VIAVI Solutions

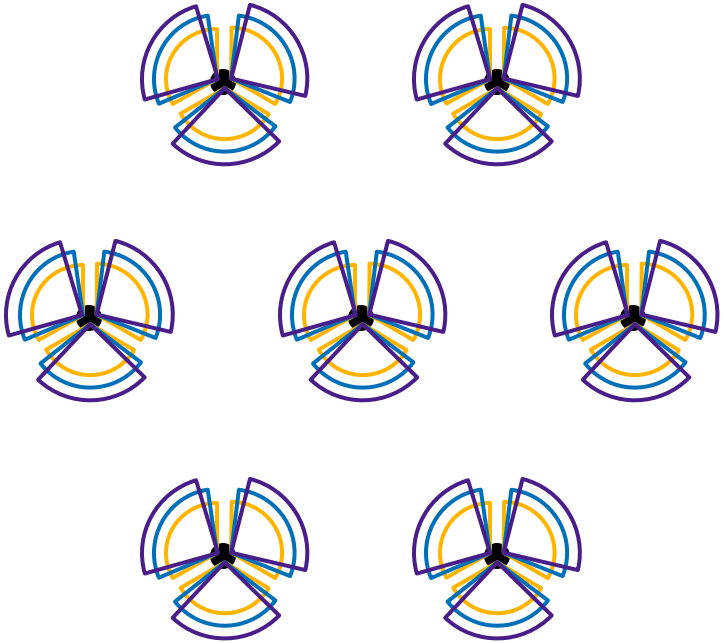
RAN Energy Saving; a Multi-Dimensional View

Berlin Open RAN Working Week 2024

Dr Chris Murphy
Regional CTO EMEA, VIAVI Solutions

Sep 2024

Energy saving mechanisms



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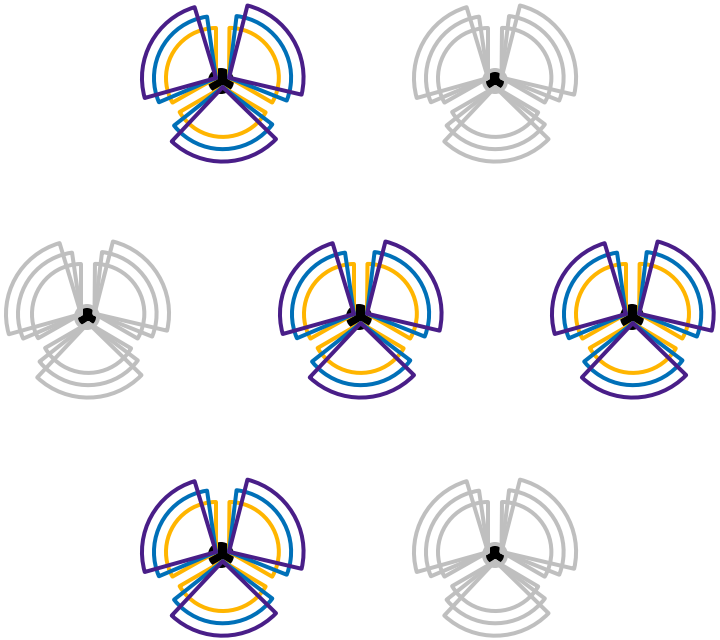
Energy saving mechanisms

