

NETWORK OPERATIONS & IT

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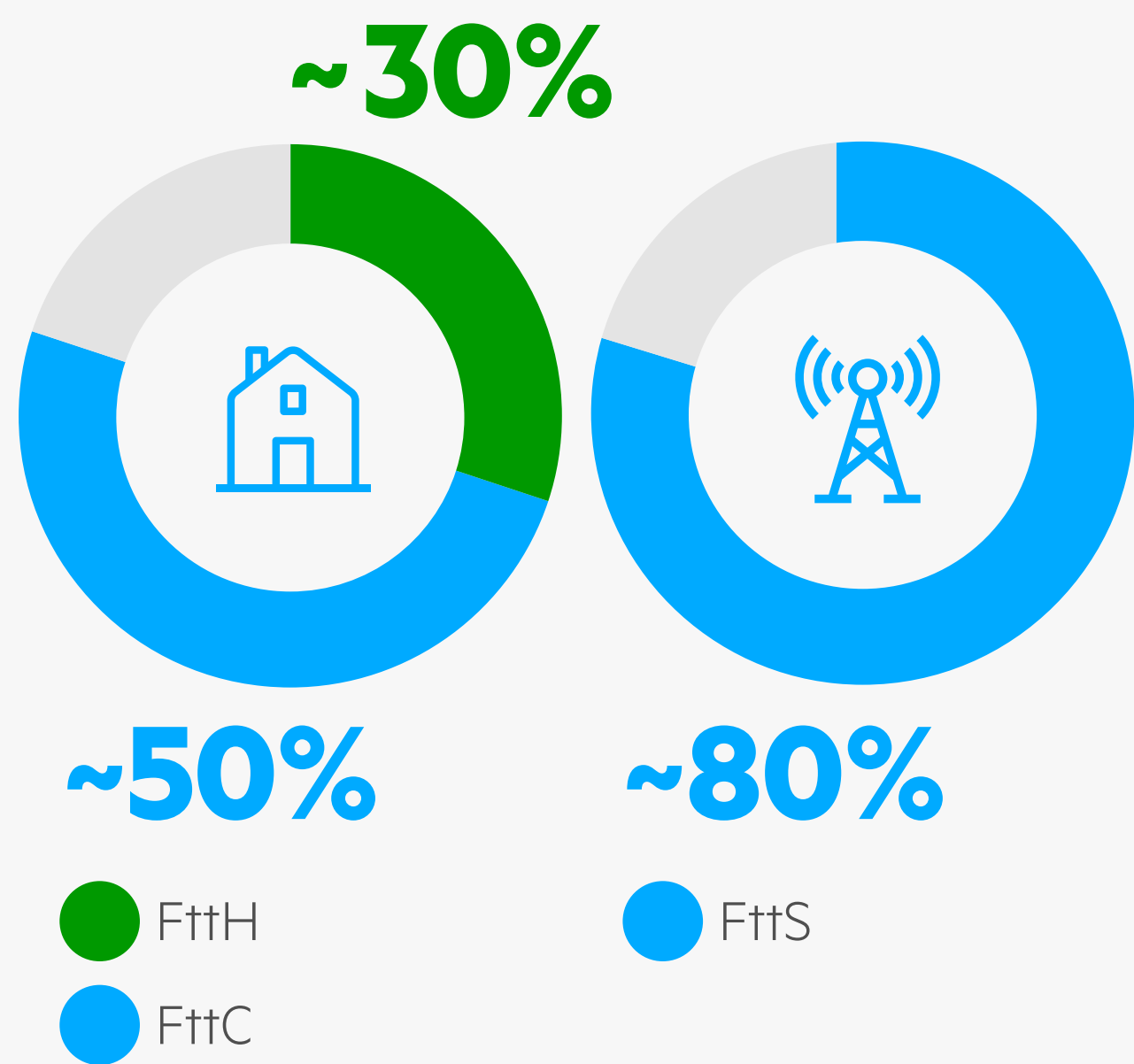


