

# WS IMT-2020/5G

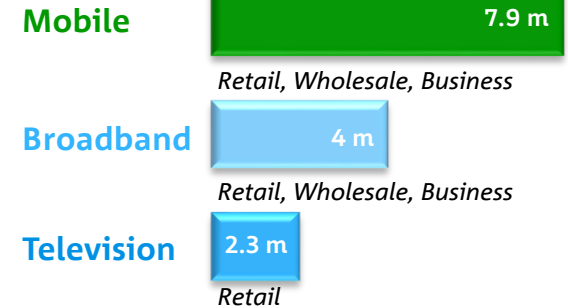
Ruud van de Bovenkamp  
10 October 2017

# Introducing KPN

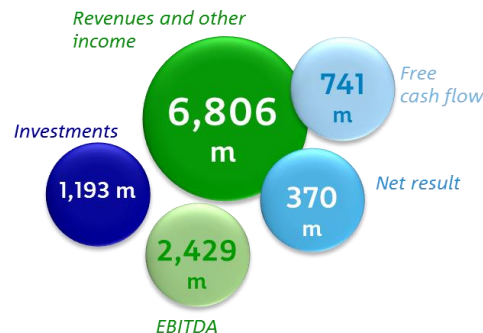
## KPN AND BRANDS



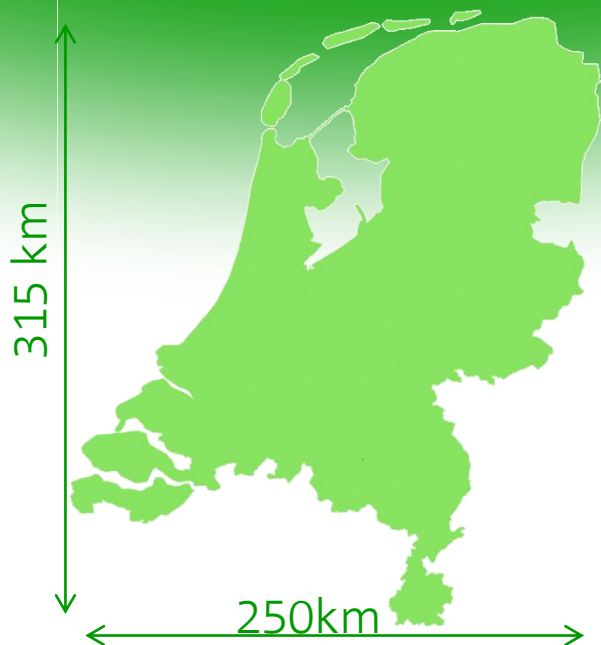
## CUSTOMERS














## KEY FIGURES (2016)



# Fixed & Mobile market in the Netherlands (Consumer market)



				
Mobile network	2G, 3G, 4G	2G, 3G, 4G	2G, 3G, 4G	4G + MVNO
Mobile network quality <sup>1</sup>				
Mobile market share <sup>2</sup>	42%	32%	19%	7%
Fixed network	FtTC, FtTH	Coax	Wholesale KPN	Wholesale KPN
Broadband market share <sup>3</sup>	40%	44%	N/A	4%
TV product perception <sup>4</sup>			N/A	
TV market share <sup>3</sup>	31%	54%	N/A	2%

Source: KPN Investor presentation, Sept. 2017

<sup>1</sup> % of clients that agree on the reputation statement that their operator has the best network; Kantar TNS (Q4 2016)

<sup>2</sup> Total Dutch (Consumer and Business) mobile service revenue market share (Q4 2016)

<sup>3</sup> Telecompaper (Q4 2016)

<sup>4</sup> Independent market survey (Consumentenbond; Q4 2016)

# High level backhaul network

Core

MPLS P/PE

Metro Core

L3/L2

Aggregation layer (~CO)

