

Disaggregation, use cases and choice: What the SCF DARTs initiative tells us

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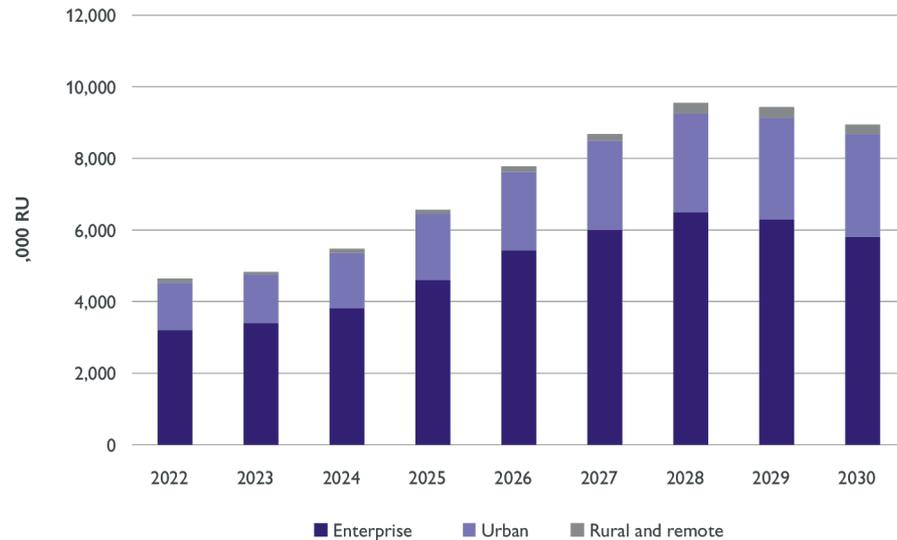


Introduction: Split Options Analysis & Positioning

- Overview of Split RAN
- Overview of DARTS Tool
- Deployment Scenarios & Architectures
- Positioning various Split Options for Small Cell Deployment
- Summary

Diverse deployments – and the rise of virtualisation – are driving growth in split architectures

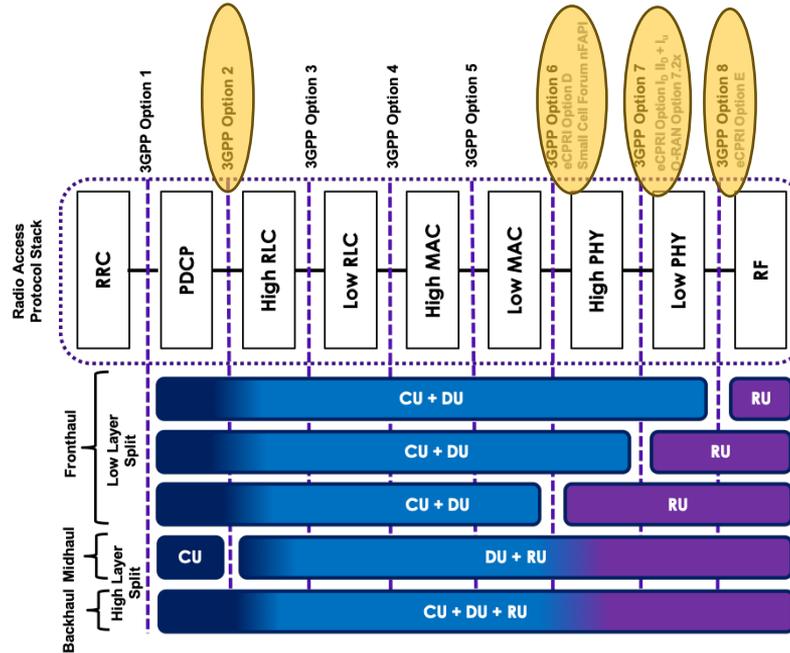
Annual deployments of small cells, global, 2022-2028, by environment



Why do we need the DARTs tool?

