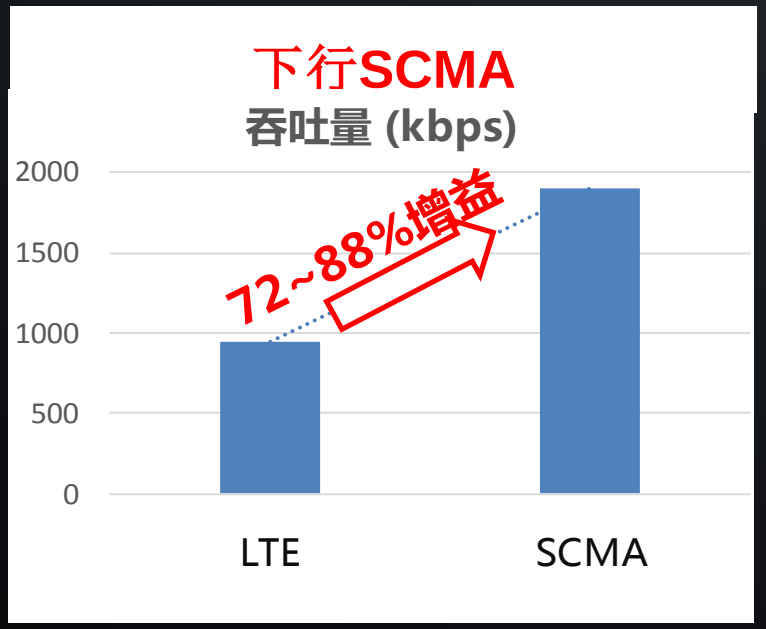
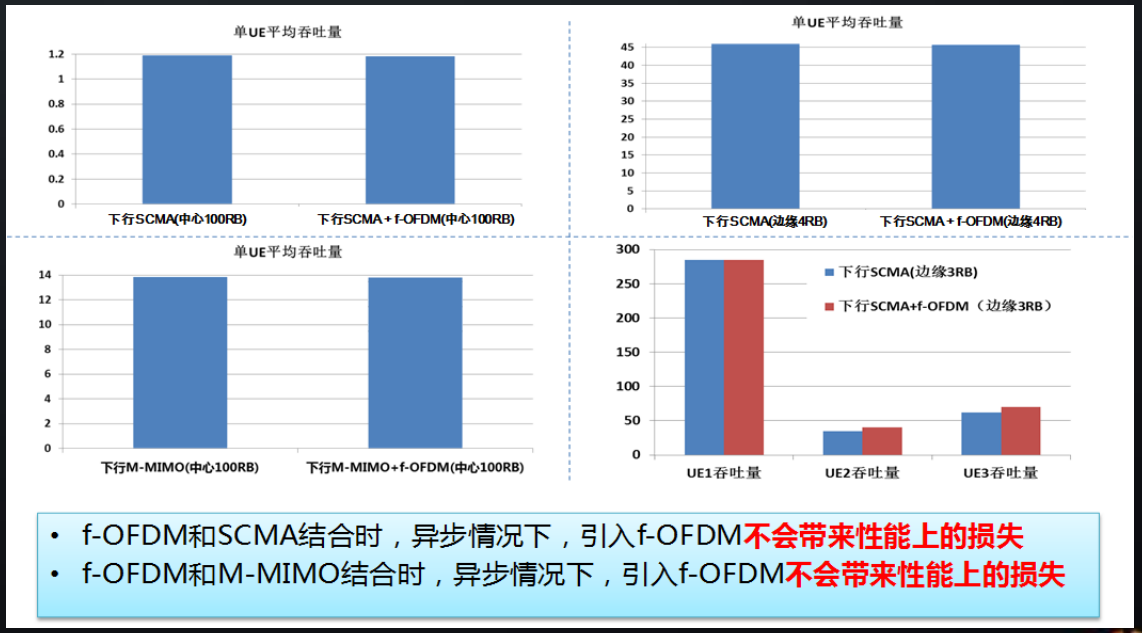
用例三: DL SCMA + F-OFDM + M-MIMO