CAPITAL
MARKETS
DAY 2018

THE BEST CONVERGED SMART INFRASTRUCTURE

Strong network, IT integration on track

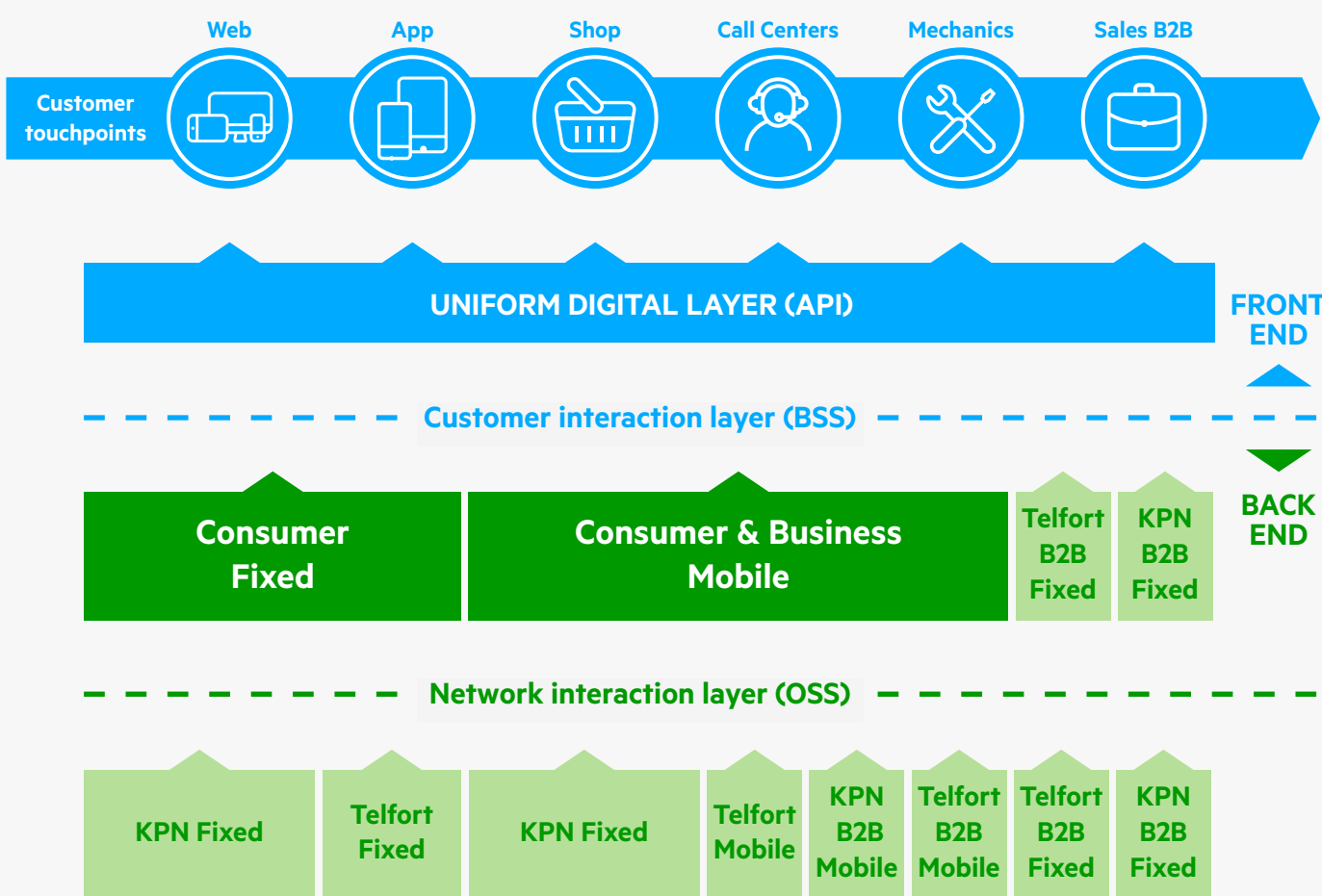
Dense fiber penetration



Best customer experience on mobile network¹



Largely simplified operating model



1 Source: Independent market survey (Consumentenbond Q3 2018)

STRATEGIC FOCUS 2019 2021

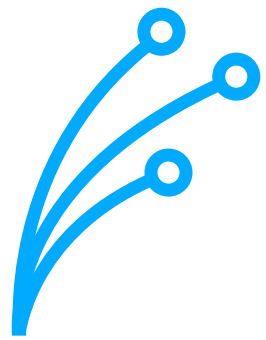
The best **converged
smart infrastructure.**

Enable **innovative
technologies.**

Accelerate **simplification**
of operating model.

