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5G Quality of Service measurement methodology

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Consultation link

- Please scan the QR code
- Or find the consultation here: https://ec.europa.eu/eusurvey/runner/5G-Quality-of-Service-mapping-methodology

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5G Mobile & FWA QoS Coverage Mapping Methodology

> Stakeholder engagement <

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16/06/2025

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Background:
Scope & Objectives

Scope & Objectives [1/4]

- methodology for geographical mapping of 5G (mobile & FWA) quality
- build on & address gaps of existing guidelines:
    1. Article 22 BEREC Guidelines on Geographical Surveys of Network Deployments
    2. Mapping Annex of Guidelines on State Aid for Broadband Networks
- **goal:** common & fully harmonized approach to 5G broadband mapping, enabling meaningful comparison of estimated QoS of 5G mobile/FWA networks across MS
- valid for policy, regulatory, and state aid contexts, preventing burden of NRA/OCA making multiple requests for 5G mapping data towards MNOs

Scope & Objectives [2/4]

- **Digital Decade target:**

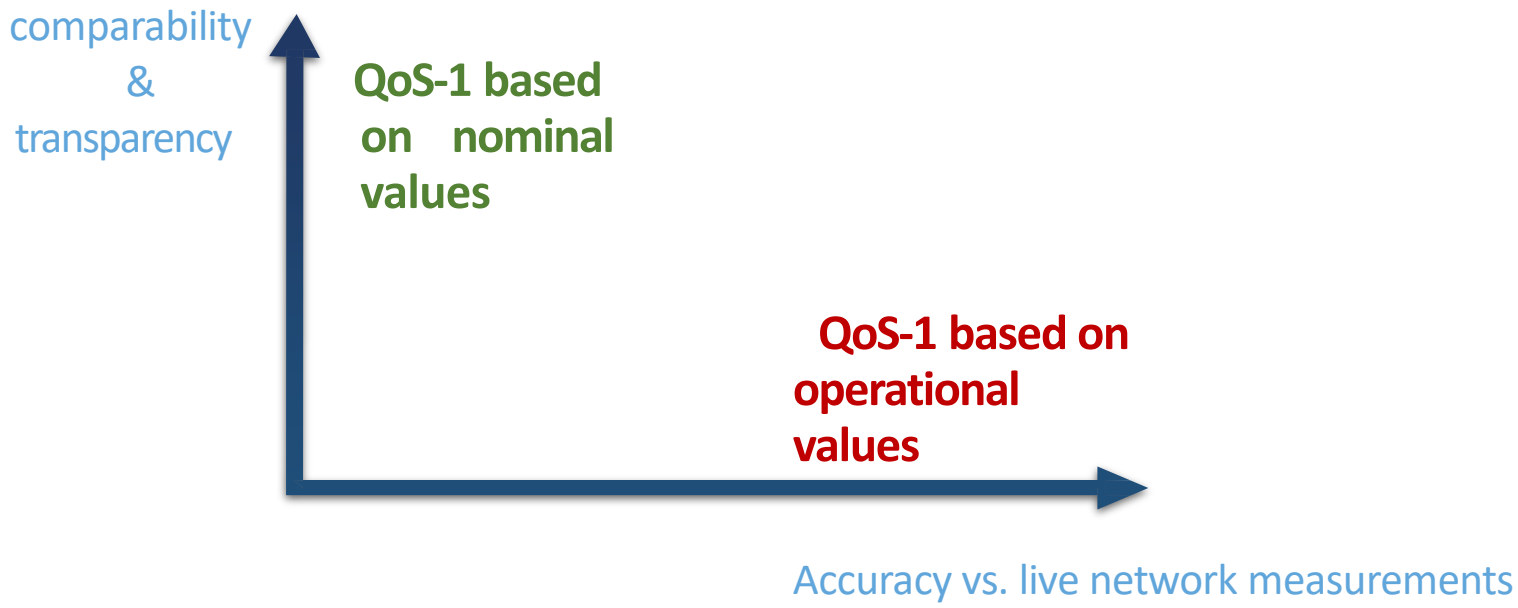
  “all populated areas are covered by next-generation wireless high-speed networks with performance at least equivalent to that of 5G”

  - **5G QoS KPI**: 5G radio signal coverage insufficient, imperative to estimate performance of 5G networks in terms of QoS under "peak-time" conditions