- Deployers are weighing up the pros and cons of these different RAN architectures – not so much having to picking one overall ‘winner’ but understanding how their characteristics may lend themselves to particular deployments. In particular the relative cost of transport versus compute at different locations from core to the edge.
- A key input to this consideration is the cost of transport, which heavily impacted by the throughput requirement – and this is where DARTS comes in.
- **DARTS**=DisAggregated RAN Transport Study

Split Options



- **Basic Tradeoff among various Splits:**
 - Fronthaul Bandwidth vs. Coordination Benefits
 - Others include:- Cost-Flexibility-Ecosystem etc.

DARTs analysis tool usage

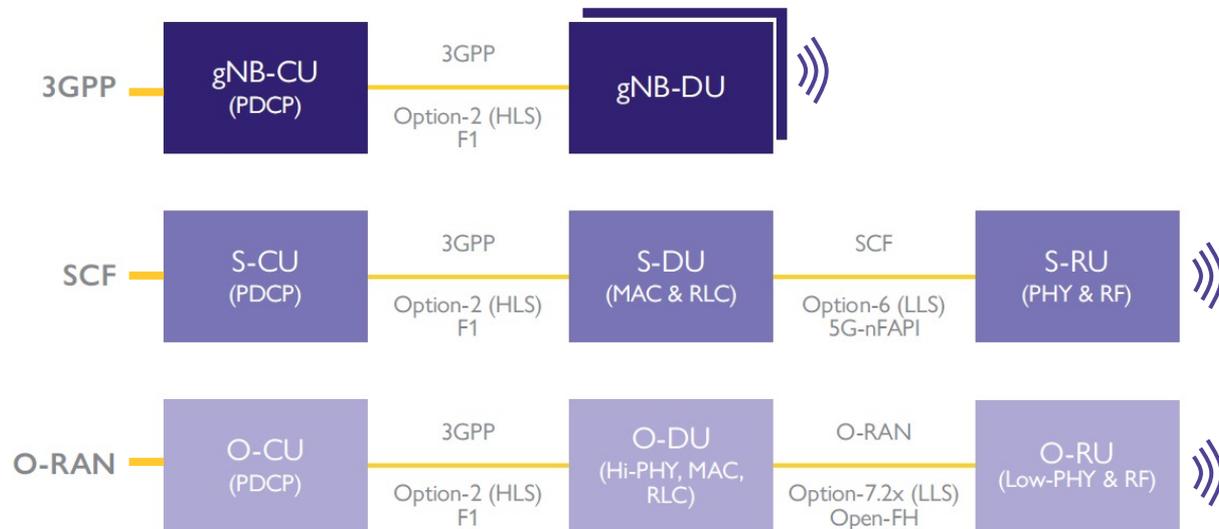


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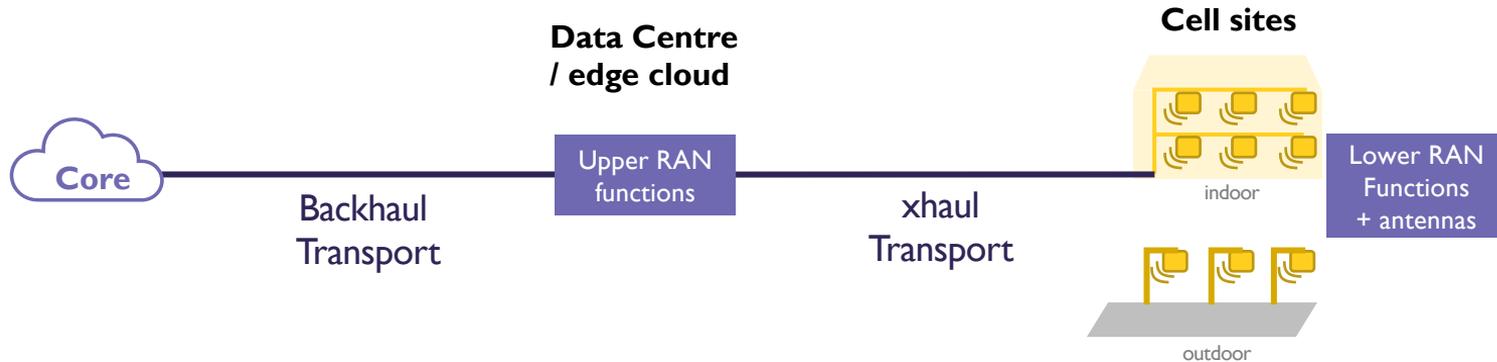
Common functional splits in disaggregated RAN

