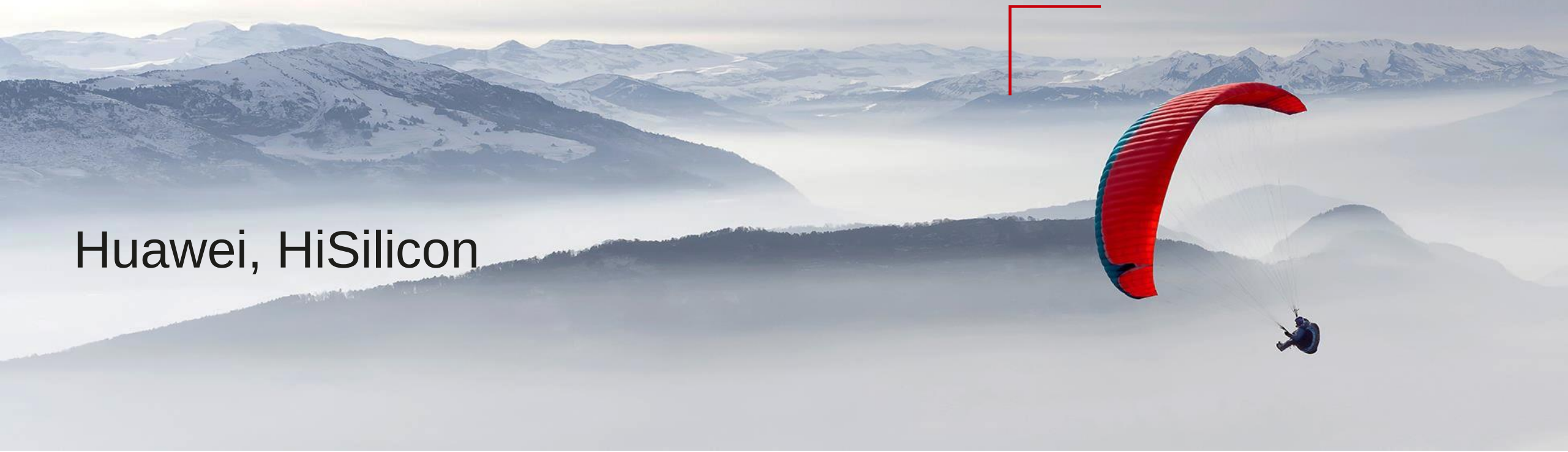
RWS-210441

3GPP TSG RAN Rel-18 workshop
Electronic Meeting, June 28 – July 2, 2021
Agenda Item: 4.1

Rel-18 NR Multi-Band Serving Cell



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- Motivations
- Multi-band Serving Cell
- Potential gains
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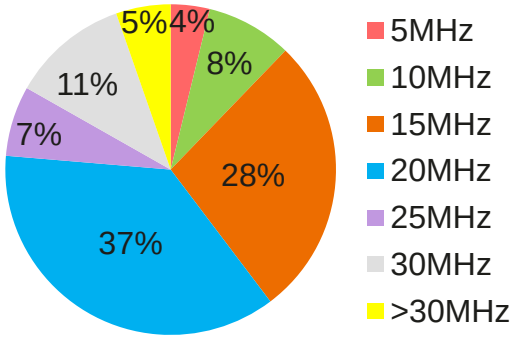
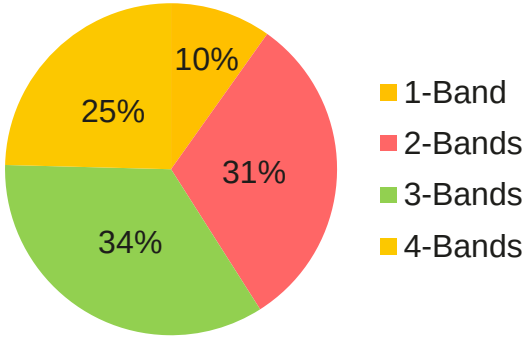
Non-contiguous FDD Spectrum: Large aggregated BW and excellent coverage

