

Fibre for 5G: the story of convergence

Study by D&O committee - FTTH Council Europe

Presented by Raf Meersman

Project manager & Member of the Board

CEO, Comsof

Dec 3, 2020

FTTH conference 2020

**Fibre
to the
Home**

**Council
Europe**





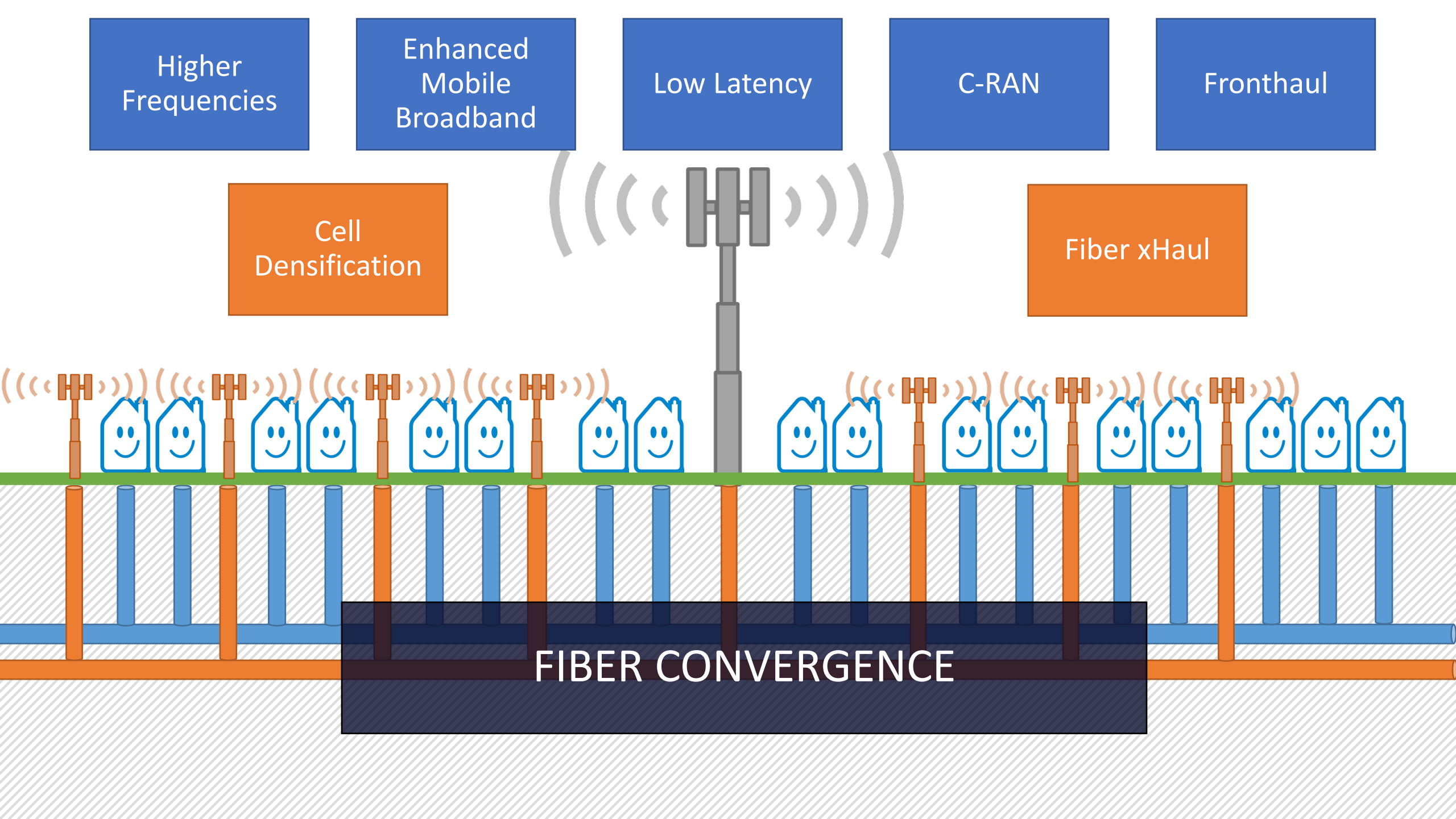
What % of Cost
for 5G Fibre
xHaul can be
saved by
convergence
with FTTH?

What is the
impact of area
density or cell
density?