The best converged smart infrastructure

digital highway of the Netherlands



Fiber roll-out
acceleration

**+1 million
FttH households**
by end 2021



Full mobile network
modernization

100% 5G ready
by end 2021



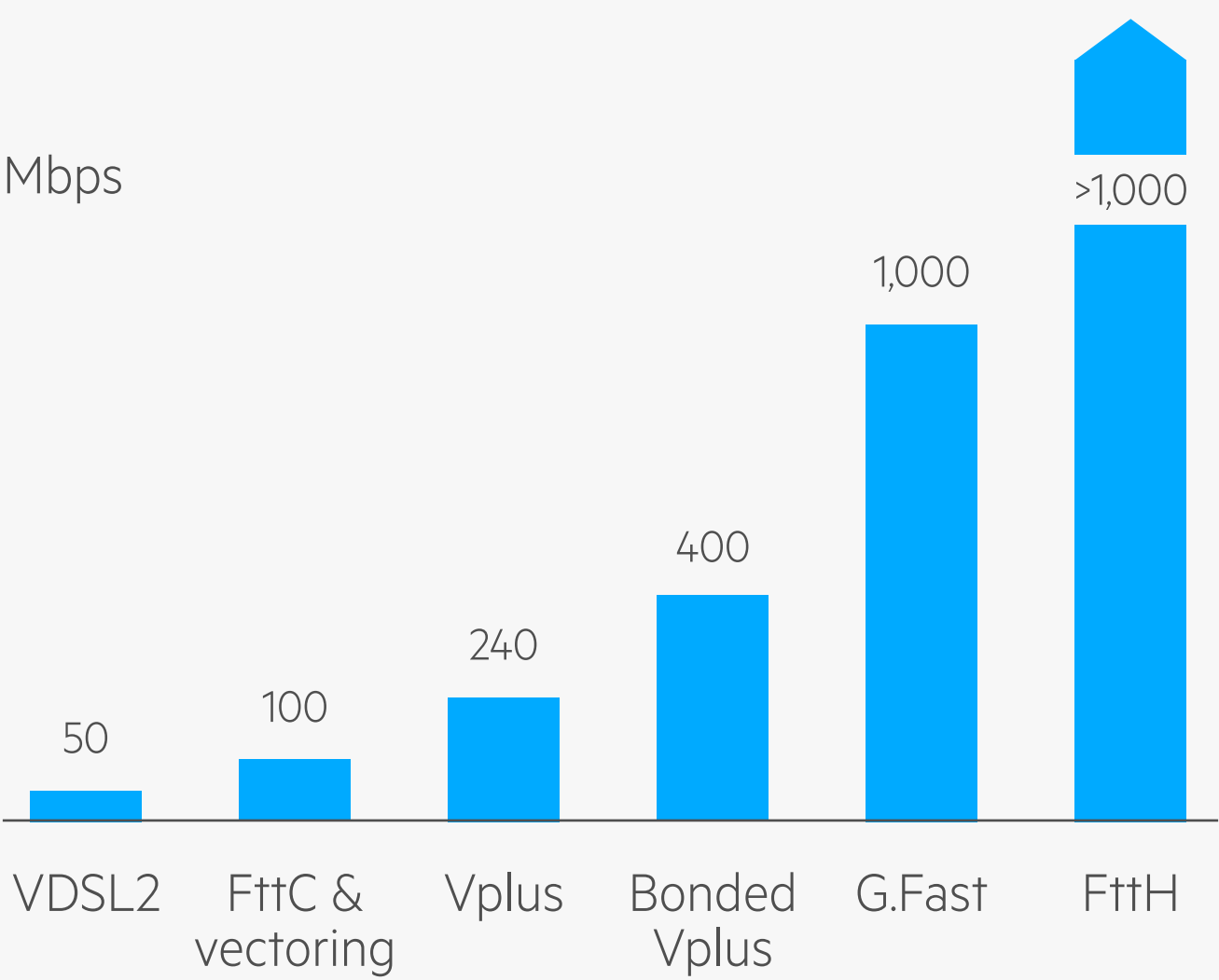
Moving to
All-IP