FDD Spectrum: Non-contiguous but large aggregated BW

BW of 95% contiguous FDD spectrum <=30MHz

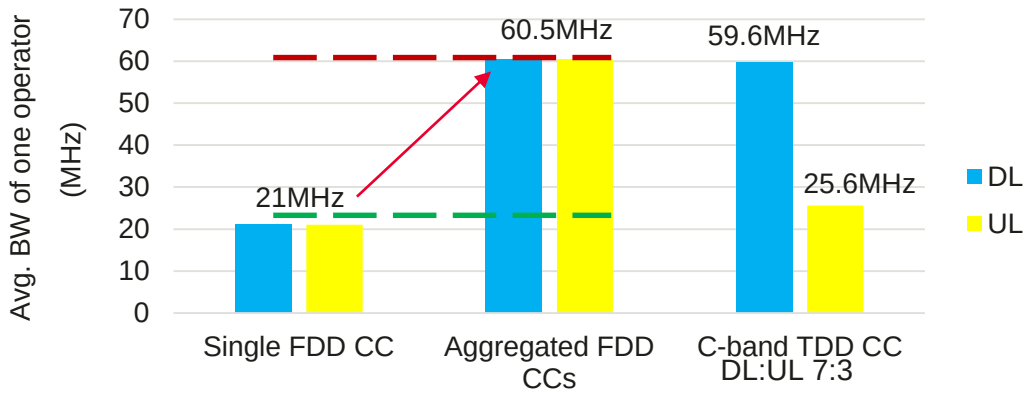


90% operators own more than 1 FDD band



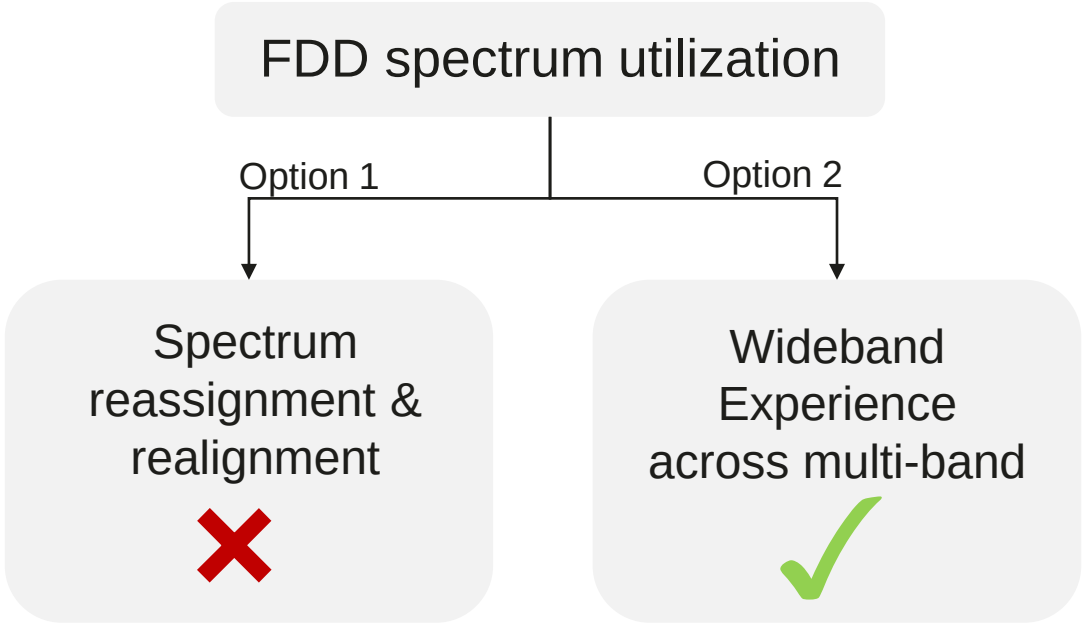
Aggregated FDD *vs.* C-band TDD

Avg. DL BW: 1:1
Avg. UL BW: 2.4:1



Note: based on statistic info over 1.4~2.6G spectrum of 63 operators.