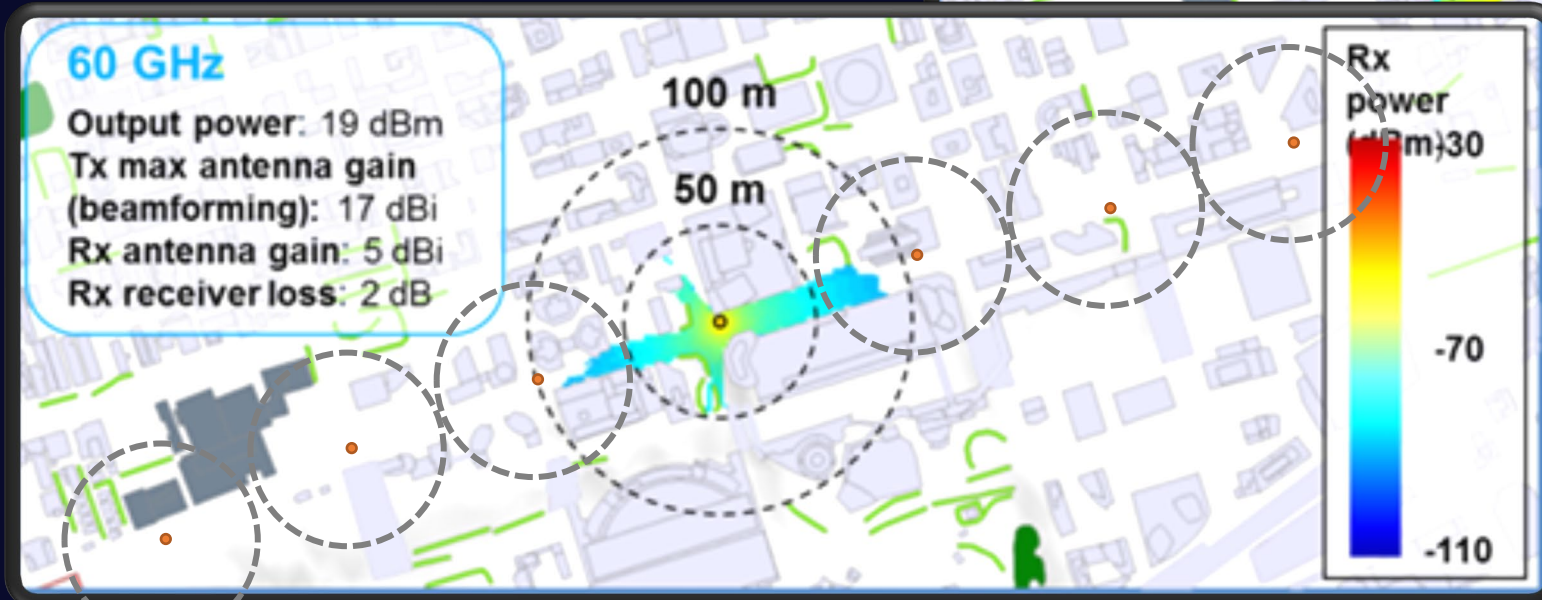
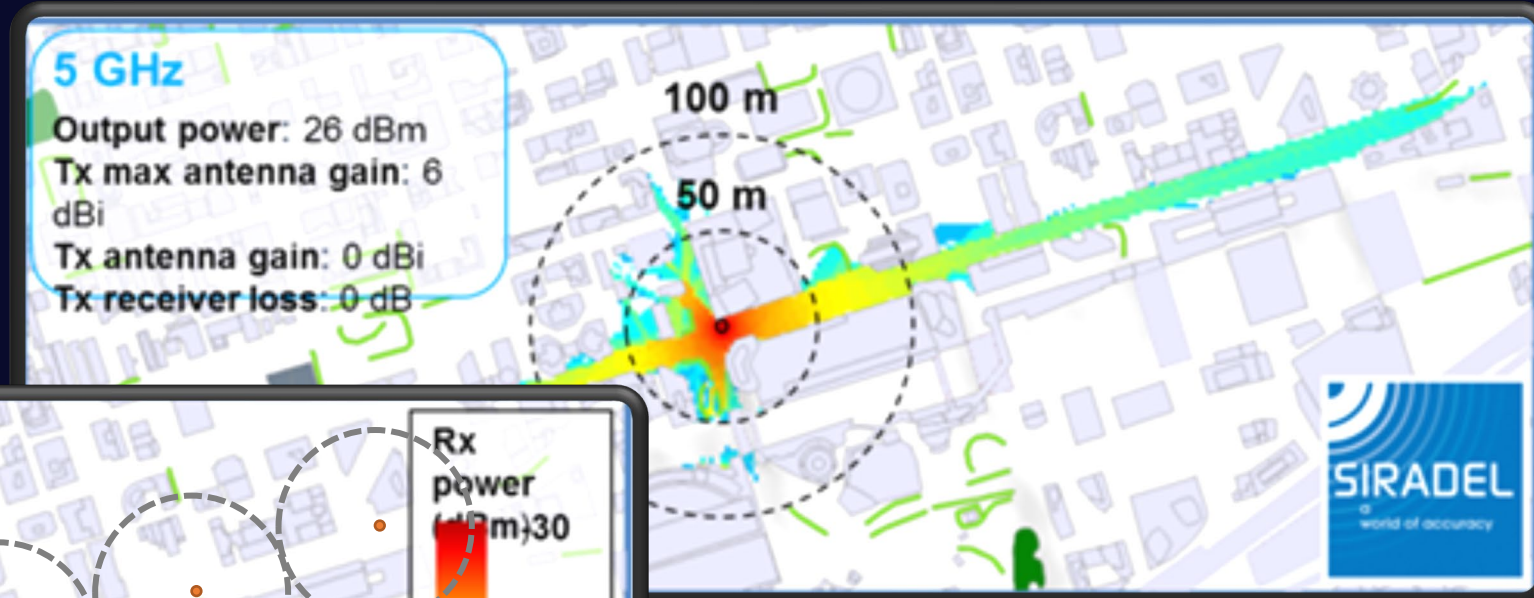
Study 2019

What is the
impact of time
and demand
uncertainty in
a phased
rollout?