- **Cell shutdown**



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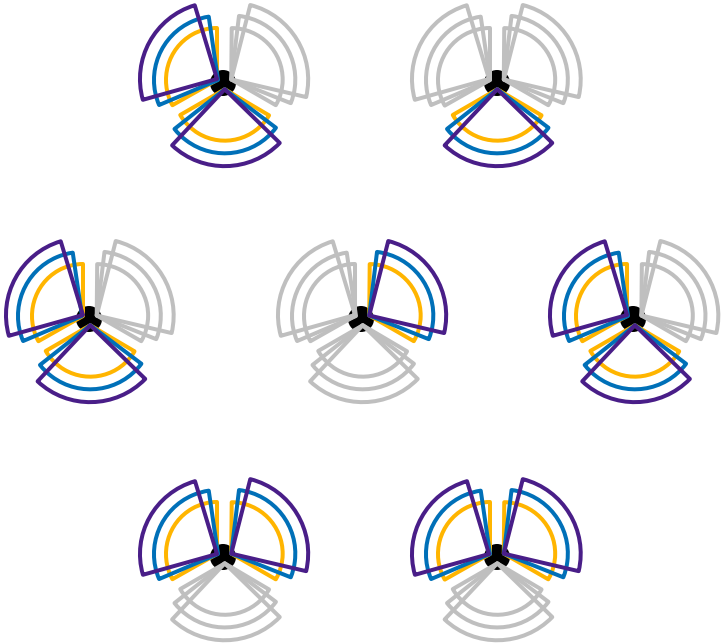
Energy saving mechanisms



- Cell shutdown
- **Sector shutdown**

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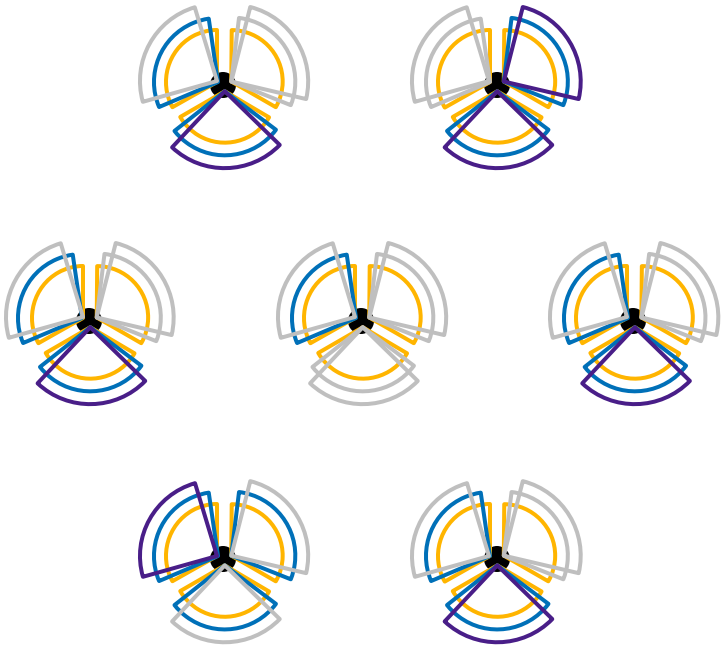
Energy saving mechanisms



- Cell shutdown
- Sector shutdown
- **Carrier shutdown**

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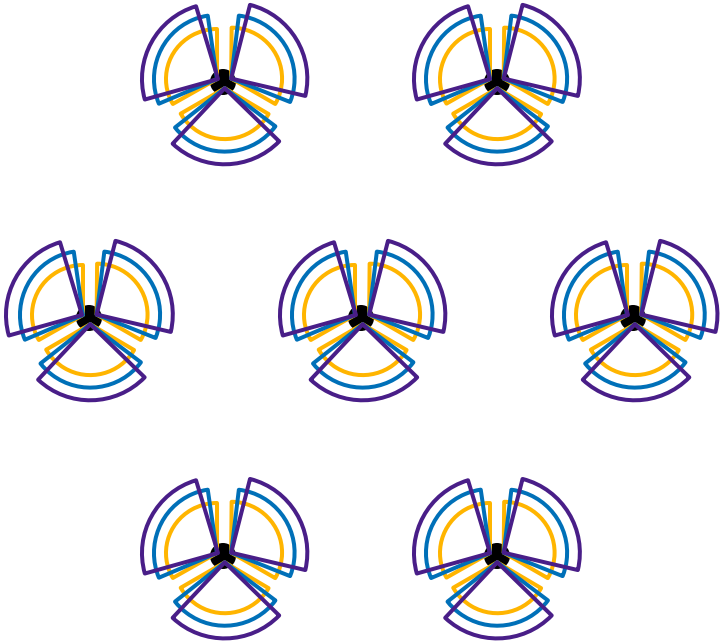
Energy saving mechanisms



