

Commercial in Confidence

# 5G Deployment Strategy revision Spectral Efficiency Improvement

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Aspire Consulting Team

# Aspire view on maximizing 5G performance

## How to get the most from installed base?

- 1 → 5G Performance is dominantly set with deployment strategy (Interoperability with LTE, Dynamic Spectrum Sharing etc.)
- 2 → For minimized overhead and maximum performance Radio interface needs optimal configuration (TDD pattern, SSB...)
- 3 → Drive test measurements as the main source of information, requires advanced postprocessing and analysis expertise
- 4 → Maximized 5G coverage with optimal RF design, DSS and 4G-5G traffic management
- 5 → Aspire Cell Performance Signature enables advanced analytics (spectral efficiency, scheduler performance...)
- 6 → Deep dive to 5G performance, understanding product above available documentation. Comparison between RAN vendors stretches performance and improves TCO



# Aspire Advanced Analytics - Cell Performance Signature

unique innovative data analytics

## Methodology

### User Experience Throughput =

#### Throughput per RB

#### #RB per user

C  
P  
S



→ Link adaptation  
(SINR -> CQI ->  
MCS: Modulation  
/TBS)  
→ MIMO utilization

L  
O  
A  
D



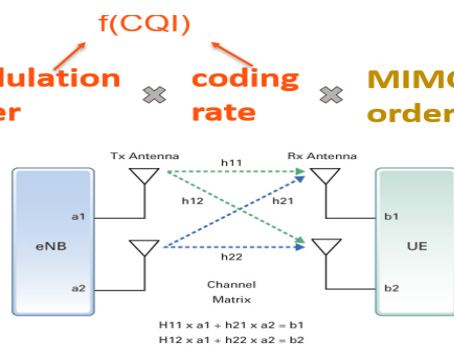
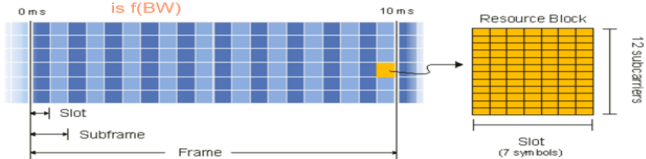
→ #RB per cell (BW)  
→ # active users per cell  
→ PDCCH configuration  
→ VoLTE, VoNR traffic



Throughput  
per RB

Where overhead  
is percentage  
of non traffic RE and  
is f(BW)

$(1 - \text{OH}) \times \# \text{ RE per RB in subframe} \times \text{modulation order} \times \text{coding rate} \times \text{MIMO order}$



## Added Value

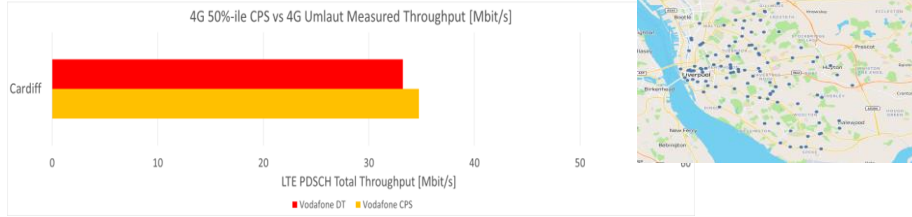
- 1 Estimates user experienced throughput with better accuracy
- 2 Provides information from close to antenna to cell edge
- 3 Works for both 4G and 5G, all RAN vendors, enables benchmark
- 4 Enables AI/ML prediction of future performance
- 5 Valuable insights on spectral efficiency
- 6 RCA and underperformers segmentation: capacity vs. radio
- 7 Supports What-If analysis for different scenarios

# CPS analytics vs. PM data vs. Real performance

- Allows assessment of spectral efficiency and user experience in different part of a cell (from close to antenna to cell edge)
- Good accuracy, CPS throughput shows good match to Drive tests, Speedtest and similar real measurements.
- Ability to anticipate future performance and perform various what-if analysis