100%
by end 2021

Increase availability 1Gbps access speeds

FttH as natural evolution of FttC

Finalize FttC roll-out
+500k households

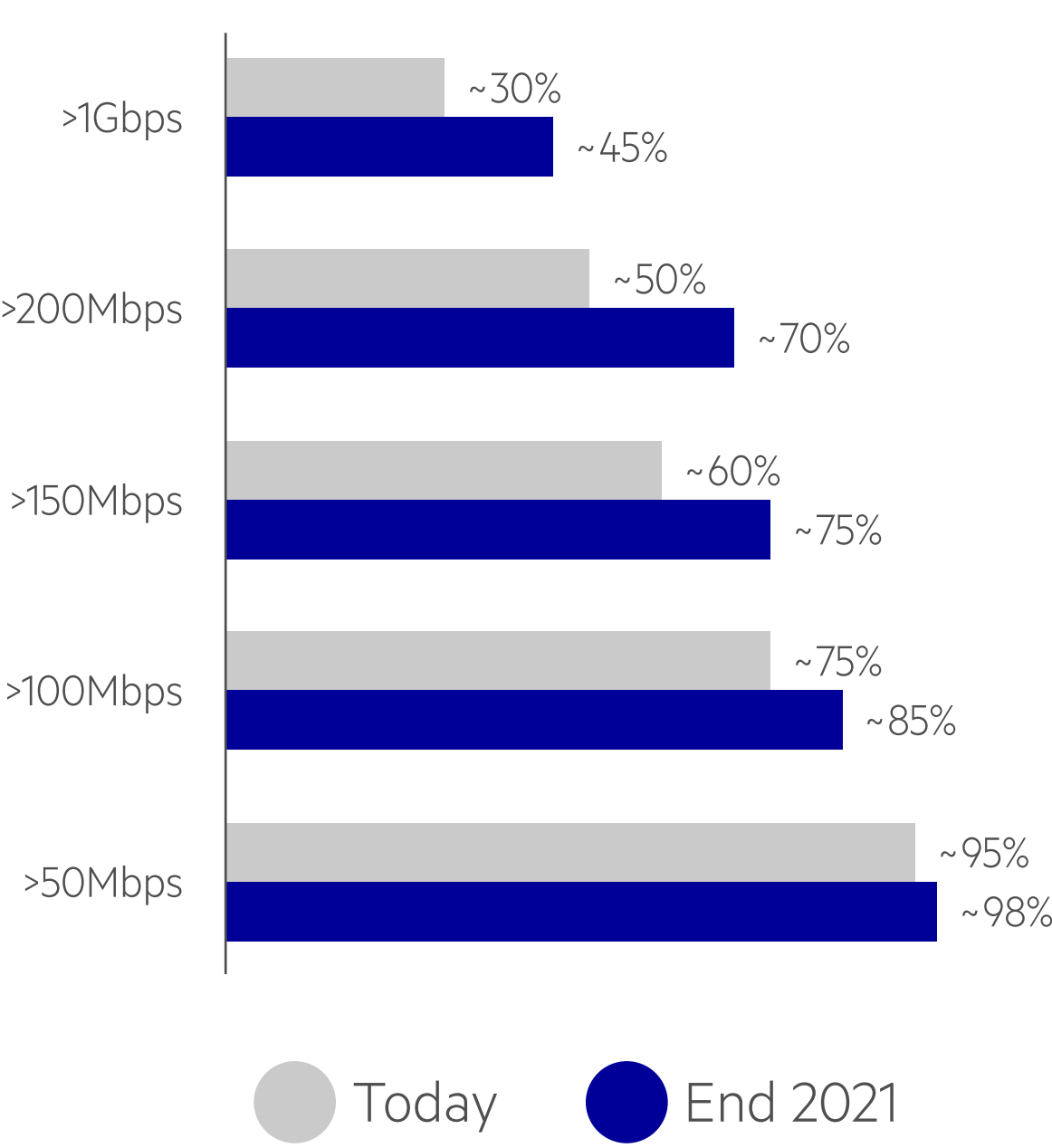


Technically possible speeds

+1 million
FttH households

>40%
of households
by end 2021