- Cell shutdown
- Sector shutdown
- Carrier shutdown
- **Symbol and subchannel blanking**

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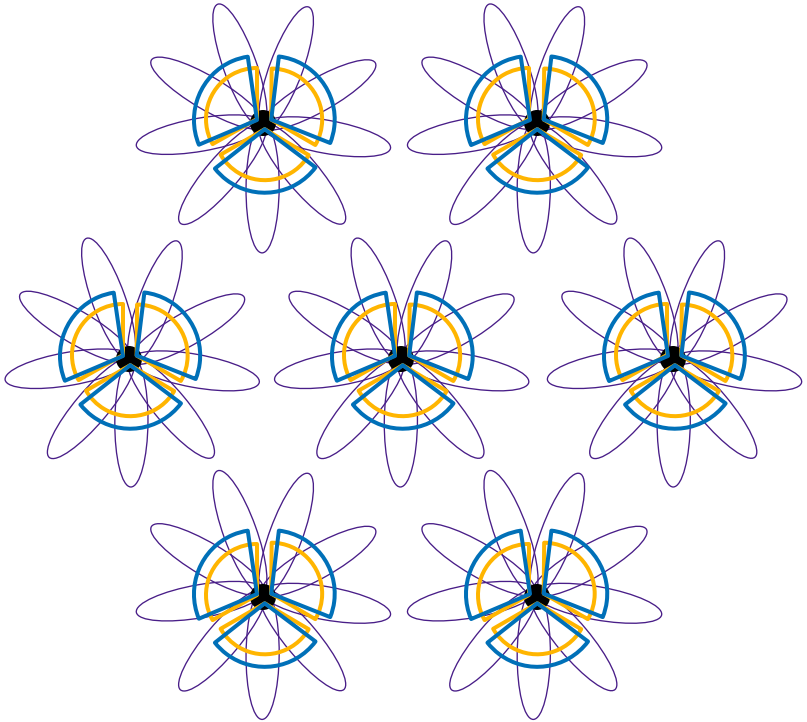
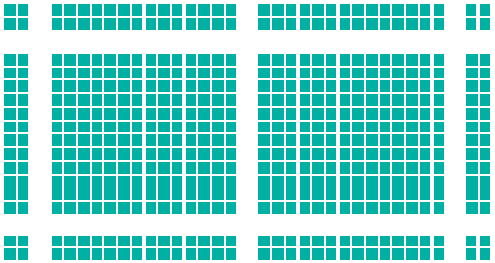
Energy saving mechanisms



- Carrier shutdown
- Sector shutdown
- Cell shutdown
- Symbol and subchannel blanking
- **Diversity, MIMO, beamforming**



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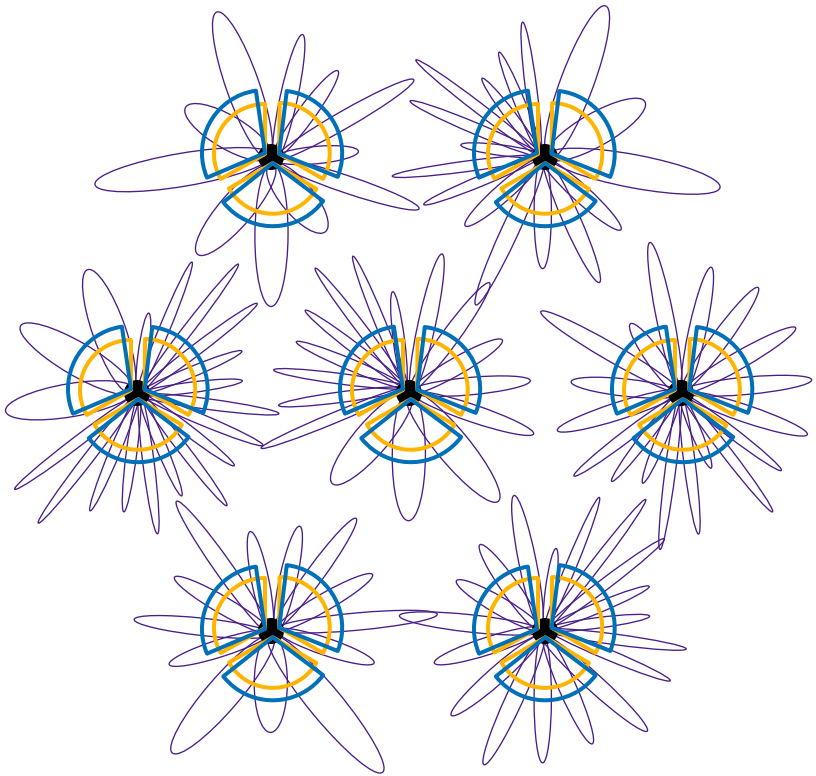
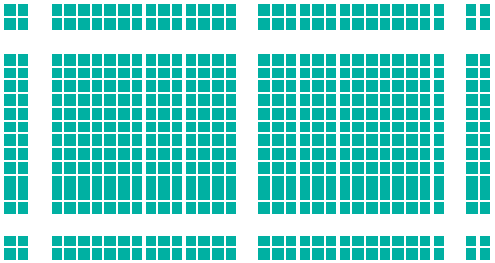
Energy saving mechanisms