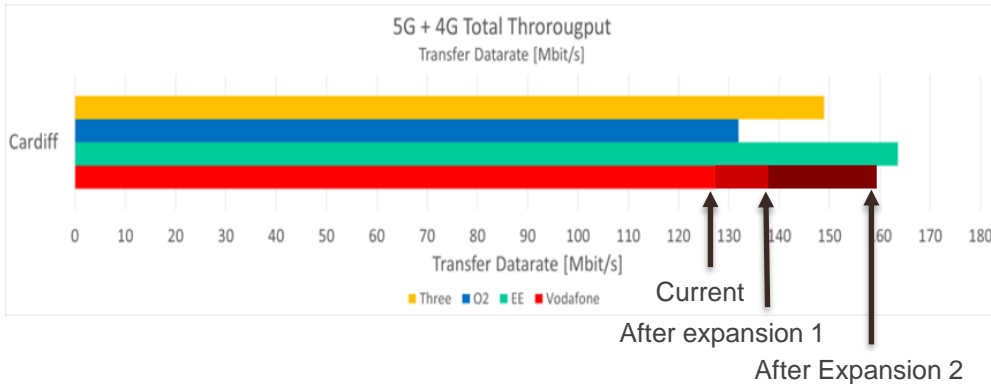


50%-ile 4G CPS vs 4G Umlaut measured throughput



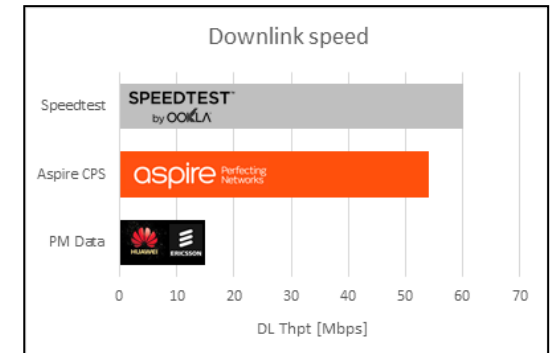
A very good match can be observed between median CPS performance and Umlaut results.

What-IF analysis with modelling of impact of capacity expansions.

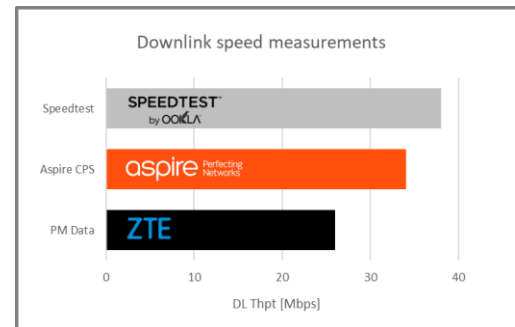


Very good match with Ookla Speedtest data proven in different markets. CPS based performance assessment reflects better reality than traditional PM based KPIs.

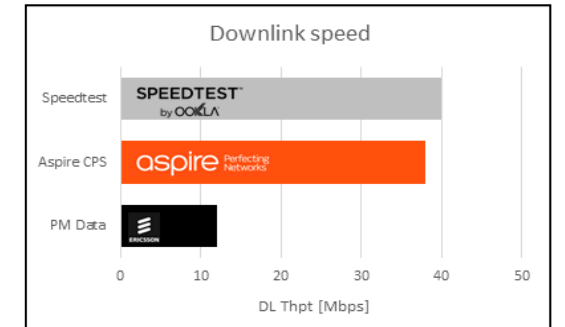
Market in Middle East:



Market in Central America:



Market in Eastern Europe:



# Aspire Advanced Analytics – 5G RANalyzer

## unique innovative drive test analytics



### Unique solution:

- Automated 5G radio interface configuration audit for large number of logfiles/measurement
- Enables **quick comparative analysis vs competition** and between different vendor solutions in the network
- Automated DL peak throughput calculation for any 5G live network configuration
- 5G parameters consistency check/verification through drive test measurements
- Most advanced deep dive analysis with most precise granularity (RE level) correlation of any 5G metrics per slot/SFN (PRB allocation, sched. activity, BLER, MCS, TBS, Rank, CQI, SSB/CSI-RS/PDSCH/TRS SINR etc.)

aspire Perfecting Networks

NR Design	
NR design aspect	Value
Carrier Band	78
Carrier Bandwidth	133 PRBs
Carrier SCS	30 kHz
SSB Position Configuration	absoluteFrequencySSB: 628032 absoluteFrequencyPointA: 627404 offsetToCarrier: 0
Number of SSB Beams	1
SSB Sweeping	No
SSB Sub-Carrier Spacing	30 kHz
SSB periodicity	20 ms
SSB Block Power	25 dBm
TDD Pattern	Number of patterns: 2 Pattern: 7-1-2 (4-6-4) Slot config: DDDSUUDDDD TDD Pattern Cycle: 5 ms
Antenna panel configuration	eight x two - Typel - SinglePanel
Codebook mode	1
CQI / TBS mapping	256 QAM table
Initial BWP	BWP-0; Size: 133 PRBs; SCS: 30 kHz
Dedicated/Active BWP	BWP-0; Size: 133 PRBs; SCS: 30 kHz
CORESET (PDCCH)	Duration: 1 symbol Size: 132 PRBs Periodicity: 1 slot Starting symbol: 1st symbol DCI Formats: 0-1,1-1 Aggregation Level: 1,2,4,8,16