Study 2020



Impact of Frequency on Coverage

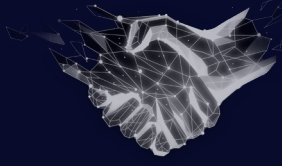


* Source: Siradel



5G – FTTH: Value of Convergence

1 Converged Network vs. 2 Standalone Networks



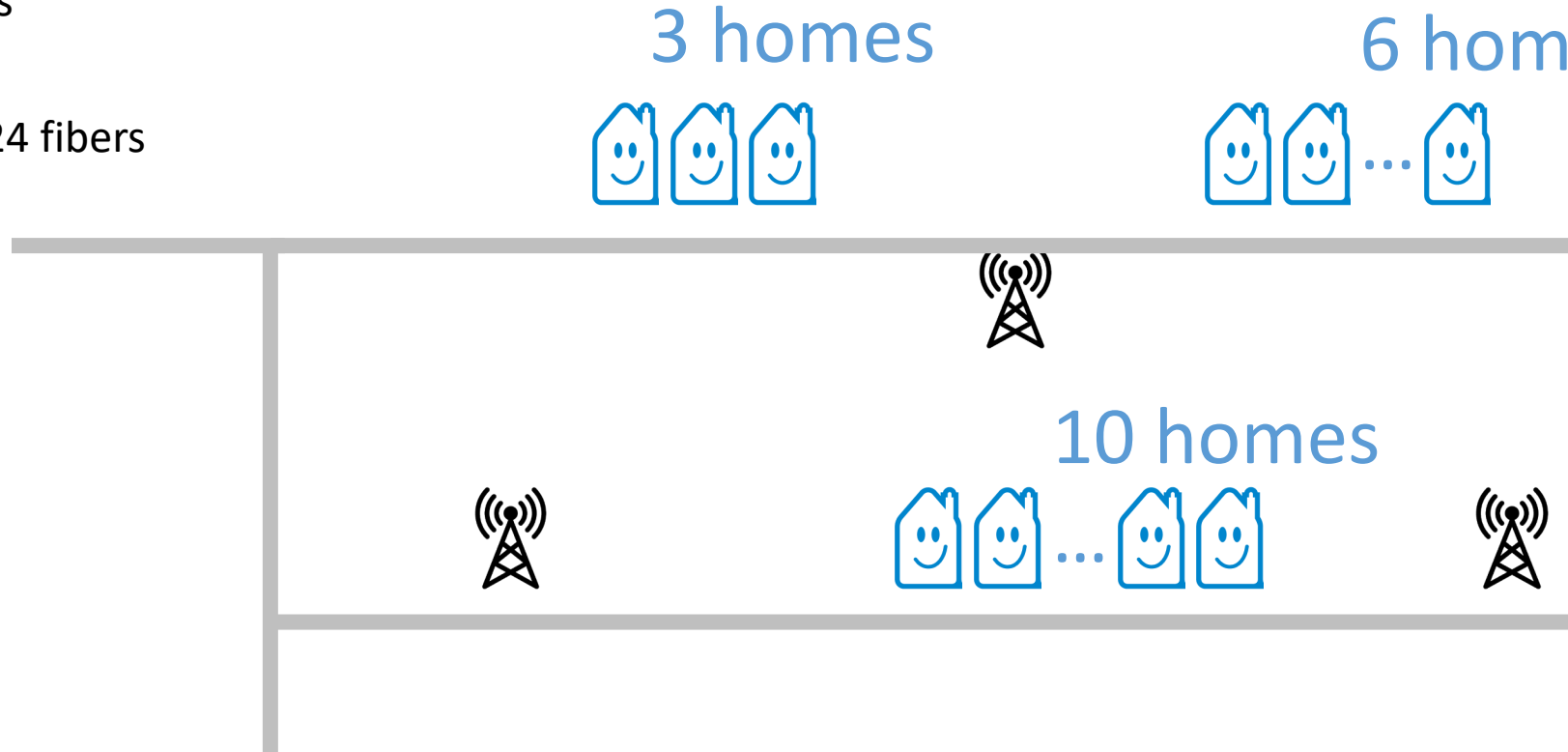
Concept illustration



A Home requiring 2 fibers

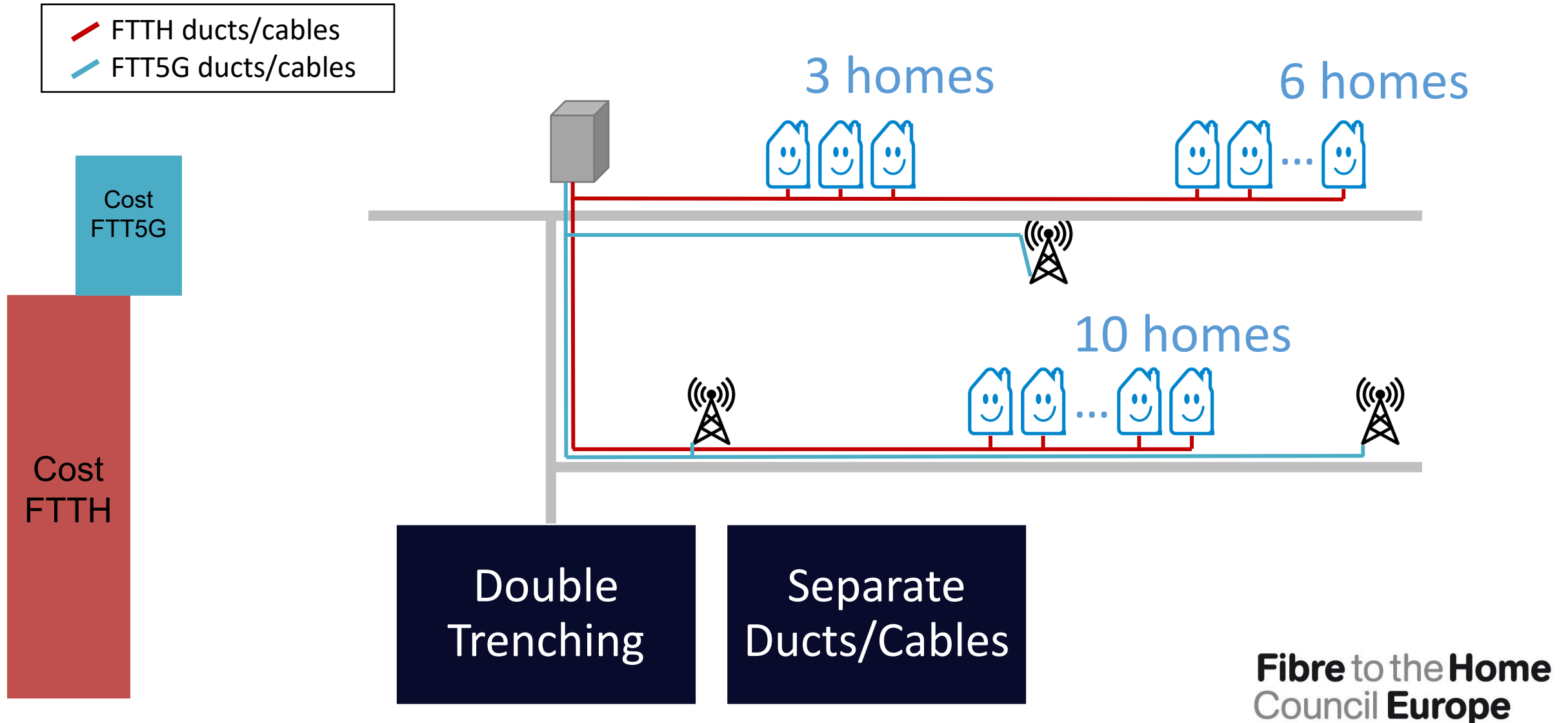
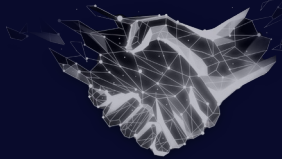