Improving average
access speeds

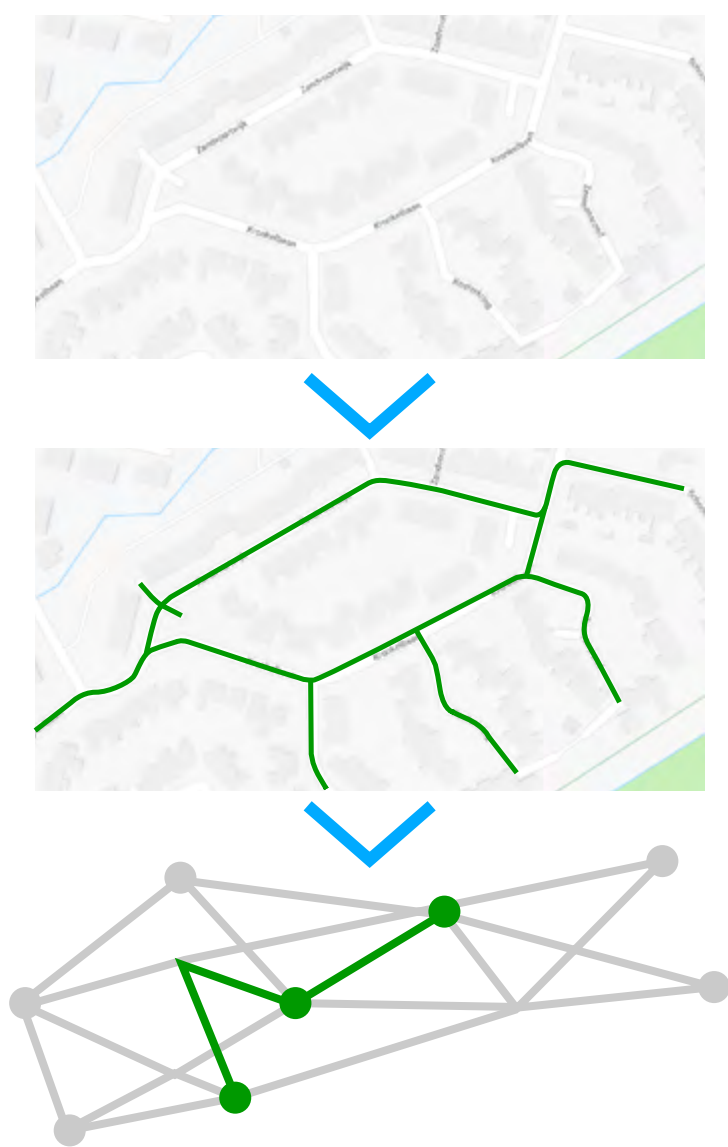


Higher utilization rate and lower roll-out costs

Higher network utilization rate in fiber areas

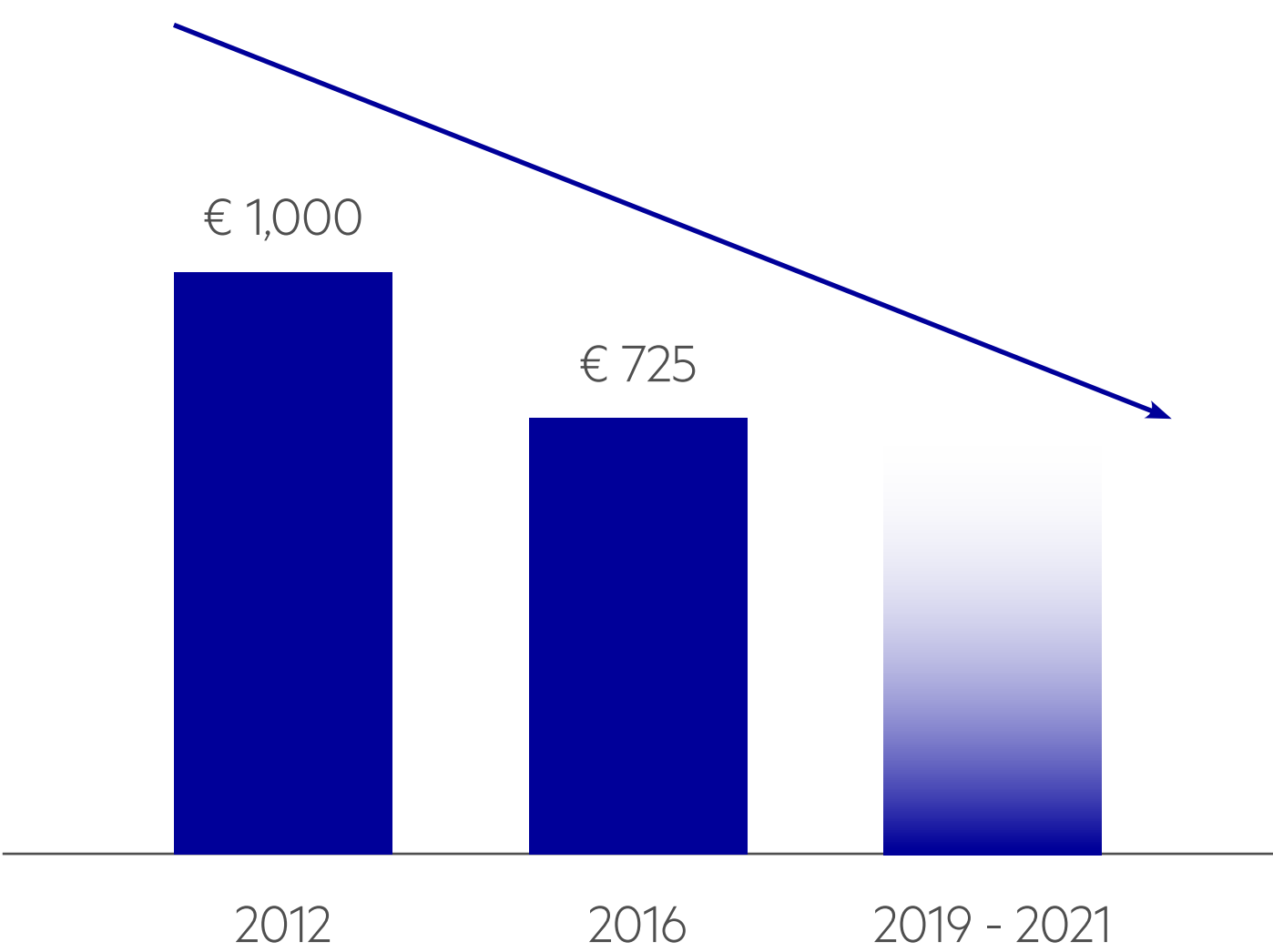
+8%pt
utilization rate¹

Automated planning & design...