Figure 3. The most commonly adopted functional splits in disaggregated RAN.



Key parameters to consider when choosing a RAN split

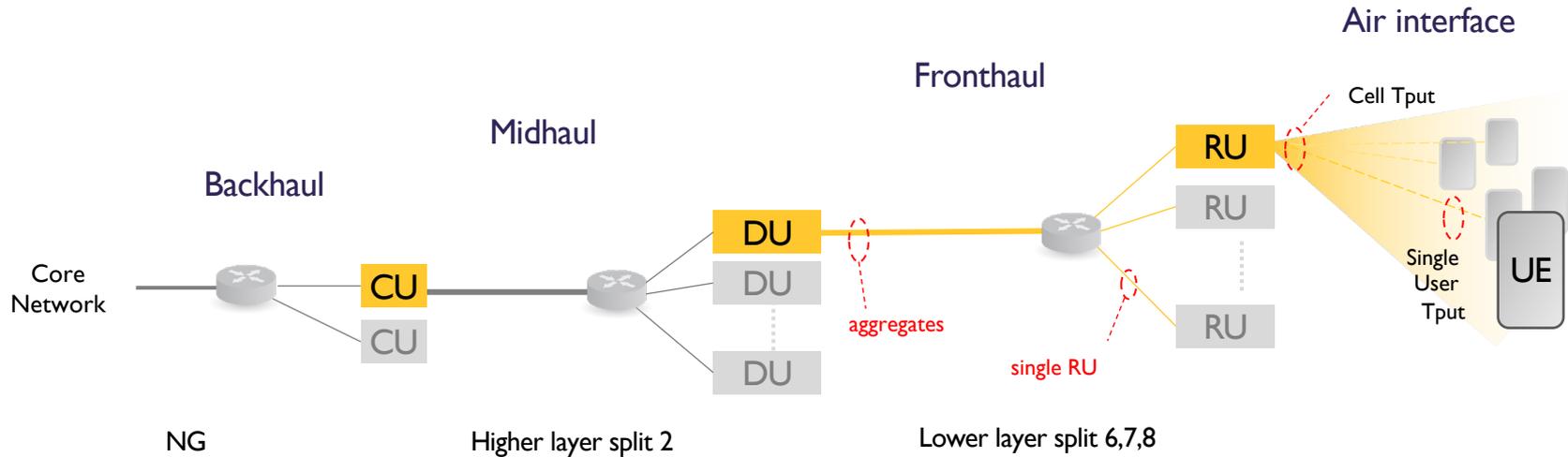
Two-unit split shown



Factors:

- Cost of space/power/compute at cell site vs data centre
- Cost of transport between sites, which is scaled by throughput requirement
- Throughput impacted by cell site air interface configuration:
 - channel bandwidth, MIMO, peak rate

Evaluating Transport bandwidth



**DARTS provides characteristics of traffic on backhaul, midhaul and fronthaul
Peak rates of dedicated links and typical rates of aggregates drive transport provisioning**

DARTS tool

1) Goto <http://smallcellforum.org/calculator>

2) Input air interface configuration

DARTS (Disaggregated RAN Transport study)

Network infrastructure deployment modelling calculator

The DARTS online tool and its outputs are for informational purposes only and are provided 'as is' with no warranties whatsoever from SCE, including any warranty of merchantability, fitness for any particular purpose, or any warranty otherwise arising out of any proposal, specification, or sample.