Non-contiguous spectrum status not change in near future



- Not feasible in medium/long term
- One contiguous wideband carrier experience over non-contiguous spectrum

Non-contiguous bandwidth with Excellent coverage

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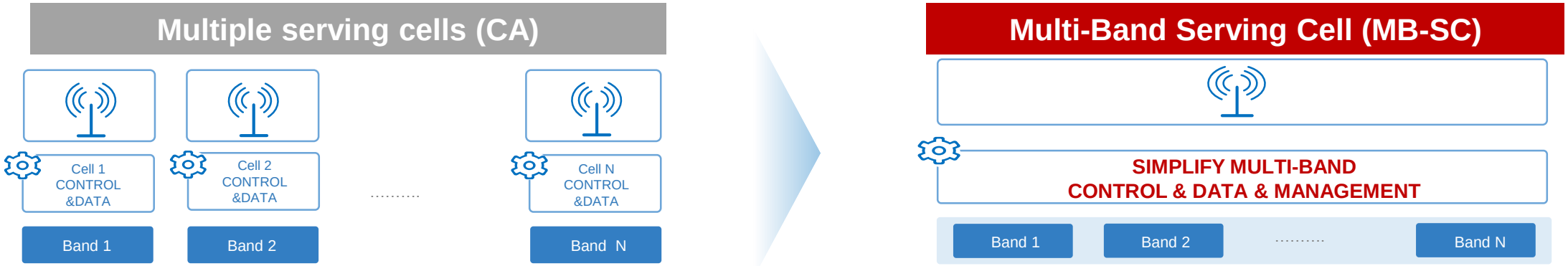
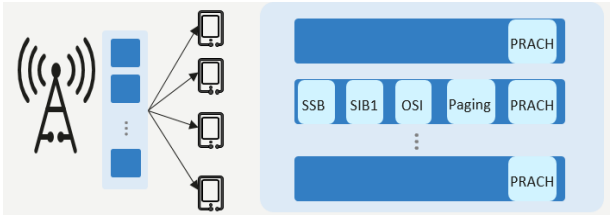
MB-SC: More efficient to aggregate non-contiguous spectrum



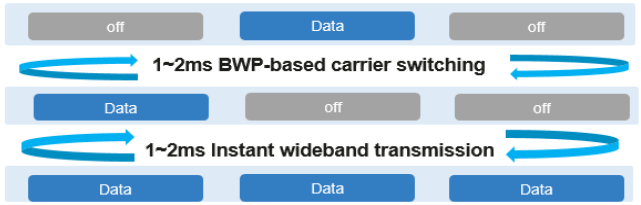
Idle/inactive State



- **Common signaling (SSB/OSI/paging) in one band**
  - All carriers are visible and accessible by UEs
- **Dynamical selection of UL carrier for Initial access**
  - Synchronized and access to all carriers without SCell procedure

Overhead reduction and offloading from initial access

Connected State

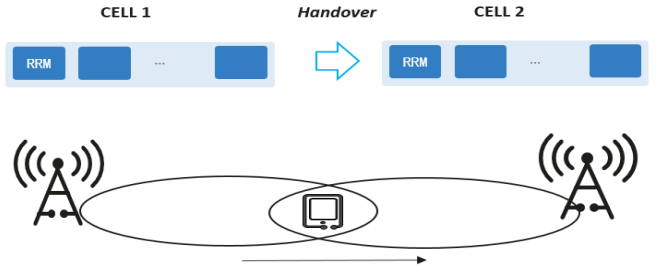


- No need SSB/RS for synch. and AGC settling
- No Scell (de-)activation procedure

- **BWP-based carrier switching and aggregation**
  - Instant wideband transmission, load balancing or power saving
- **L1/L2 overhead reduction**
  - Single PDCCH scheduling multi-carriers, sharing TRS etc.