Time to design all NL non-fiber areas from **2 years** to **20 hours**

...contributing to lower average roll-out costs



Significantly lower roll-out costs per home passed

¹ Comparison with DSL, Q3 2018

Regional hybrid access approach



Fixed access roll-out

- Finalize FttC
- Accelerate FttH
- Roll-out hybrid fixed-mobile solutions



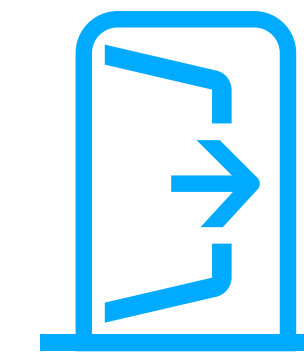
Regional access-to-activation

- Communication
- Marketing & sales
- Optimize current areas



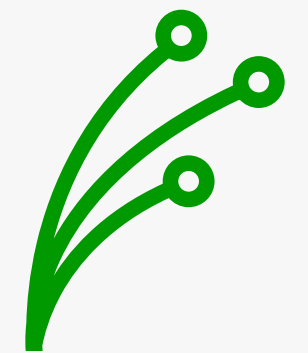
In-home

- In-home WiFi coverage
- Do-it-yourself tooling
- In-home equipment



Copper phase-out

- Migrate copper base to fiber
- Switch-off copper

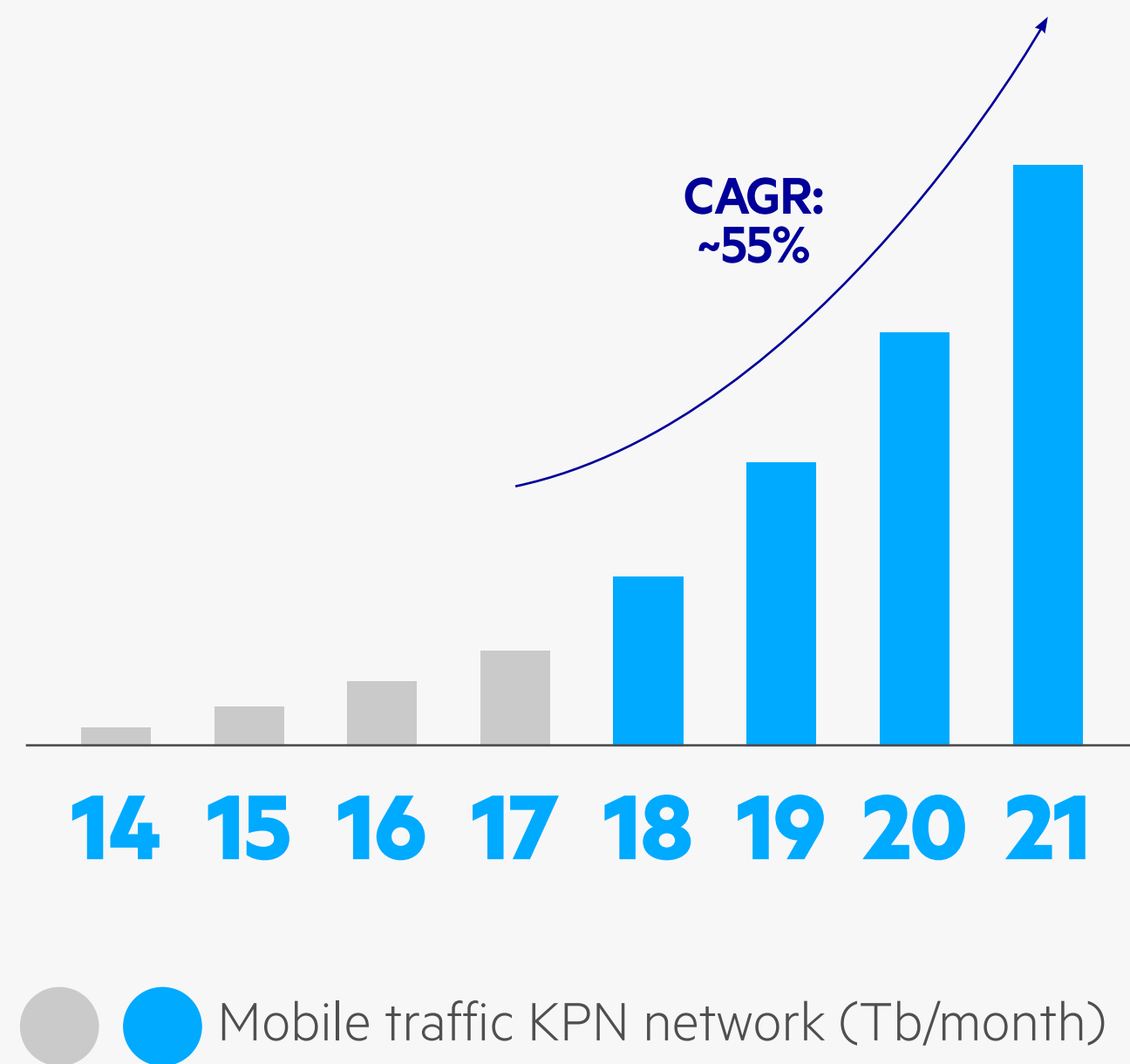


Technology

- Network topology (FttB / PON / G.Fast)
- In-home
- Hybrid solutions

Full mobile network modernization by 2021

Continued strong data growth...



...requires mobile equipment upgrade...