- this Methodology is a prescriptive & detailed guide for quantifying:
  - **5G theoretical radio coverage**, reflecting service availability vs. RSS threshold
  - **5G QoS coverage**, in terms of estimated peak-time end-user speeds in DL/UL

Scope & Objectives [3/4]

- to estimate 5G QoS-1 end-user speeds, methodology adopts low complexity, transparent modelling approach and specifies nominal (rather than operational) parameter values wherever appropriate



Scope & Objectives [4/4]

- selected modelling approach addresses the key goals:
  i. **straightforward comparability** of the 5G QoS mapping data across MSs
  ii. **transparency & understandability** of 5G QoS mapping data across spectrum of potential end-users
  iii. **applicability to both existing & planned** 5G network infrastructure deployments (in the context of state aid)

Methodology Overview

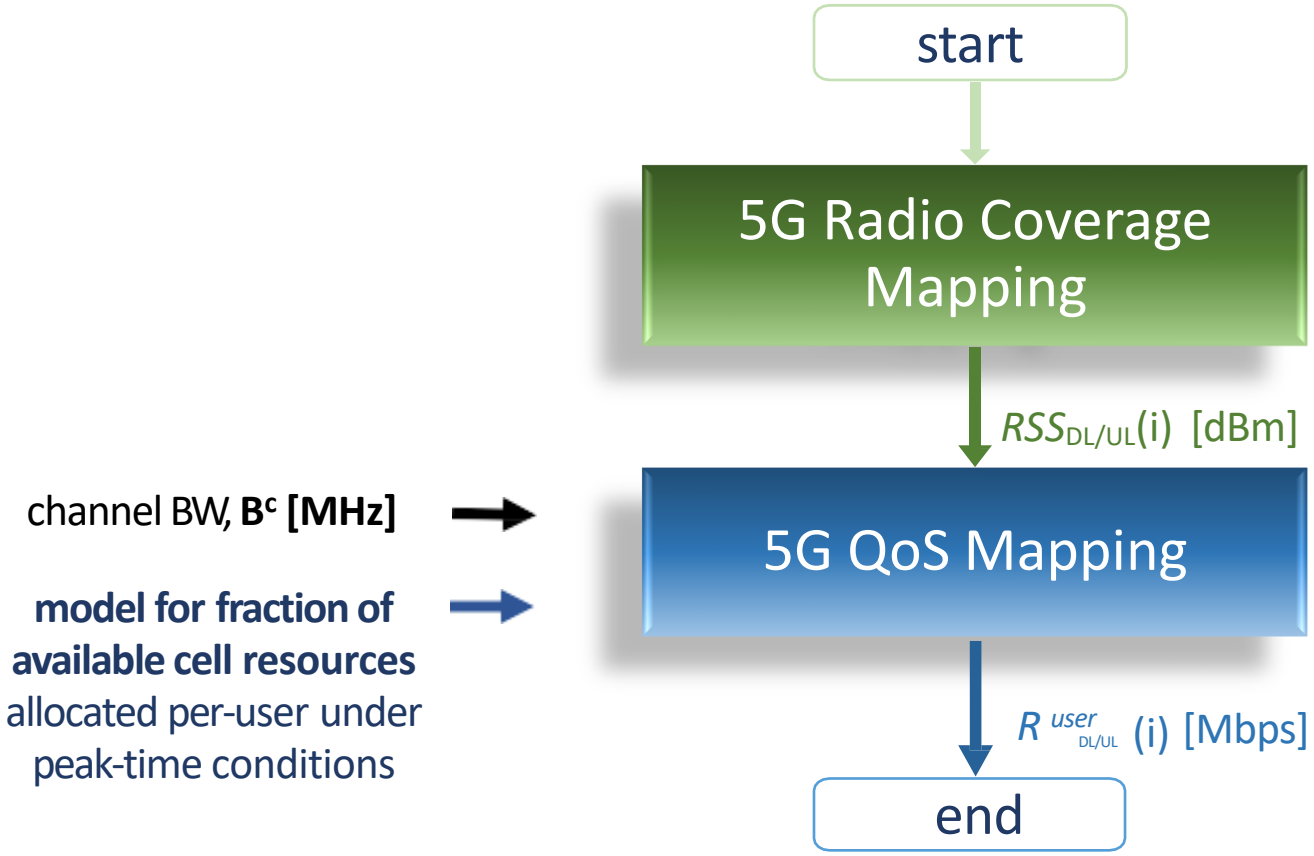
Methodology Overview [1/5]