Improved experience and capacity

Mobility Management



- **Simplified Mobility Management**
  - One RRM for all carriers instead of RRM per carrier
  - One handover without SCell addition/releasing procedure
  - O&M complexity reduction due to less serving cells

Simplified O&M and better experience

"One serving cell" UE Experience & compact management

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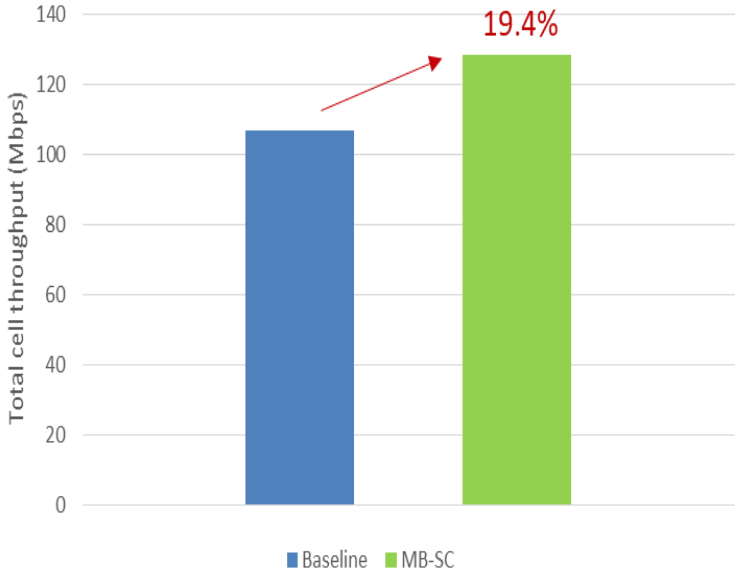
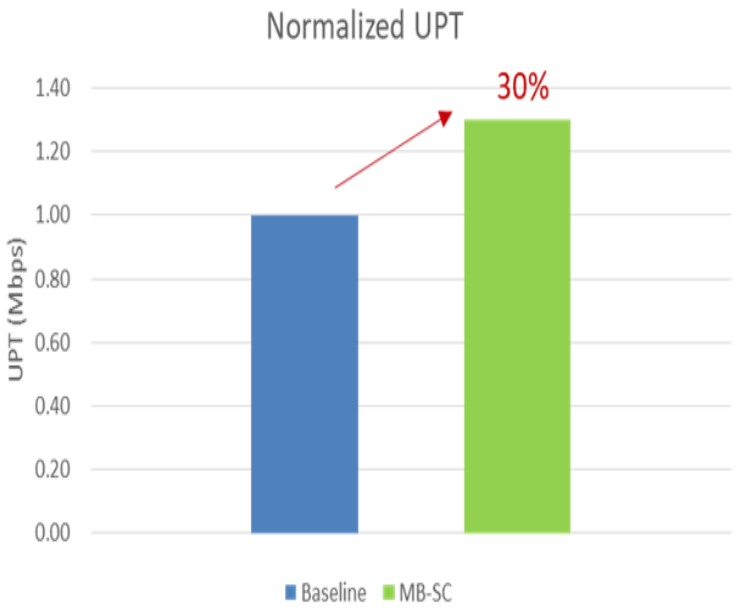
MB-SC: Potential gains