100%



...to enable latest technologies

Massive
MIMO

5G
ready



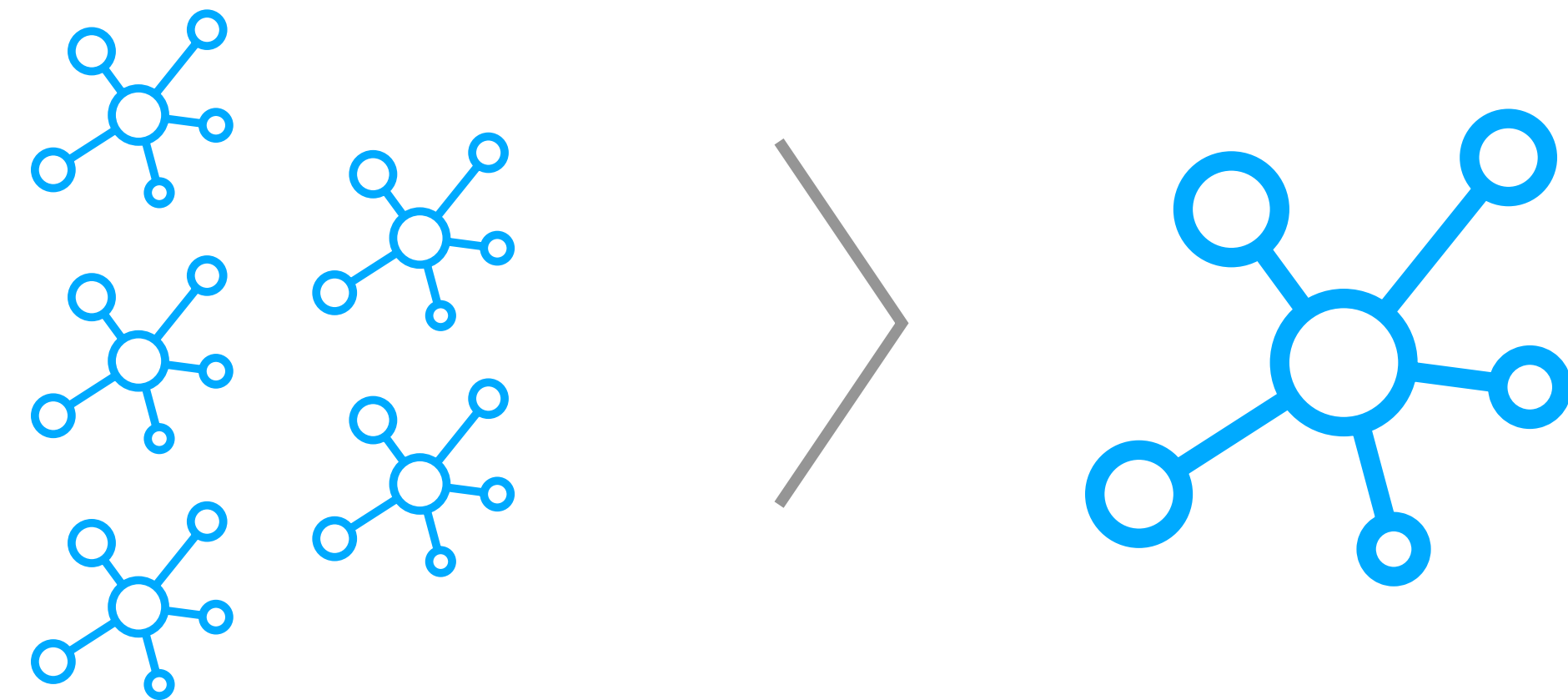
Field Labs

Rationalize networks

Shutting down
legacy networks

PSTN SDH
ISDN **3G**
Copper in fiber areas

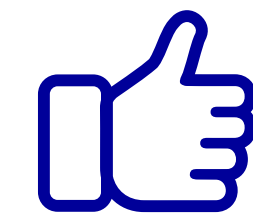
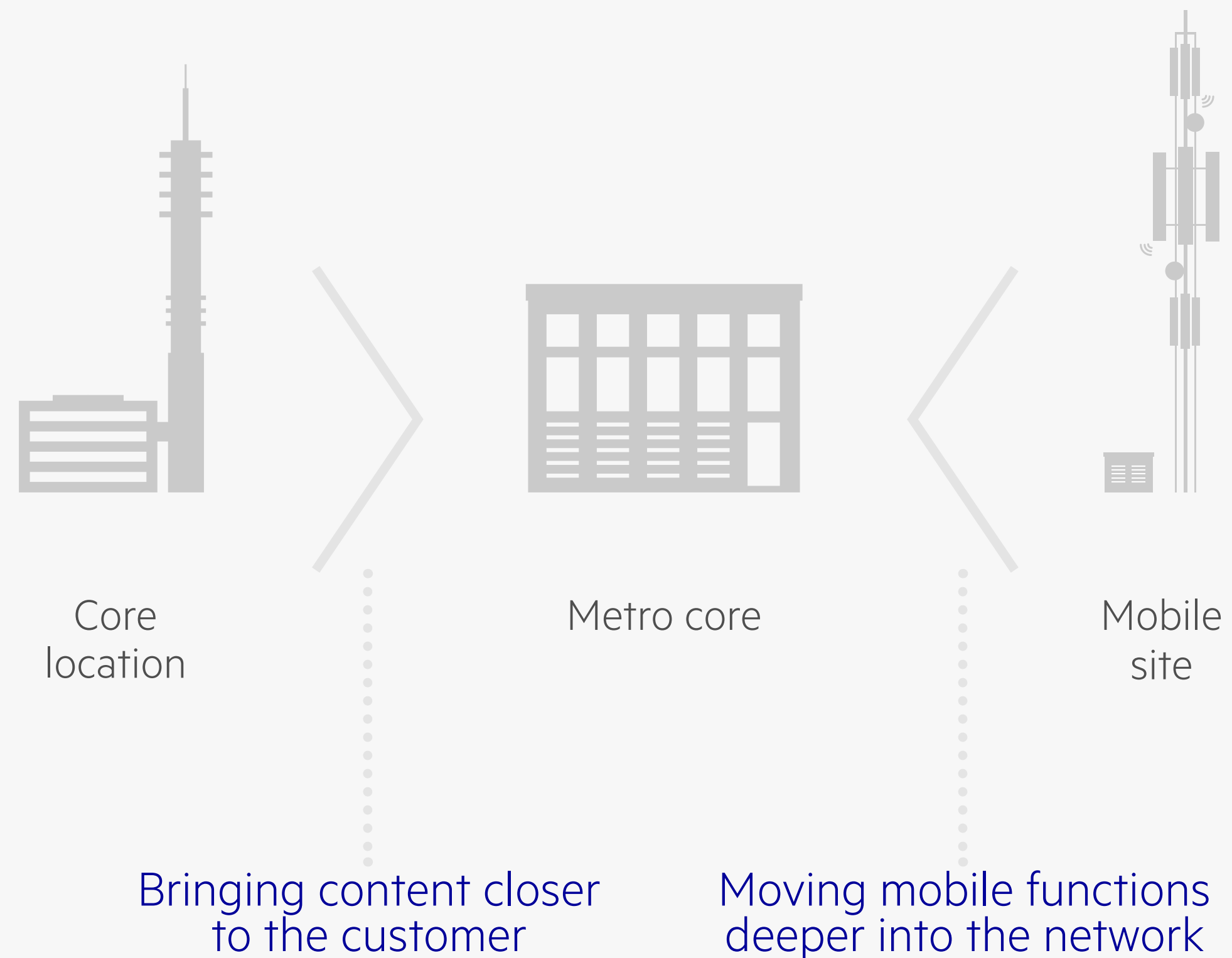
Moving to single
core network