- **territorial mapping: 5G radio coverage & 5G QoS coverage data** on the basis of 20 m × 20 m grid pixels* (TBD)
- MNO must calculate & report 5G mapping data to NRA per freq. band & per-pixel

- 5G wireless networks may offer:
  (1) mobile broadband service: **5G mobile networks**
  (2) fixed wireless access service: **5G FWA networks**
    > methodology requires **separate mapping** of **mobile and FWA** deployments
    > in case MNO using common frequency band for mobile & FWA, must declare fixed **mobile: FWA channel bandwidth partitioning ratio** and map mobile & FWA separately

- distinguish **5G-NR FR1** (sub-6 GHz) vs. **5G-NR FR2** (mm-wave)

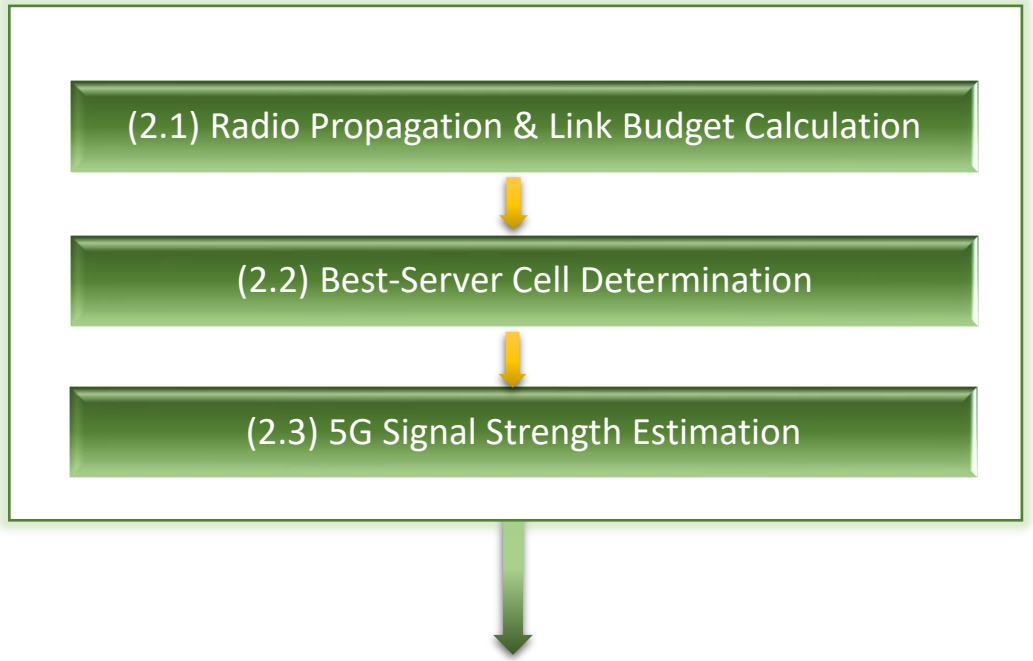
Methodology Overview



per-pixel 5G radio coverage in terms of RSS in DL/UL

per-pixel 5G QoS coverage in terms of peak-time per-user DL/UL data rate

Methodology Overview

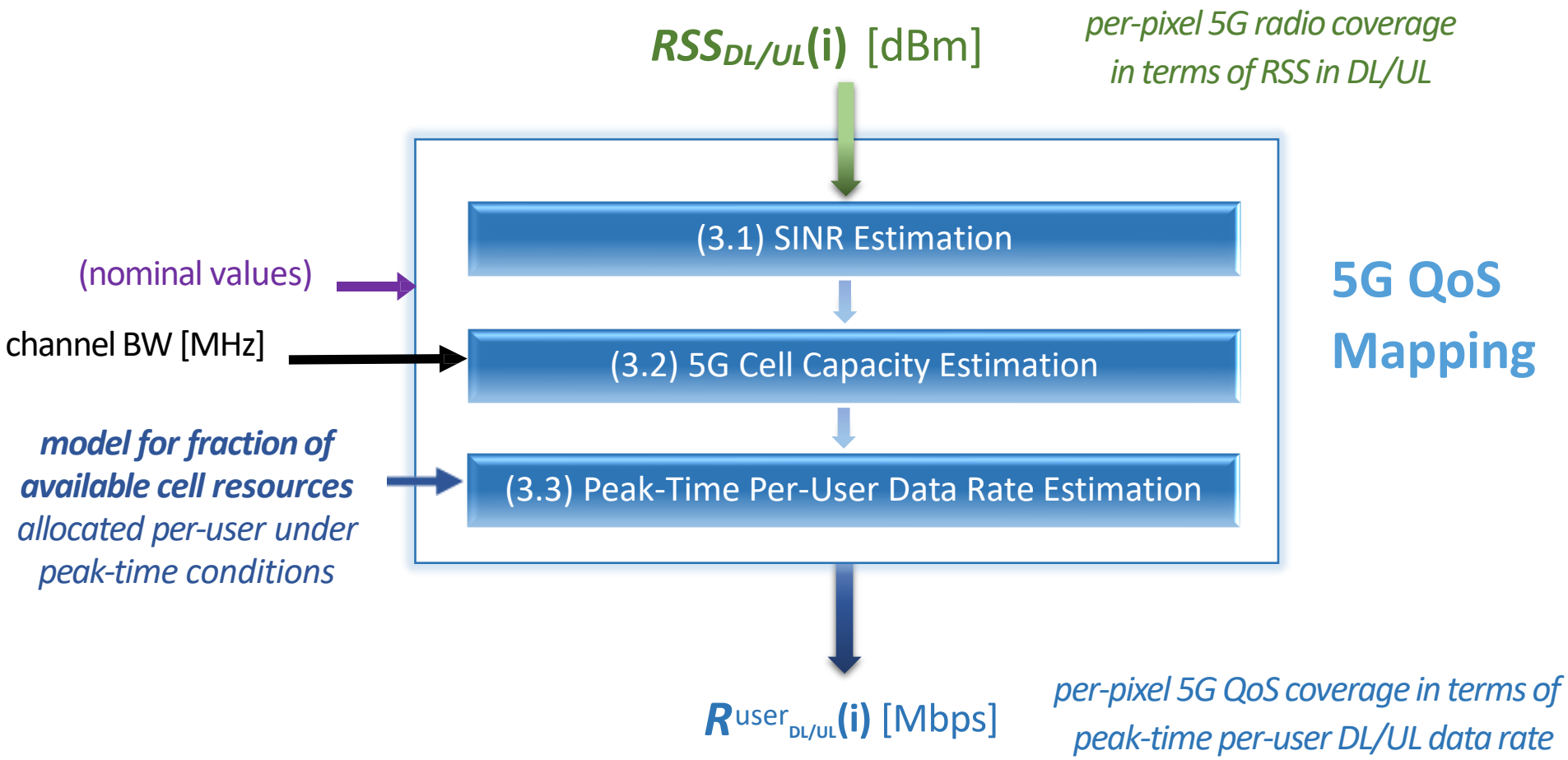


5G Radio Coverage Mapping

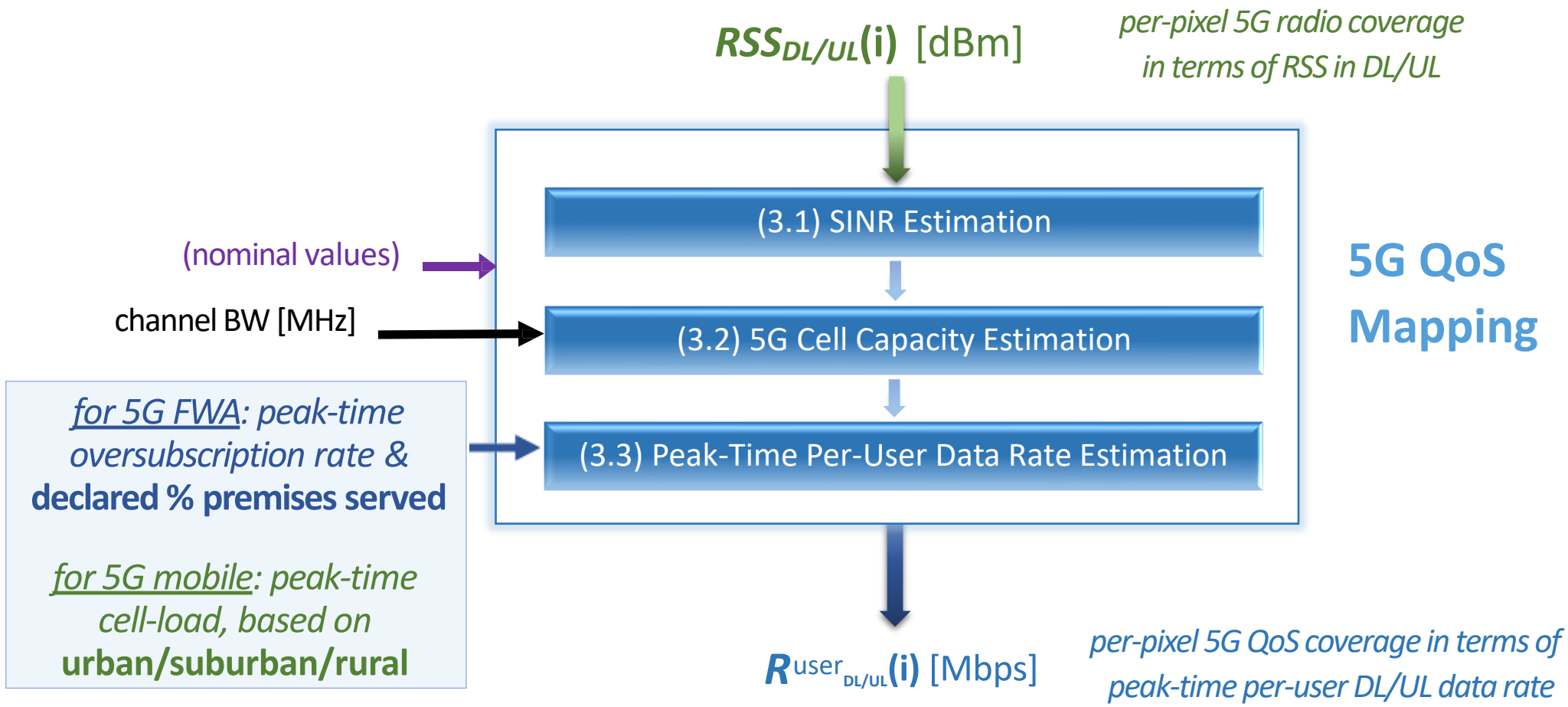