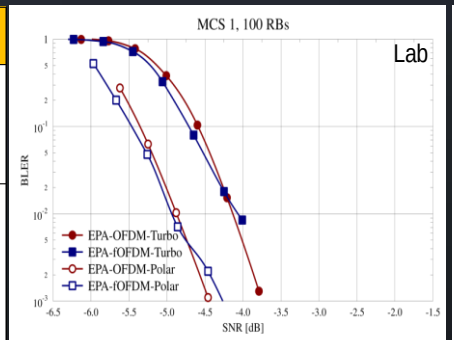


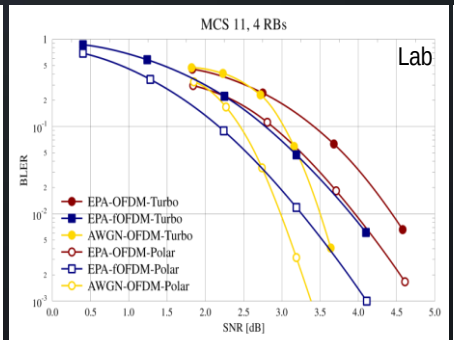
- f-OFDM和SCMA结合时，异步情况下，引入f-OFDM**不会带来性能上的损失**
- f-OFDM和M-MIMO结合时，异步情况下，引入f-OFDM**不会带来性能上的损失**

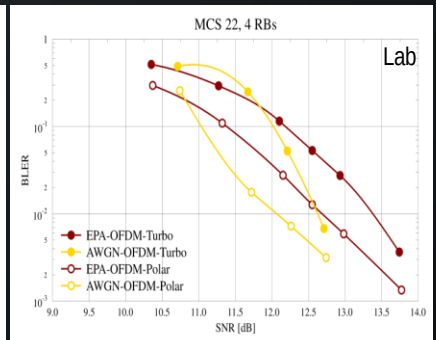
用例四：Polar Code + F-OFDM

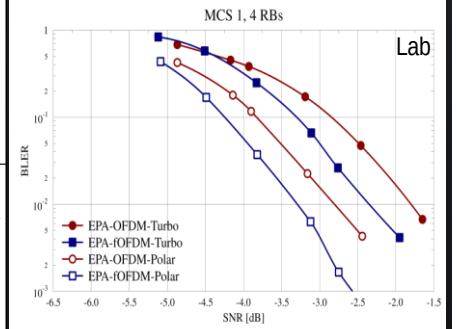
- ❖ Polar 码 比Turbo 码外场测试有0.5 ~ 1.2 dB增益
- ❖ f-OFDM 滤波器不会影响Polar Code性能

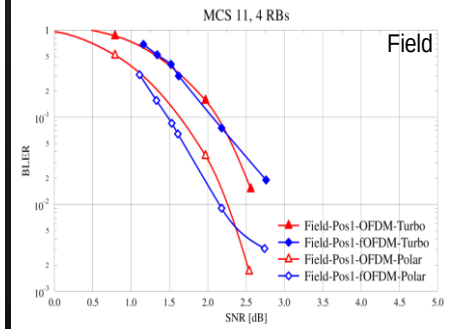
MCS	Packet size	Waveform	Channel	Notes
1	Large (100RBs)	OFDM	EPA	No field test is conducted because the required SNR is too low
		f-OFDM	EPA	
	Small (4RBs)	OFDM	EPA	
		f-OFDM	EPA	
11	Large (100RBs)	OFDM	AWGN	Tests with AWGN channel are only conducted with OFDM due to the time limitation of this TC
			EPA	
			Field (2 positions of Center UE)	
		f-OFDM	EPA	
			Field	
	Small (4RBs)	OFDM	AWGN	
			EPA	
			Field	
		f-OFDM	EPA	
			Field	
22	Large (100RBs)	OFDM	Field	No lab test is conducted with large packet size due to the time limitation of this TC
		f-OFDM	Field	
	Small (4RBs)	OFDM	AWGN	
			EPA	
			Field	
		f-OFDM	Field	

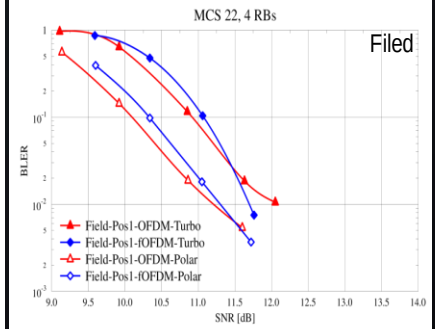












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华为5G新空口技术评估小结

5G新空口：在成都完成5G新空口外场测试，技术研究的增益全部实现。**理论研究与外场验证结果一致**，证明技术可行，相关的测试结果已联合向业界发布

5G新空口	频谱效率增益（理论）	实际外场验证
SCMA	1.4	1.6
f-OFDM	1.2	1.2
Polar Code	1.15	1.15
SCMA+Polar Code外迭代	1.1	1.1
Grant Free	1.25	待验证
Short TTI	1.15	待验证
合计	3.055	

Thank you

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