A 5G antenna requiring 24 fibers



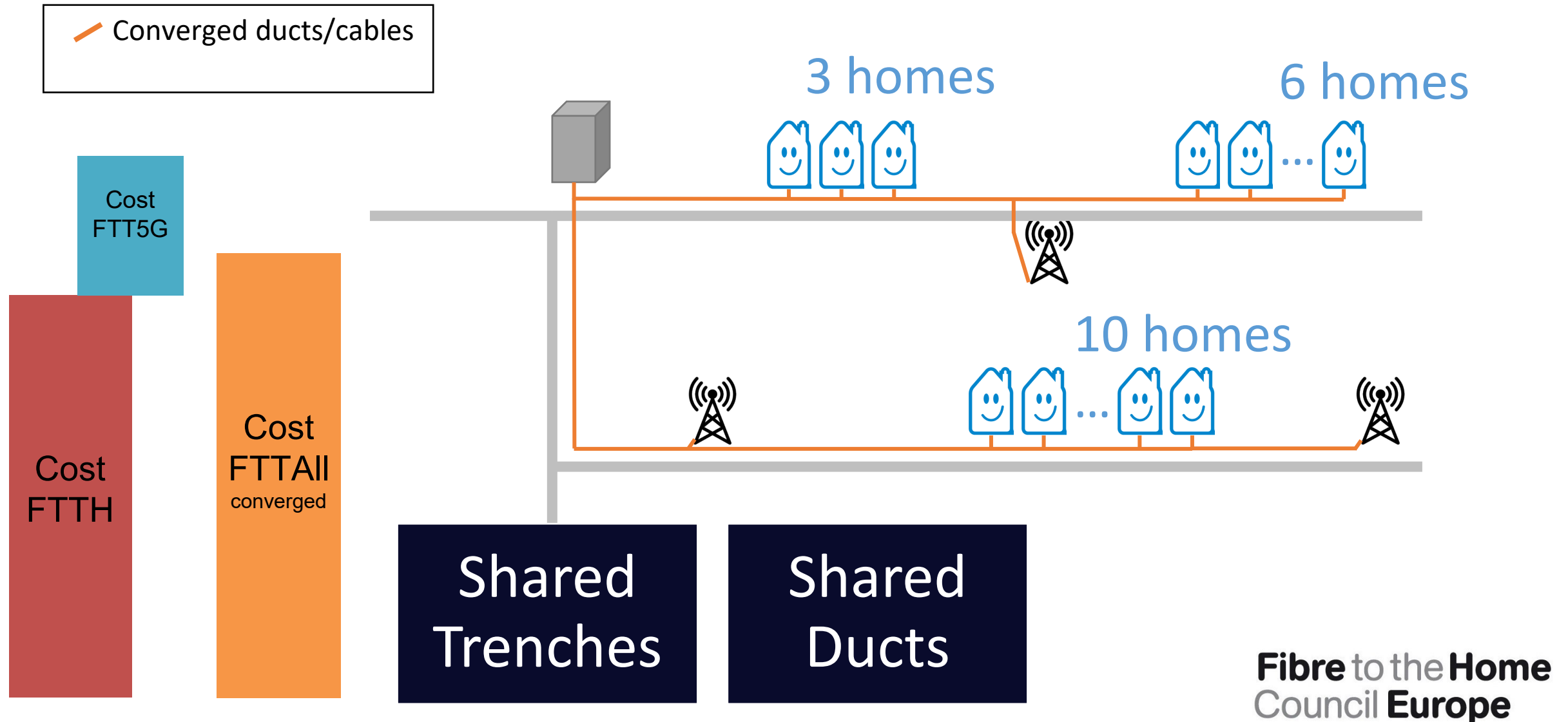
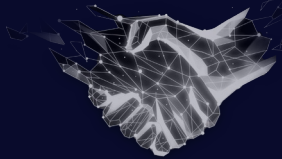
5G – FTTH: Value of Convergence

1 Converged Network vs. 2 Standalone Networks



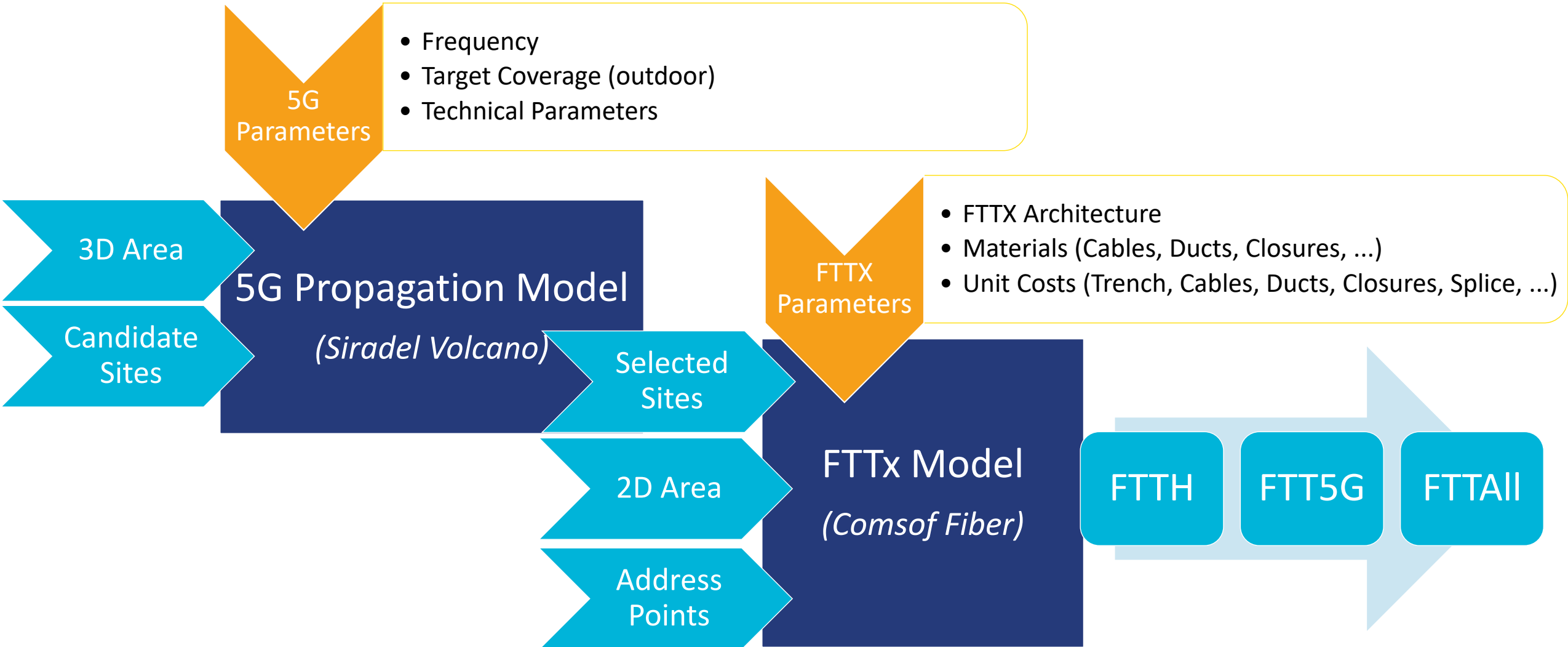
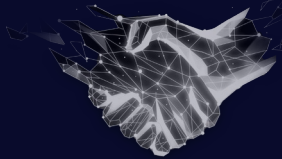
5G – FTTH: Value of Convergence