per-pixel 5G radio coverage in terms of RSS in DL/UL

Methodology Overview

[4/5]



Methodology Overview [5/5]



Collection & Aggregation of 5G QoS Mapping Data

Collection of 5G QoS Mapping Data

- **5G QoS mapping data to be reported** by MNO to NRA, for each of its 5G-NR operating bands (per-pixel, over target network area):
  - classification of 5G service offered in the operating band f_c : ***mobile*** or ***FWA***;
  - **channel bandwidth** B^c in the operating band f_c
  - **5G radio coverage** in terms of RSS in DL/UL: $RSS_{DL/UL}(i)$ **[dBm]**
  - **5G QoS coverage** in terms of peak-time per-user DL/UL data rate: $R^{user}_{DL/UL}(i)$ **[Mbps]**
  - **for FWA: the declared percentage of premises** λ **served** at the reported 5G QoS level
- additional data may need to be disclosed by MNO for **basic/in-depth verification purposes** (at request of NRA)

Aggregation of 5G QoS Mapping Data

- upon receiving the **5G mobile and FWA mapping data** from each MNO, the NRA/OCA shall aggregate the data to **produce composite national maps**

- depending on the regulatory objective, one or more method may be used:
    - **minimum per location**: taking the lowest QoS value reported by any MNO for each pixel: suitable for identifying under-served areas where no operator delivers the required performance (e.g. for state-aid screening)
    - **market-share-weighted average per location**: calculating a weighted average of the QoS values reported by all MNOs for each pixel, using each MNO's national market share for the weighting factors: provides an estimate of the typical end-user experience
    - **maximum per location**: taking the highest QoS value reported by any MNO for each pixel: reflects areas that are served by at least one operator at the given QoS level, suitable for coverage reporting under the Digital Decade targets or for public transparency maps

Thank you!
Questions?