- Carrier shutdown
- Sector shutdown
- Cell shutdown
- Symbol and subchannel blanking
- Diversity, MIMO, beamforming
- **MIMO adaptation**



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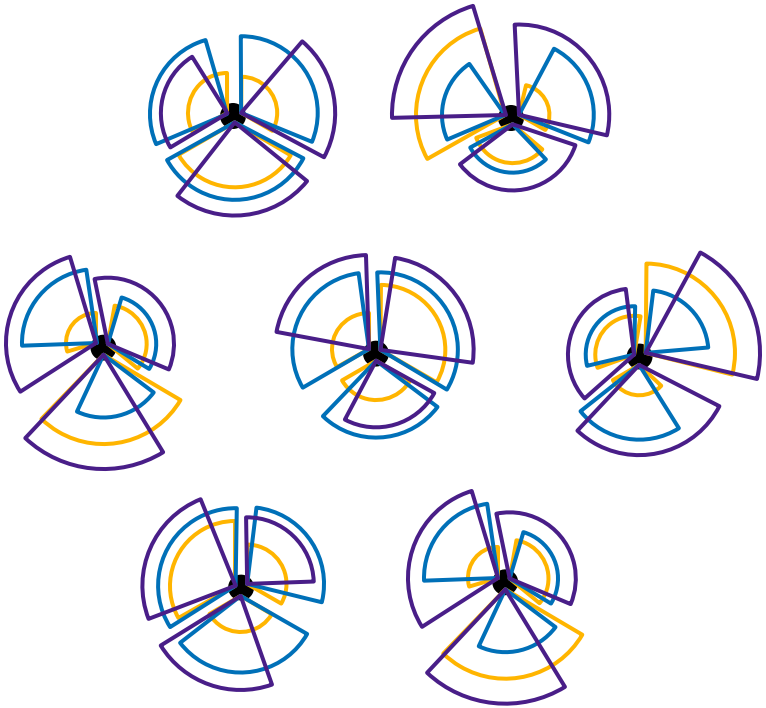
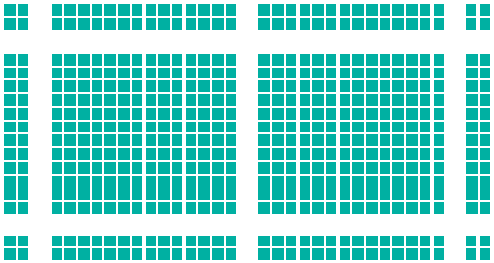


- Carrier shutdown
- Sector shutdown
- Cell shutdown
- Symbol and subchannel blanking
- Diversity, MIMO, beamforming
- MIMO adaptation
- **Adaptive sectorisation**