28 GWh power savings (2019-2021)

Decentralize networks

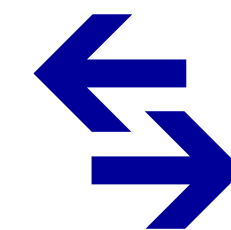
(De)centralization



Improved customer experience

70%

Offload core traffic network



Low latency services



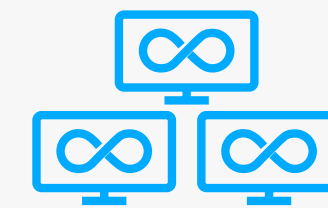
Regional network upgrades at lower spend

Virtualize networks



~50%

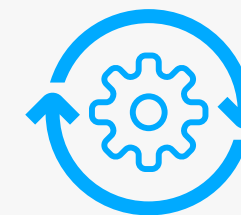
Virtualized network
functions by end 2021
(<5% in 2018)



Perceived infinite bandwidth



Personalized and adjustable



Predictive and automated
recovery



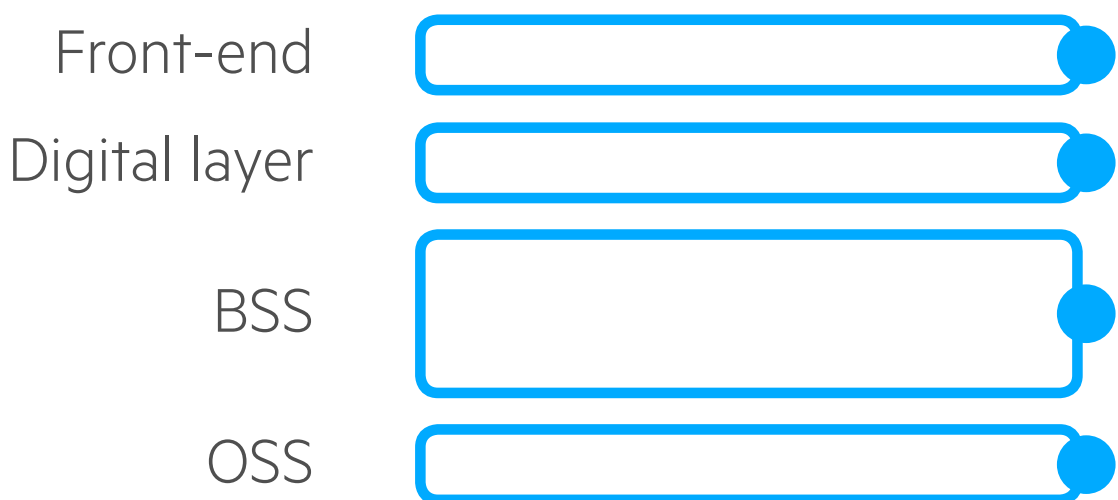
Lower TCO

**Through flexible, scalable and
automated networks**

Accelerate simplification of operating model

Finalize
IT integration

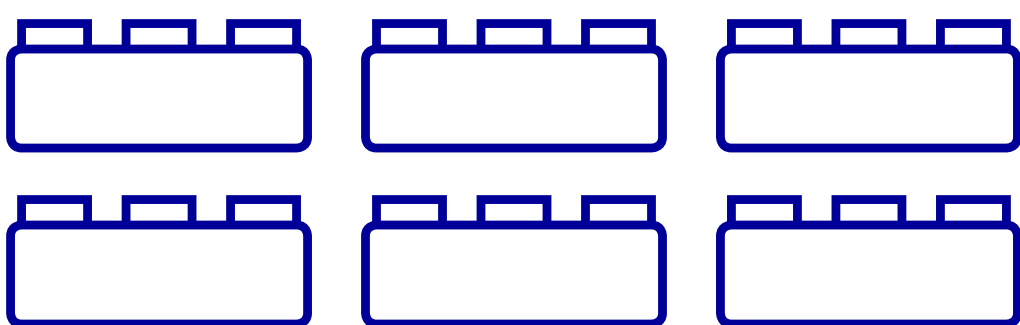
End 2021



From **20 to 2** converged IT stacks

Moving to standard
cloud building blocks

End 2021



Concentrating data centers

Significantly contributing to

~€ 350m

2019 - 2021 new net
opex savings program¹

¹ Indirect opex adjusted for the impact of restructuring costs and incidentals

THE BEST CONVERGED SMART INFRA STRUCTURE

~45% of households
at >1Gbps

~70% of households
at >200Mbps

~50% virtualized
network functions