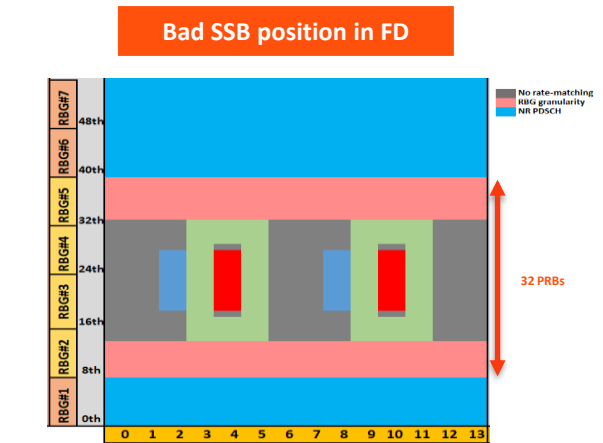
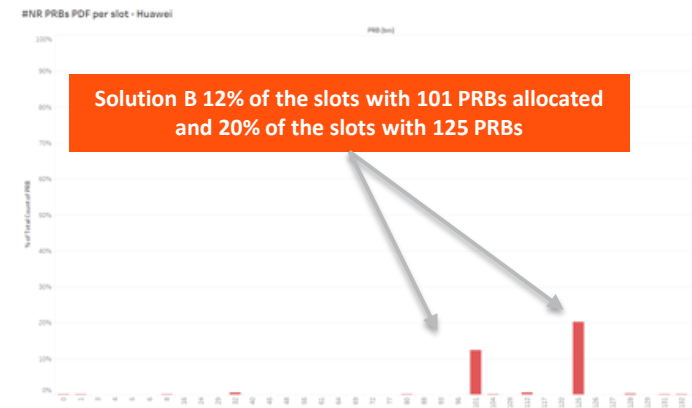
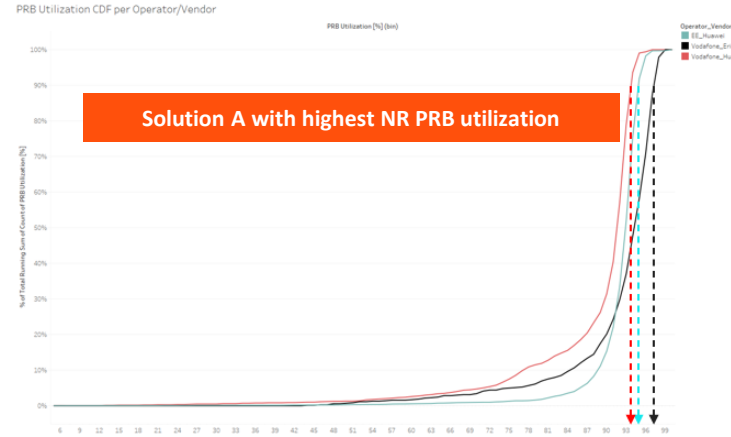
# 5G Deployment strategy revision

Case study – Tier 1 Operator in Europe, 5G SSB positioning affecting throughput

## SSB configuration deep dive:

- ◆ Analysis on SSB positioning for 2 vendors
- ◆ Different positioning affects the PRBs that are available for PDSCH
- ◆ Comparison between vendors shows higher allocation of PRBs in one vendor.
- ◆ Grid representation of each SSB positioning and impact in available PRBs for PDSCH.
- ◆ 12% of slots have reduced PDSCH bandwidth due to SSB positioning
- ◆ Optimization in SSB positioning to bring higher throughput to end user