1 Converged Network vs. 2 Standalone Networks



5G – FTTH: Value of Convergence

Calculation Model & Assumptions



5G – FTTH: Value of Convergence

3 Areas – Various Densities



Urban



High Dense

- 4k Buildings
- 30k Homes
- 24k inh/km²
- Lots of “Visitors”

Suburban



Medium Dense

- 5,7k Buildings
- 5,7k Homes
- 3,5k inh/km²

Rural

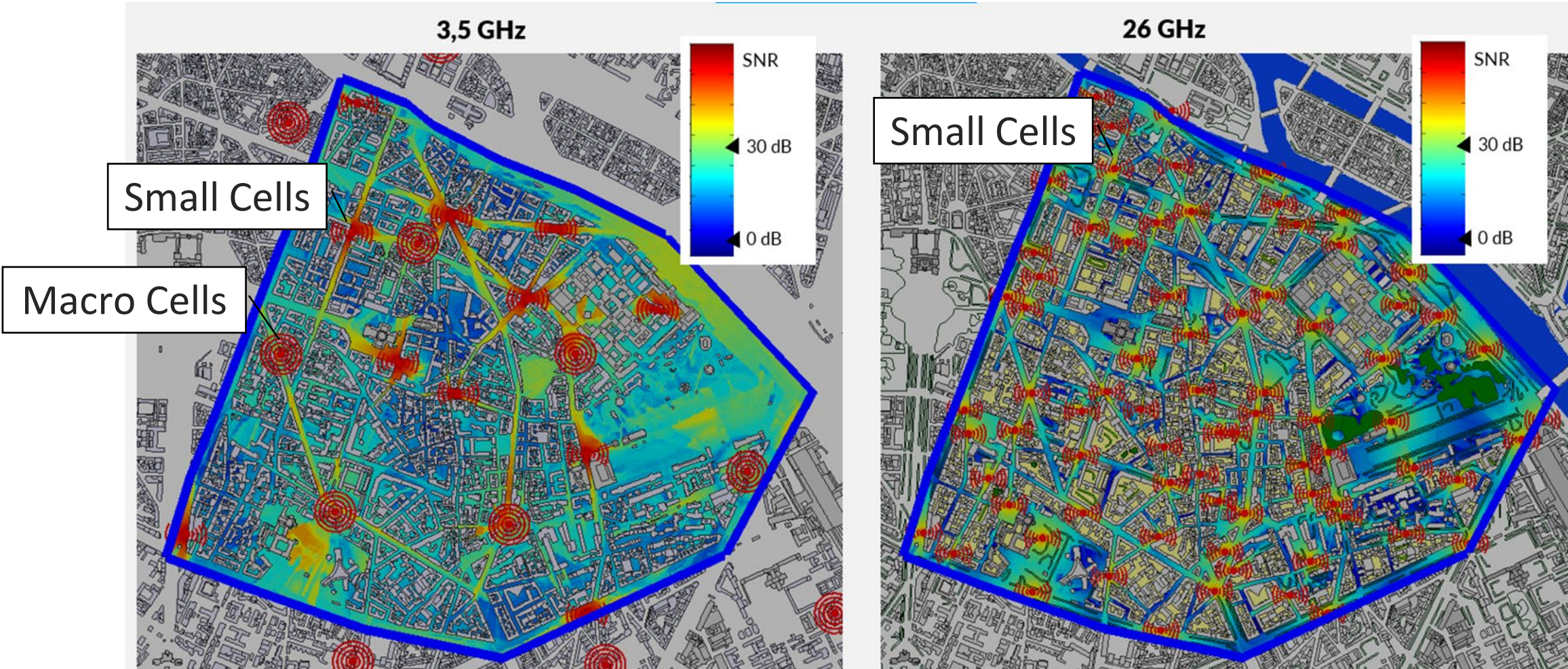


Low Dense

- 7,1k Buildings
- 7,1k Homes
- 95 inhabitants/km²



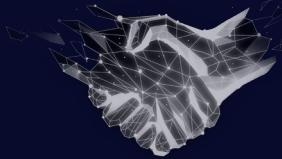
High Cell Density: 5G Small Cells @ 3,5GHz + 26GHz (95%)



Source: Siradel (Volcano Model)

Fibre to the Home
Council **Europe**

Output: Selected Sites per Area and Cell Density



High Dense Area

- Macro Sites at 3,5 Ghz (6)
- Small Cells at 3,5 Ghz (11)
- Indoor Hotspots (13)

- Macro Sites at 3,5 Ghz (6)
- Small Cells at 3,5 Ghz (11)
- Indoor Hotspots (13)
- Small Cells at 26 Ghz (11+29)

- Macro Sites at 3,5 Ghz (6)
- Small Cells at 3,5 Ghz (11)
- Indoor Hotspots (13)
- Small Cells at 26 Ghz (11+87)

Low Cell
Densification

Medium Cell
Densification

High Cell
Densification

6

x5

30

6

x10

59

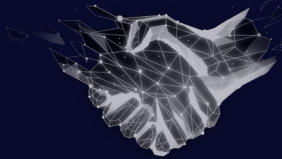
6

x20

117

Fibre to the Home
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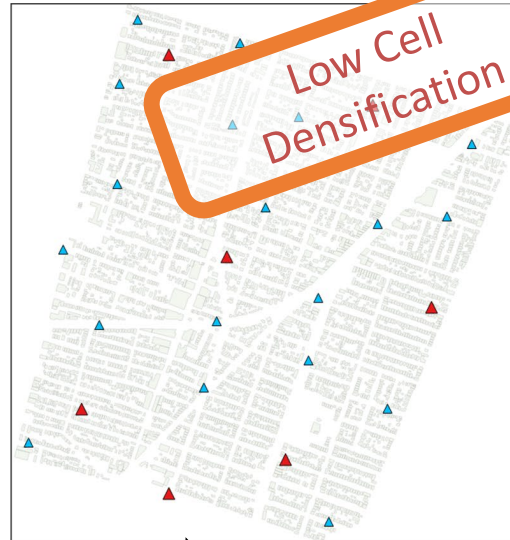
Output: Selected Sites per Area and Cell Density