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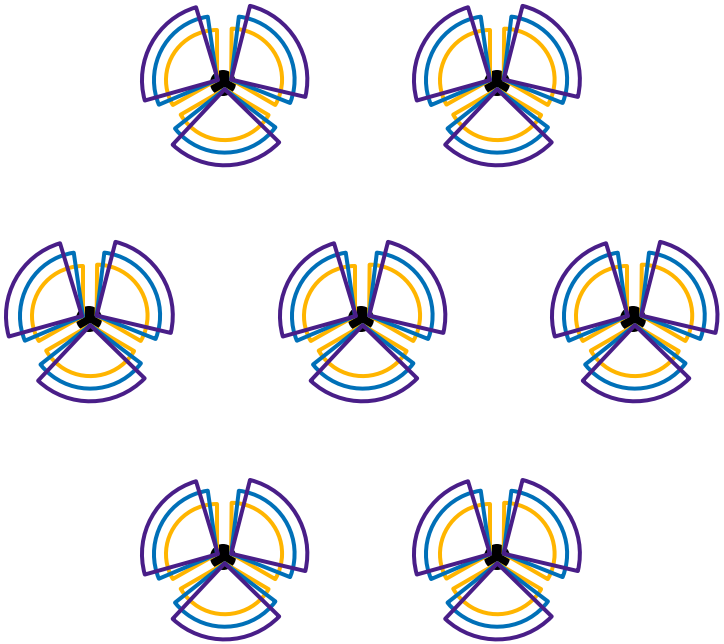
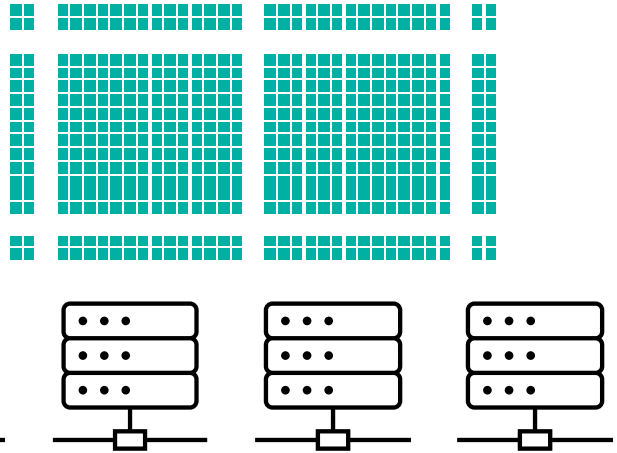
Energy saving mechanisms



- Carrier shutdown
- Sector shutdown
- Cell shutdown
- Symbol and subchannel blanking
- Diversity, MIMO, beamforming
- MIMO adaptation
- Adaptive sectorisation
- **Compute and orchestration**



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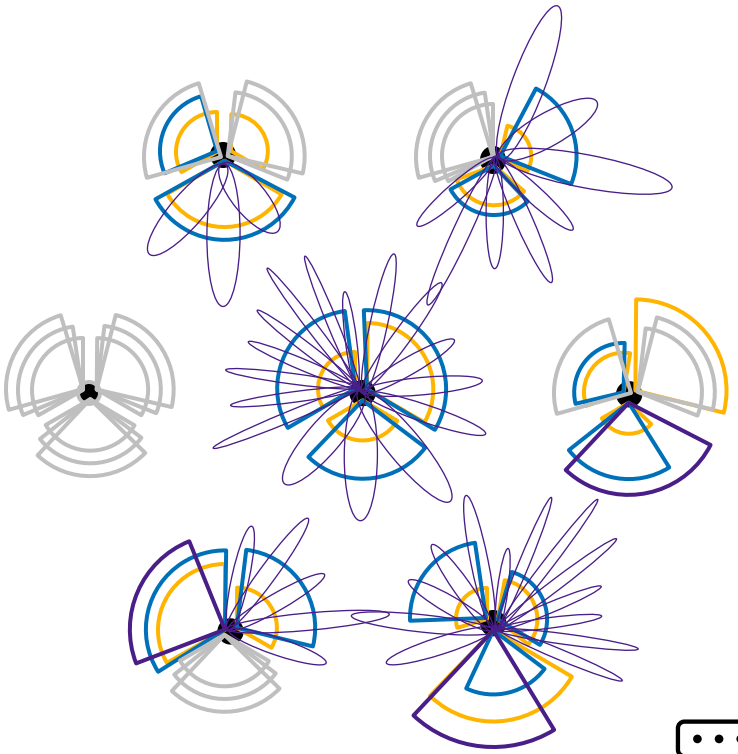