Please complete each input field and then press compare. If the inputs aren't visible, or you need to reset your selection, use the reset button.

Technology: NR, Duplex mode: FDD, Enable Massive MIMO: NO, Bandwidth: 10, Antenna Configuration: 2T2R, Number of DL MIMO Layer: 1, Number of UL MIMO Layer: 1, Traffic Dimensioning: CELL AVERAGE

RESET COMPARE

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The Disaggregated RAN Transport Study (DARTs) tool is a free online calculator that evaluates and compares bandwidth requirements for various popular splits in a range of custom scenarios.

DARTs – an online tool for the wireless industry

In the 5G era, deployers and equipment developers need to be able to select from a menu of open RAN options in order to address different use case requirements effectively, but without resorting to customized or proprietary approaches.

Given the broad range of use cases that need to be addressed, SCF's view is that it is not just possible, but preferable to have several options fully developed and supported, as long as all the interfaces that gain strong support are also working within a broader framework of interoperability, including within the framework of 3GPP specifications.

With transport a central consideration in determining the cost and efficacy of a particular split architecture, SCF has developed a simplified version of the DARTs online tool that is freely available for the industry.

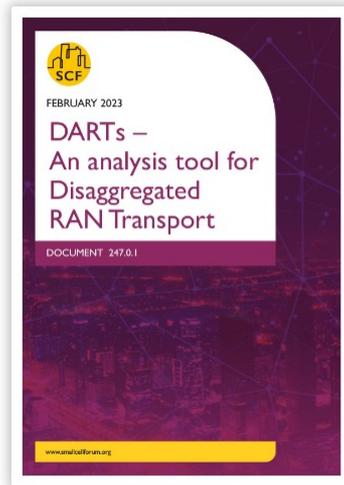
Access DARTS TOOL

3) Outputs: transport bandwidth at different split points



DARTS Paper

1) Goto <https://scf.io/en/documents/247> **DARTs - An analysis tool for Disaggregated RAN Transport.php**



DARTs - An analysis tool for Disaggregated RAN Transport

Document number: SCF247

The aim of this paper is to help deployers plan, design and budget for transport networks in different deployment scenarios. In the paper we discuss the details of the interfaces of different splits and their transport bandwidth requirements. We also discuss parameters which affect transport bandwidth calculations and their default values.

DOWNLOAD PDF →

DARTs analysis tool usage

- The DARTs tool has been accessed by almost 200 different tech companies, plus;
- Approx 20 different universities
- 5 non-profit organisations, including Ofcom and Batelle Memorial Institute

Top users:



NOKIA

Adtran

Qualcomm

Radisys

DELL
Technologies



JMA
WIRELESS

MAVENIR

ADVA
Optical Networking



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Deployment Scenarios & Architectures



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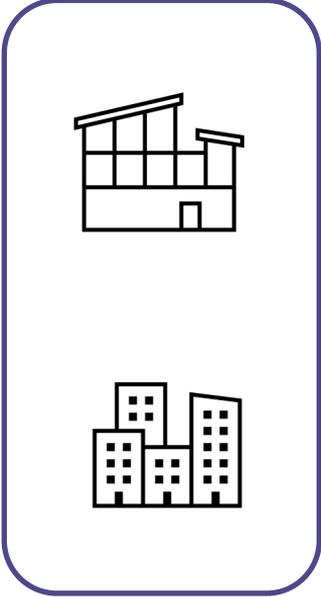


Example Deployment Scenarios:

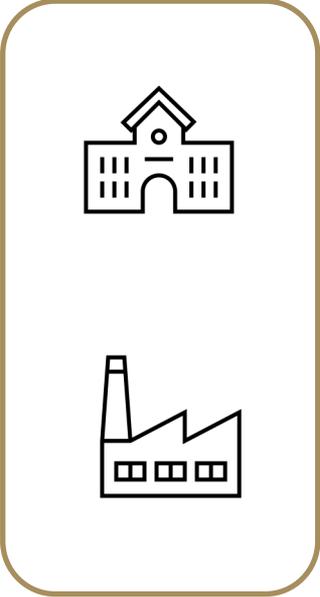
Residential



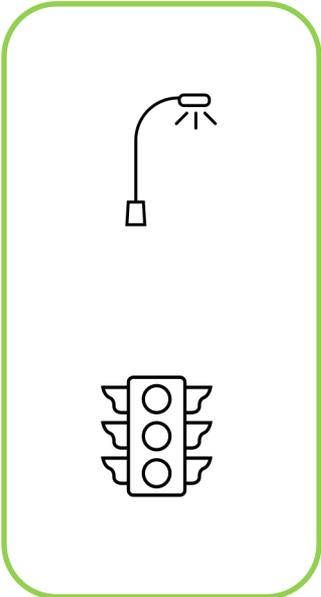
Enterprise



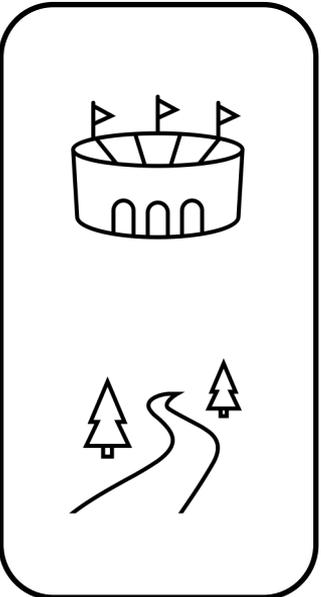
Campus/Industry



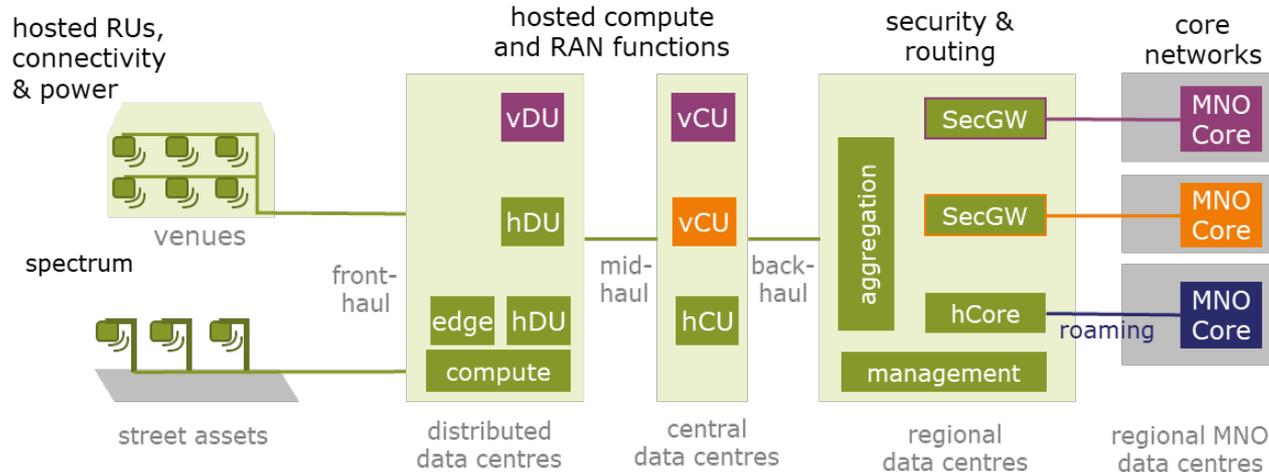
Outdoor



Other



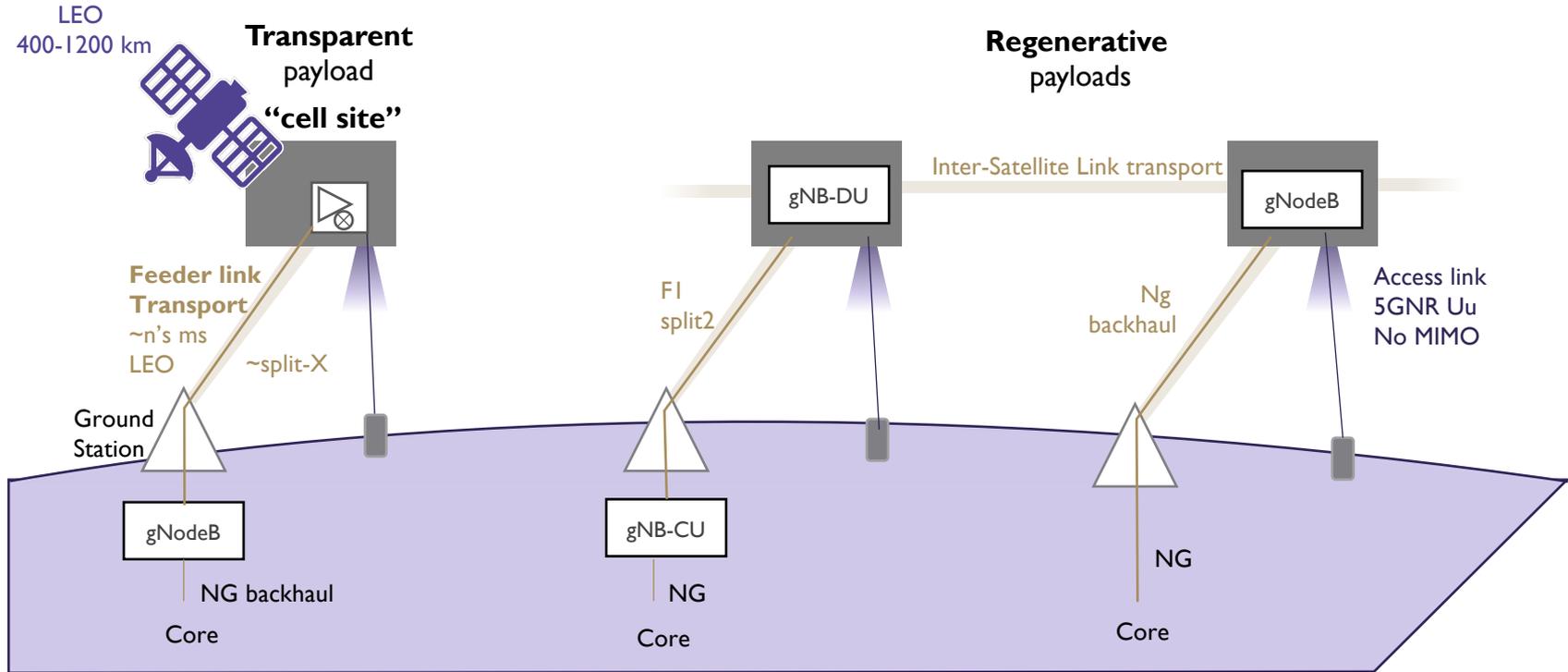
Deployment Example: Neutrally Hosted Open RAN Framework [SCF244]



hxx potentially hosted elements Dedicated tenant elements

Neutral hosts offer sites and data centres to MNOs, linked together with transport networks
The relative cost of transport vs compute drives optimal choice where RAN functions are hosted

Extreme deployment example: Investigating Satellite Regenerative Payloads for Non-Terrestrial Networks



SUMMARY

Aim of this work

- **Positioning Summary**

- Leveraging of the DARTS tool for the anticipated fronthaul data rate requirements for example common cell configurations in this work item.
- Future network requirements of dynamic reconfigurability.
- Consider requirements for uplink performance improvement (ULPI).

- **Key takeaway**

- Service providers should consider these trade-offs and their specific use cases when selecting the RAN split option that will best meet their requirements for their 5G deployments.

END



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