Medium Dense Area



▲ Macro Sites at 3,5 Ghz (7)
▲ Small Cells at 26Ghz (20)



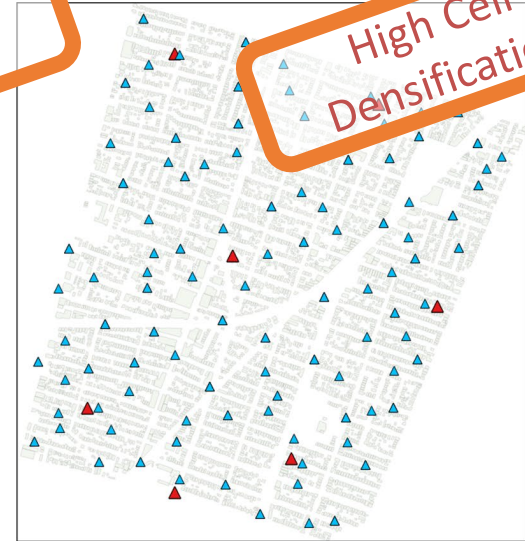
Low Cell
Densification

▲ Macro Sites at 3,5 Ghz (7)
▲ Small Cells at 26Ghz (49)

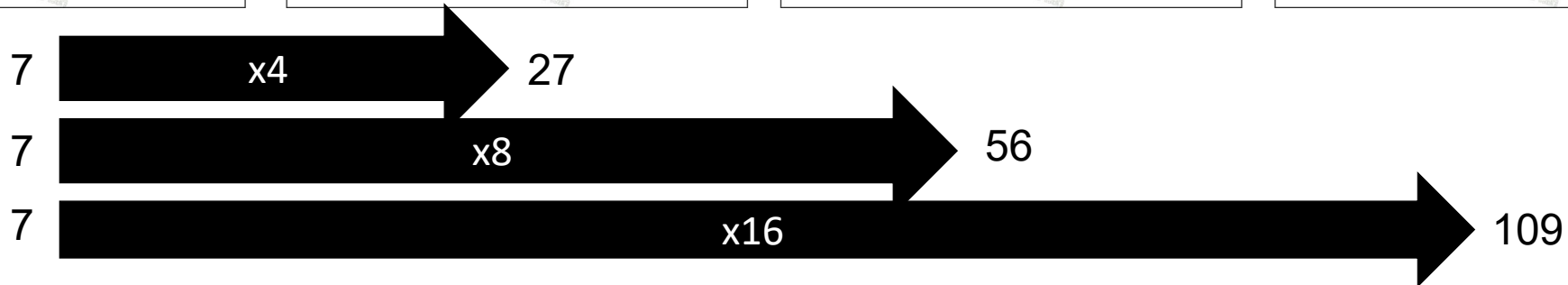


Medium Cell
Densification

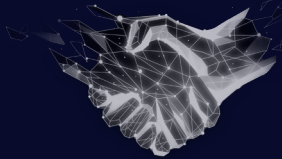
▲ Macro Sites at 3,5 Ghz (7)
▲ Small Cells at 26Ghz (102)



High Cell
Densification



Output: Selected Sites per Area and Cell Density



Low Dense Area

2

x2

4

Low Cell
Densification

- Macro Sites at 3,5 Ghz (2)
- Small Cells at 3,5 Ghz (2)

2

x4

8

Medium Cell
Densification

- Macro Sites at 3,5 Ghz (2)
- Small Cells at 3,5 Ghz (6)