Lowest signaling overhead



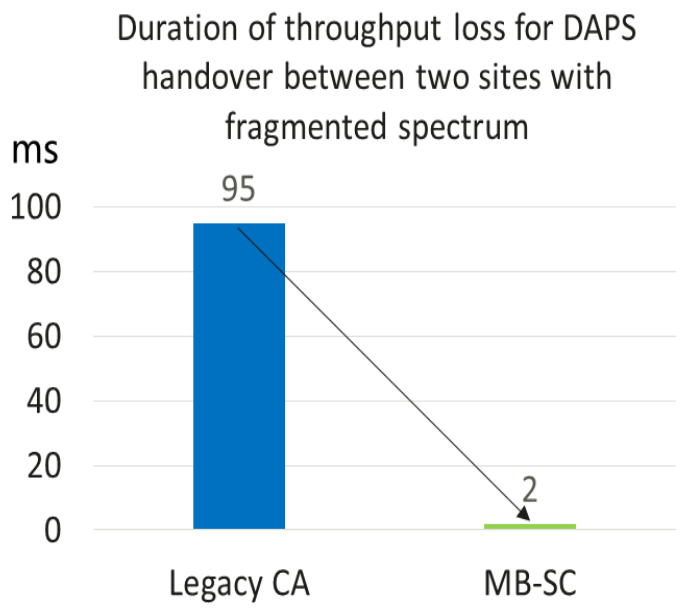
DL Capacity

Lowest latency of multi-band operation



DL UPT

Least interruption & delay of Mobility



Interruption reduction for Mobility

Optimized signaling overhead, latency & interruption

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MB-SC: Potential Objectives

Specify mechanisms for configuring one serving cell over non-contiguous carriers from one or multiple bands [RAN1/2/4],

- Support multiple active DL&UL BWPs in the serving cell for a UE where each BWP is mapped within a carrier of contiguous bandwidth
- Support single PDCCH scheduling PDSCH/PUSCH over multiple BWPs within the serving cell
- Support the operation of initial access related channels/signals being transmitted only in one carrier of the serving cell
- Note: The frequency distance between the non-contiguous carriers in the serving cell may be within a limit such that simplified network and/or UE behavior can be exploited, e.g. the time-frequency synchronization, QCL, etc. from one carrier can be used for another carrier of the serving cell.

Thank you.

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Simulation assumptions: DL capacity (1/3)

Table 1: System level simulation assumptions for single PDCCH

Parameters	Assumption
Carrier frequency	700/800/900 MHz
Bandwidth	10 MHz
SCS	15kHz
Inter-site distance	500m
Antenna	4T2R
Channel model	SCM-UMA-3D
IBLER of PDSCH	10%
Device deployment	80% indoor, 20% outdoor
UE speeds of interest	Indoor users: 3km/h
	Outdoor users (in-car): 30 km/h
Traffic model	Full buffer
Scheduling algorithm	PF
NR UE number per cell	10/15/20
UE speed	3km/h
PDCCH symbols	3
DCI size (excluding CRC)	Legacy DCI scheduling one carrier: 60 bits
	DCI scheduling 3 carriers: 132 bits
Target BLER of PDCCH	1%

Table 2: Configuration assumptions for common signalling

Parameters	Assumption
SSB	4 symbols& 20 RBs @20ms
TRS	2 symbols&2 slots& wideband @20ms
SBI1	14symbols&48 RB @20ms
OSI	14symbols&16 RB @20ms
Paging	14symbols&16 RB @20ms
CORESET0	48RBs&2symbols @20ms

Simulation assumptions: DL UPT (2/3)

Table 3: Evaluation assumptions for UPT and power saving

Common parameters	Assumption
Number of carriers	3
Carrier bandwidth	10MHz
Traffic model	FTP3
Packet size	0.5Mbyte (36.872)
RU	20%
Legacy CA with SCell (de-)activation	**Assumption**
Deactivate SCell condition	No packet arrival within 100ms
R17 SCell activation delay	12ms
MB-SC	**Assumption**
Switch to one band condition	No packet arrival within 20ms
The delay of switching back to multi-bands	2ms

Simulation assumptions: Interruption of mobility (3/3)

Table 5. Duration without CA for the mobility between two sites with DAPS

Procedures	**Delay**
DAPS handover delay 1	46 ms (38.133) Including RRC procedure delay Excluding cell search time since the new PCell is known Including waiting for PRACH occasion
2-step RACH procedure	10 ms gNB sending RAR
DAPS handover delay 2	11 ms (38.133)
SCell addition	16 ms (38.331)
SCell activation	12 ms (R17 DSS discussion) Excluding cell search time since the SCells are known Using temporary RS for activation