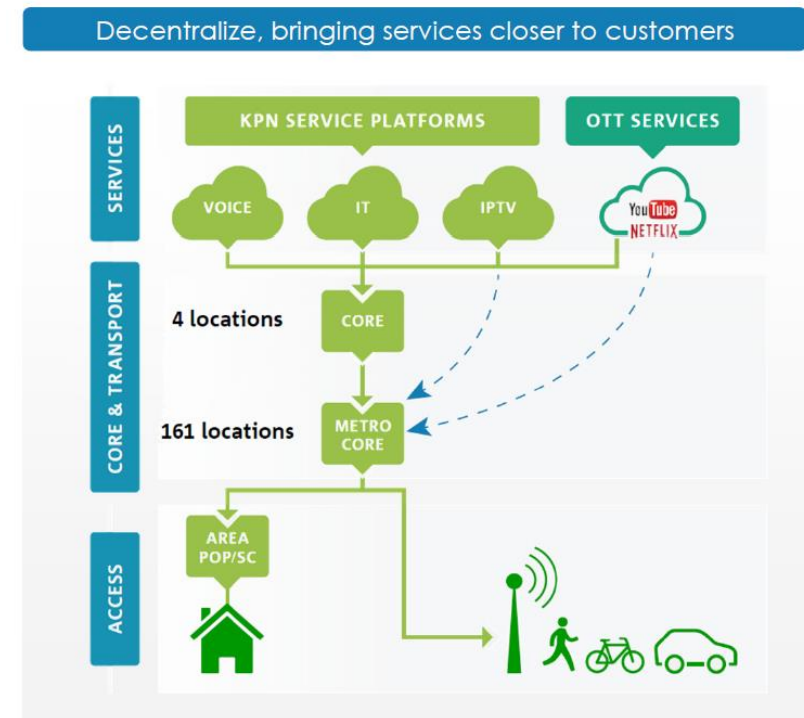
L2

Access



# Deployment of 5G Core

- The 5G Core will be deployed at the four core locations
- (Parts) of the 5G core can be deployed at the MC layer in an NFV platform



Source: KPN Investor presentation, Sept. 2017

# Deployment of CU & DU

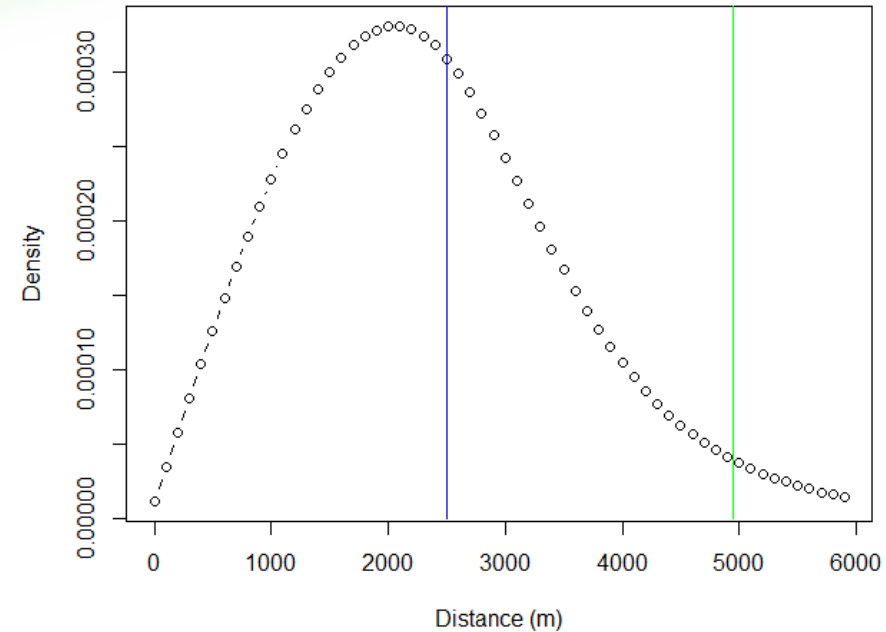
- Currently the functions of CU & DU are deployed at cell site.
- If CU can be virtualised, it could be deployed in NFV platform at MC location.
- For Macro-sites, DU can move from cell site to CO if needed for RAN functionality or cost optimisation.
- For single antenna small cells, the placement of DU can be CO or cell site.

# Central Offices

## 1362 Central offices



Distance distribution to CO



PDF of distances from arbitrary point in CO area to the CO.  
Average in blue, 95<sup>th</sup> percentile in green.