2

x8

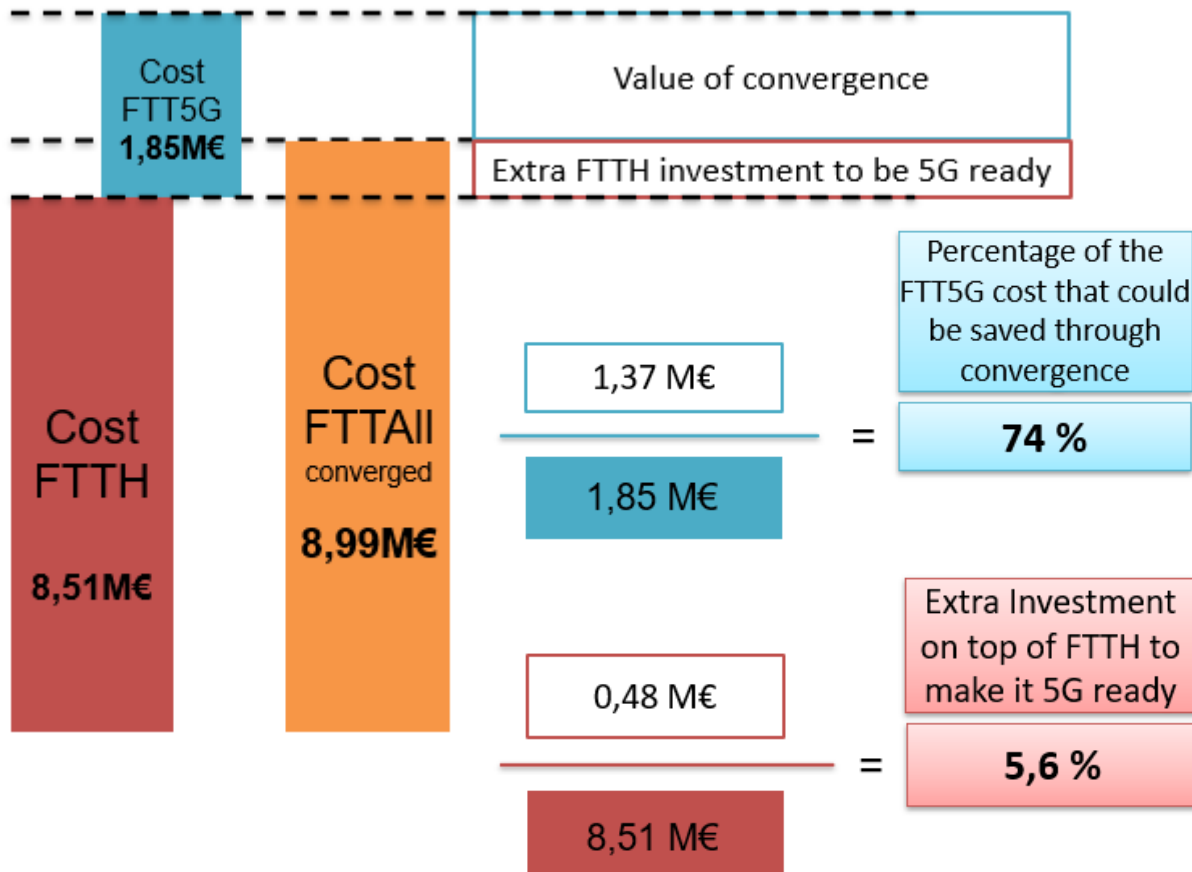
16

High Cell
Densification

- Macro Sites at 3,5 Ghz (2)
- Small Cells at 3,5 Ghz (14)

5G – FTTH: Value of Convergence

Example Result: High Dense Area – High Dense Cells



Between 65% and 96%
of Fibre costs for 5G xHaul
can be eliminated
by rolling out an optimised
and future proof
converged fibre network

The extra investment needed to
immediately make an FTTH network ready
for 5G (even for high density of cells)
is only 1% to 7%

A risk worth taking?

What if we rollout FTTH and high-dense 5G in different phases over time, not knowing the 5G fiber demand at the time of our FTTH deployment?

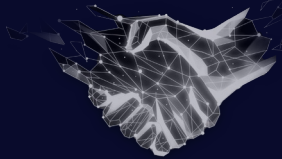
We need to foresee spare capacities on top of FTTH for reuse in future 5G fibre rollout

How much spare capacity is needed to benefit from convergence?

What is the cost reduction for FTT5G for a certain level of spare capacity?

5G – FTTH convergence

Study 2020 - Assumptions



High Dense Area

- 30k homes
- 24k inh/km²
- Fiber network: underground/ducts

Phase 1 = FTTH with X% spare:

- 12%
- 24%
- 48%

Phase 2 in Year Y =

- Year 1 + 5
- NPV based on discount rate of 8%

Year Y: High Cell Density

- 95% coverage at 26Ghz
- Cell densification with Factor 20

Year 1: FTTH
with X% spare
ducts

Year Y: FTT5G
maximally
reusing spare
capacity

5G – FTTH convergence

Study 2020 - Assumptions



Distribution Material	Feeder Material
Microducts with ABF	Microducts with ABF
2f, 12f cables	12f, 96f cables
12-way Microduct Bundles (7/3.5)	7-way Microduct Bundles (14/10)

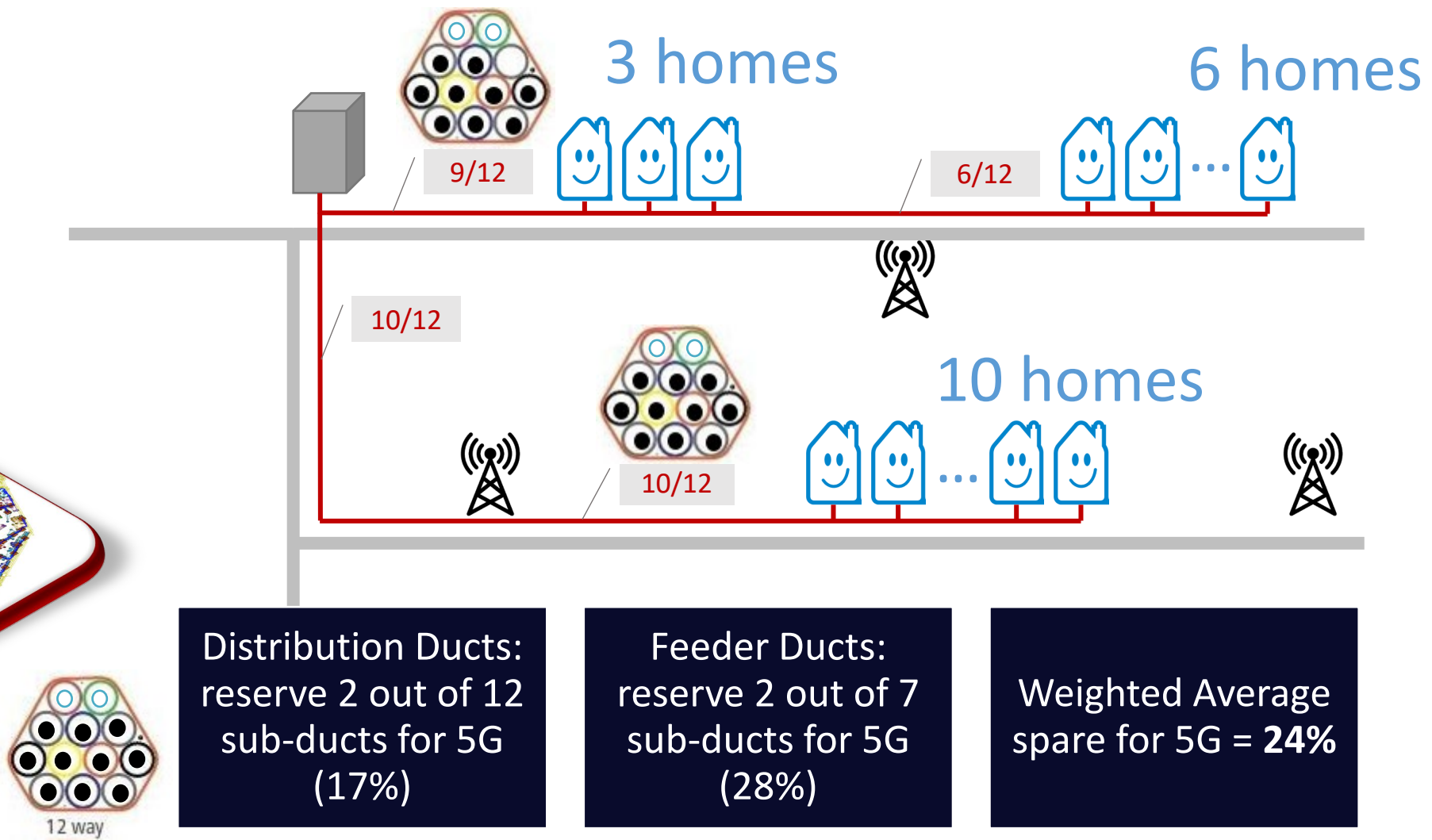
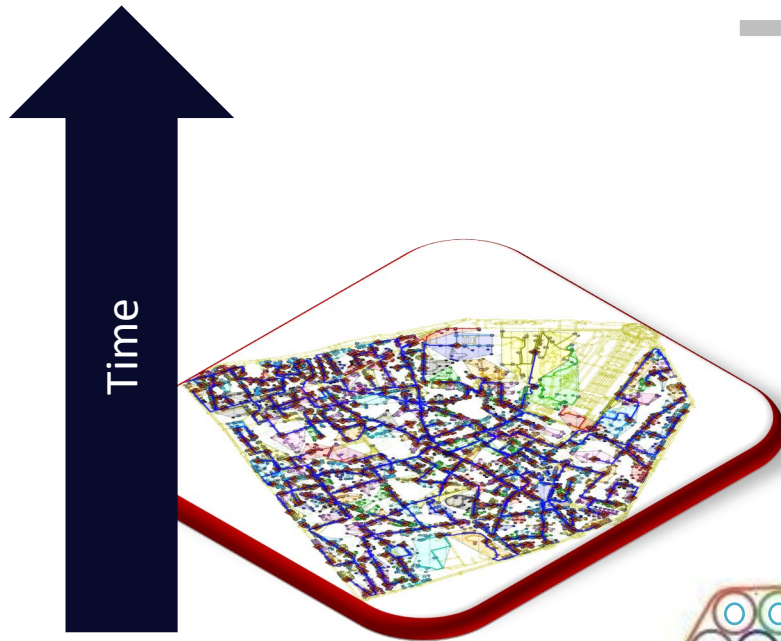
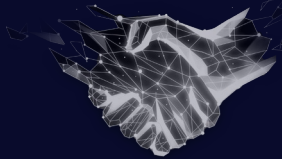