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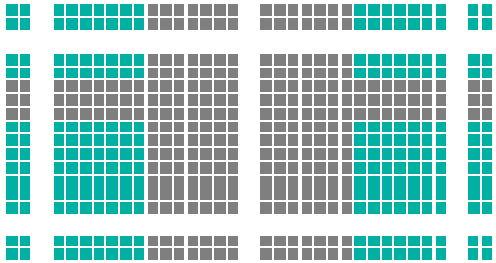
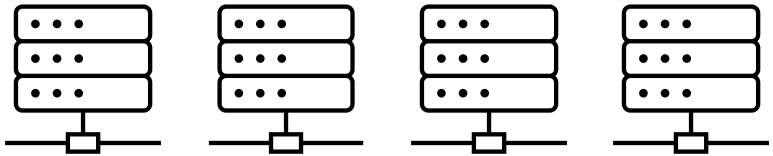
- Compute and orchestration





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Challenges to energy saving

Shared infrastructure	• Antennas and other infrastructure shared between carrier frequencies, technologies, MNOs.
Logical/physical correlation	• Uncertainty about reality of infrastructure on the ground.
Vendor-proprietary features	• Some components are opaque – taking a system view is harder.
Cost of data	• Some aspects need measurements, data collection, analytics, ML, etc – this can also consume energy.
Optimization	• Hugely complex search space with a multitude of dimensions. Many components of objective function.

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Dimensions of energy saving

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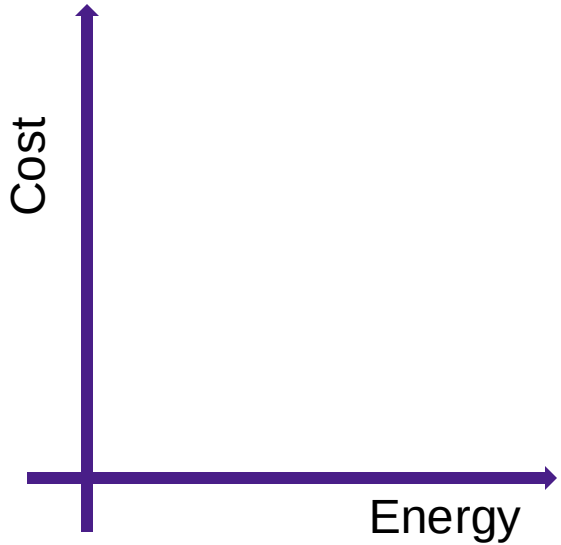
Dimensions of energy saving



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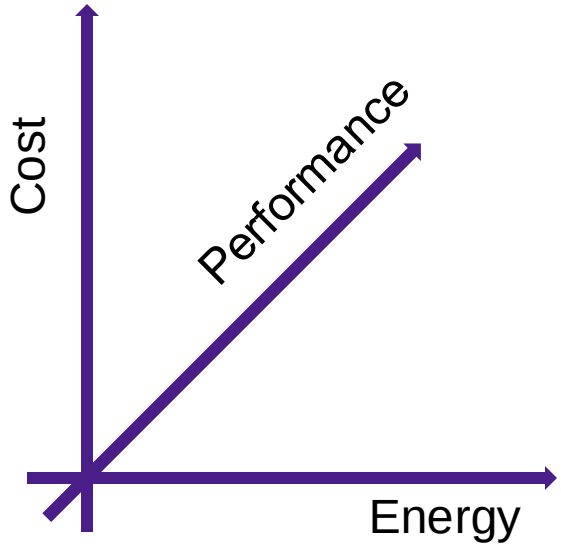