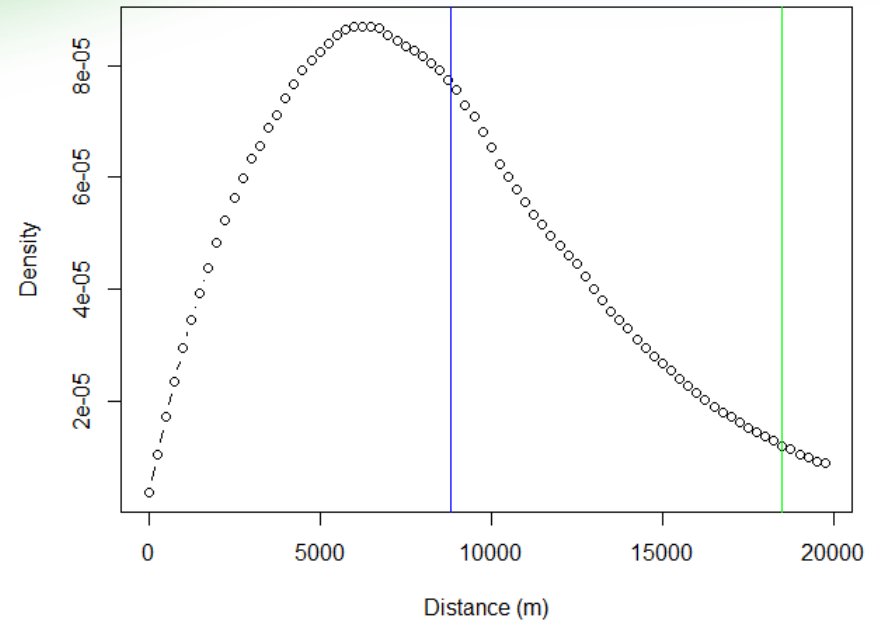


# Metro Core Areas

## 161 MC locations



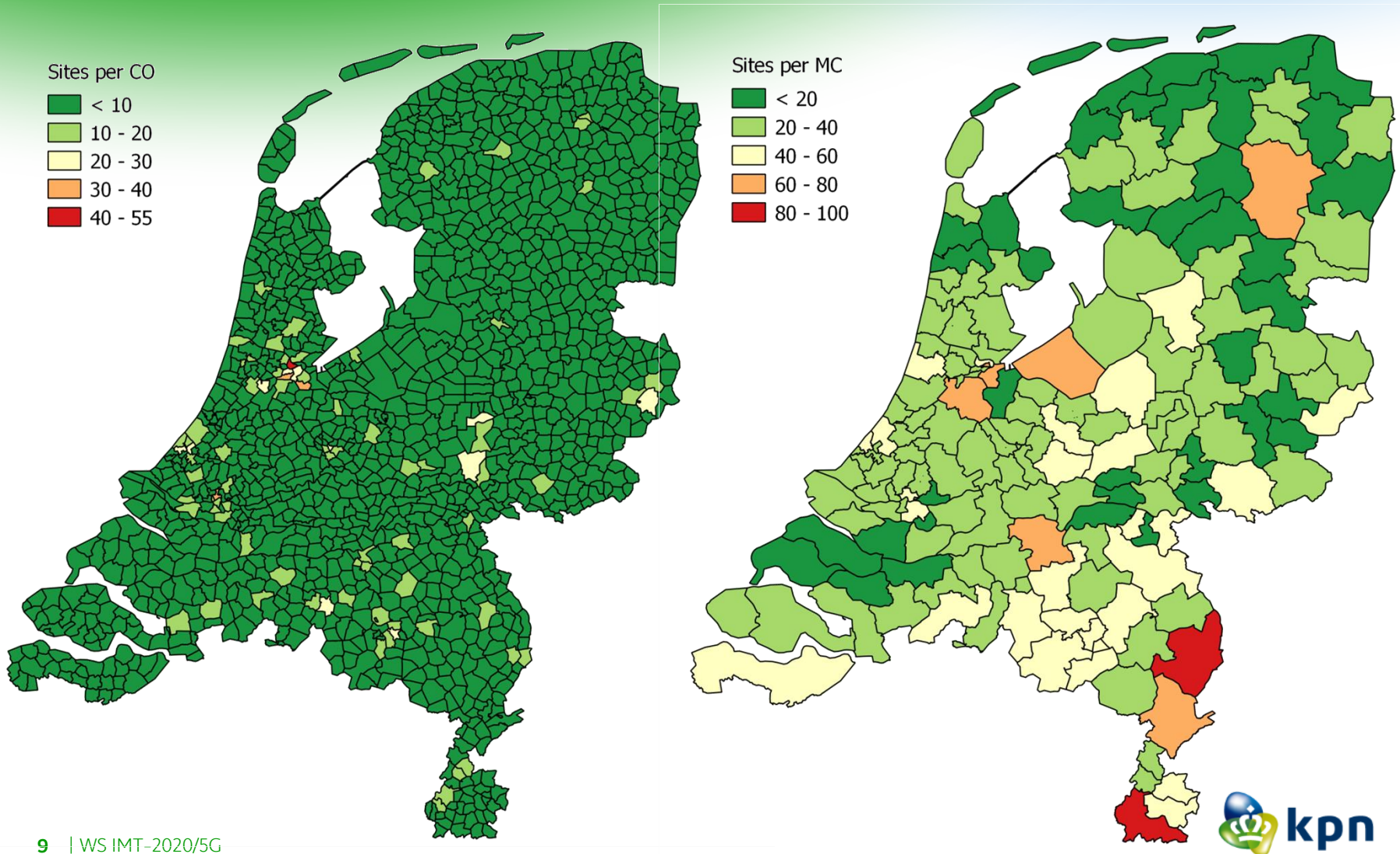
Distance distribution to MC



PDF of distances from arbitrary point in MC area to the MC location.  
Average in blue, 95<sup>th</sup> percentile in green.



# Current number of cell sites



# Estimate of future sites and interfaces

- Number of entities:
  - sites: 5.000 – 50.000
  - DU: 1.000 (with DU at CO) – 5.000 (DU in the field)
  - CU: 161 (with CU at MC) -
  - 5G Core: 4 - 161
- Distances:
  - Site <-> DU: 1-20Km (some outliers)
  - DU <-> CU: 5-40 Km (some outliers)
  - CU <-> Core: 20-800 Km (primary and backup)

# Bedankt voor uw aandacht