**SSB positioning optimization reduces overhead and improves throughput and spectral efficiency**



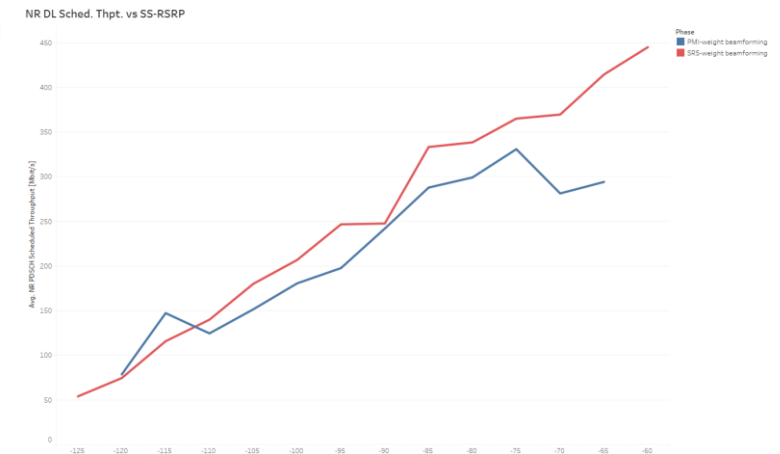
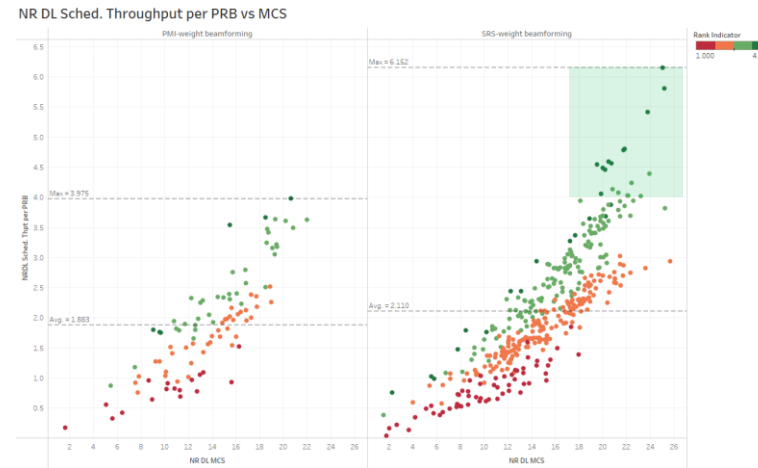
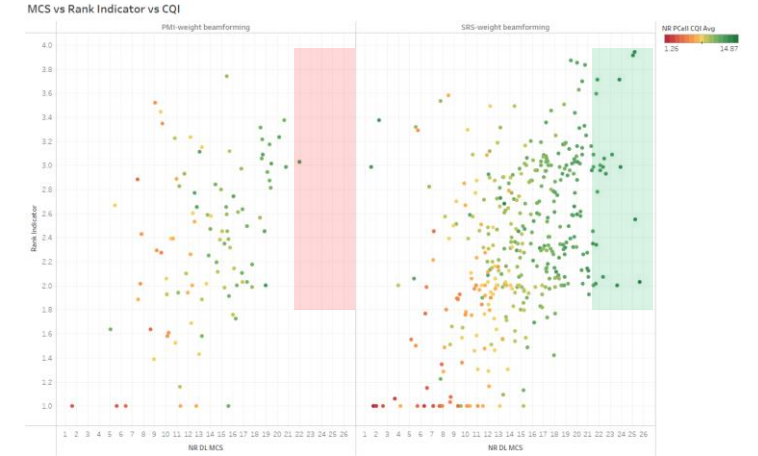
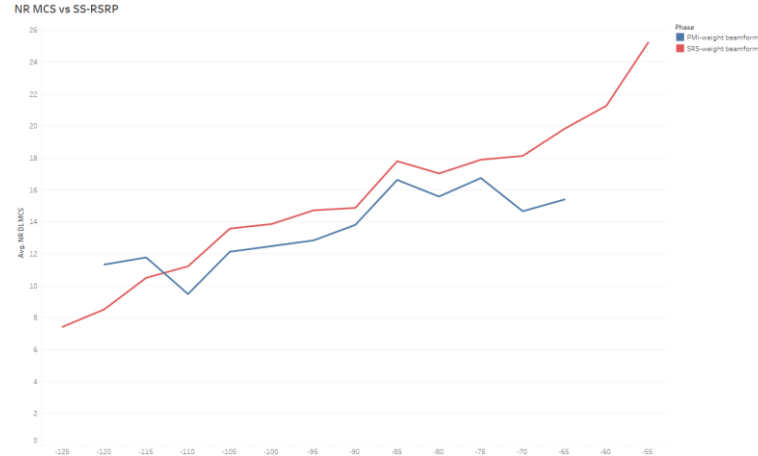
# 5G Deployment strategy revision

Case study – Tier 1 Operator in Europe, Beamforming strategy and impact on spectral efficiency

## Beamforming performance deep dive:

- ◆ Comparative analysis of two solutions (SRS-weighted DL beamforming vs PMI-weighted DL beamforming)
- ◆ Comparing achieved NR Sched. Thpt. for different SS-RSRP levels, from close to antenna to cell edge
- ◆ Scheduling performance assessment, symbol level
- ◆ Deep dive to Link adaptation performance (MCS selection, CQI and Rank indicator)
- ◆ Additional tuning of UL SINR threshold for switching between PMI and SRS-weight based beamforming

**Spectral efficiency improvements through tuning and maximization of beamforming performance**



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Networks

Together we achieve great things