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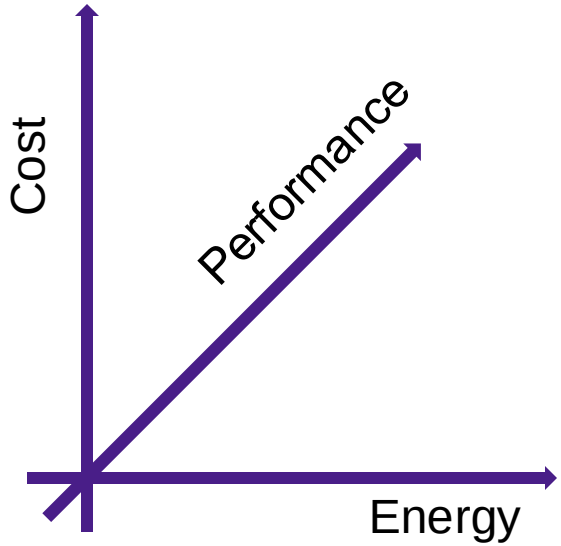
Dimensions of energy saving



- Performance
- Energy
- Cost
- Carbon intensity
- Data requirements
- Responsiveness
- Complexity
- Resilience

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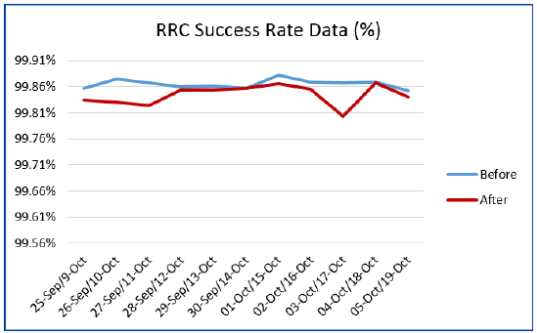
Combined optimization and energy saving

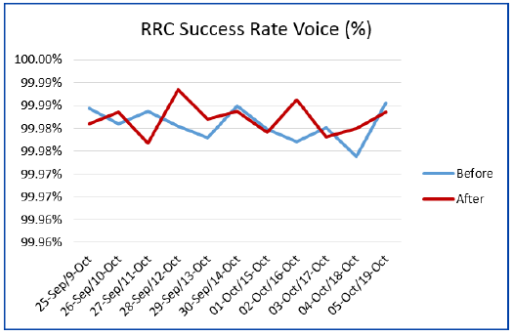
GSM Association Non-confidential
Case Study – Proximus Optimisation & Energy Saving

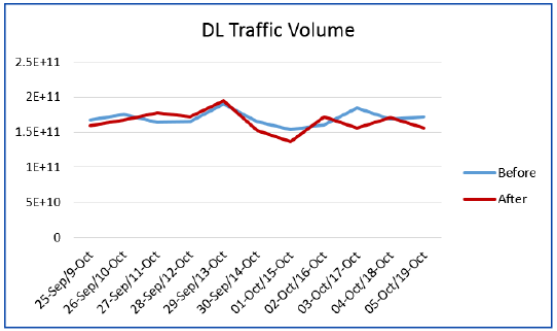
Proximus Optimization & Energy Savings
Version 1.0
June 2018

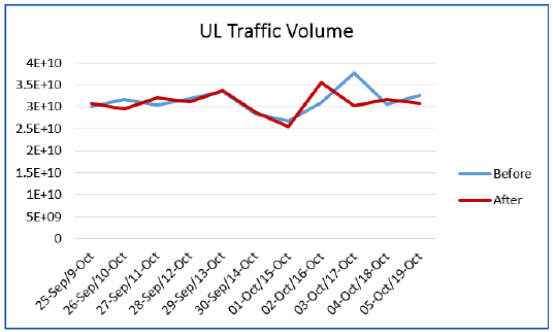
This is part of the GSMA case study series on Future Networks

- Operation on Proximus, Belgium's 3G network
  - Cluster of 42 sites, 328 sectors.
- Goal to
  - turn off cells to save energy
  - optimize CPICH power and electrical tilts to maintain performance.
- Outcome
  - 8 cells disabled (2.4%)
  - Performance maintained.









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