Fiber Demand
2f per Home
12 active + 12 spare fiber per 5G site
GPON technology (1:32 for FTTH / 1:4 for FTT5G)

Distribution – Spare	Feeder – Spare	Average Spare
1 microduct out of 12	1 microduct out of 7	12%
2 microducts out of 12	2 microduct out of 7	24%
4 microducts out of 12	4 microduct out of 7	48%

5G – FTTH convergence

Example: FTTH with 24% spare, then FTT-5G



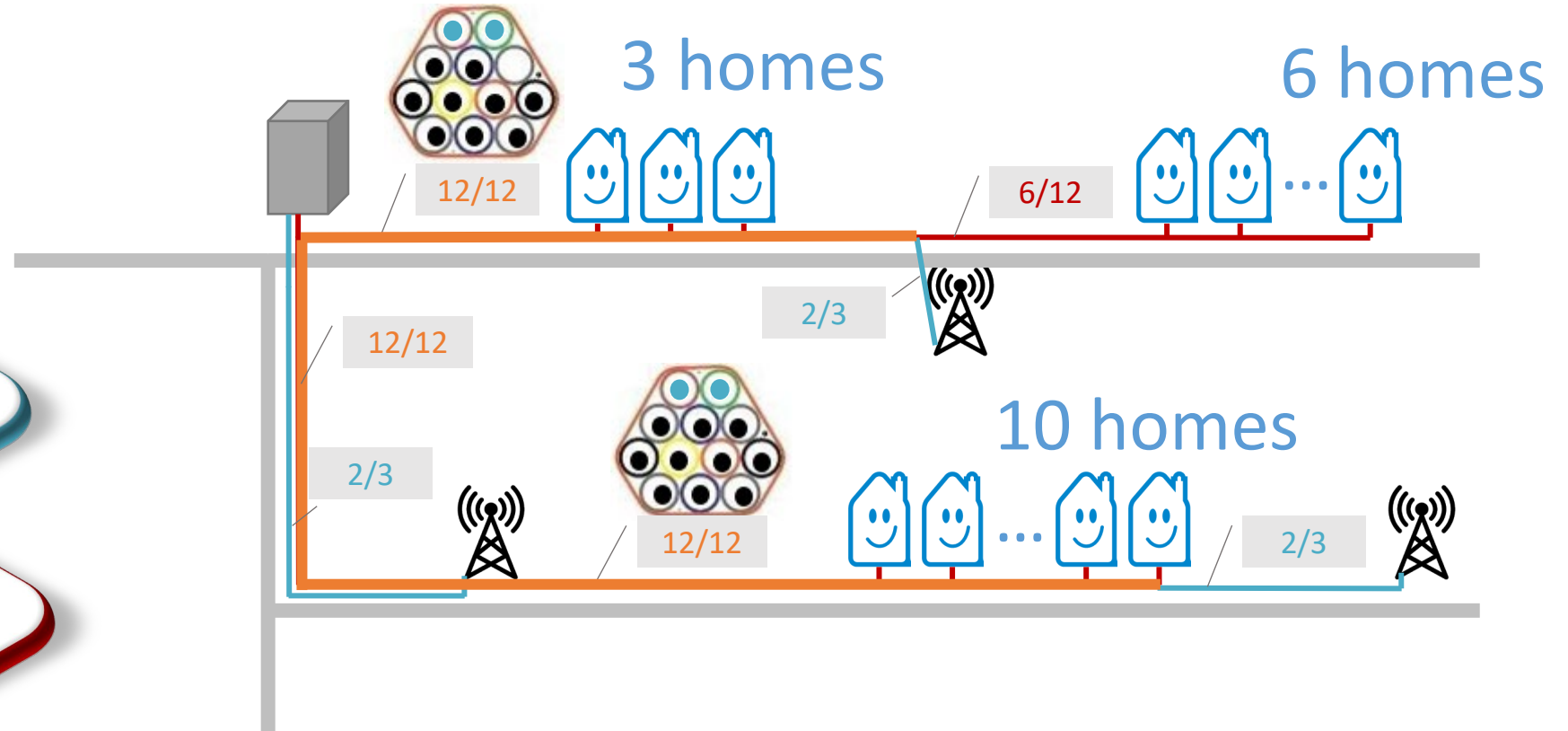
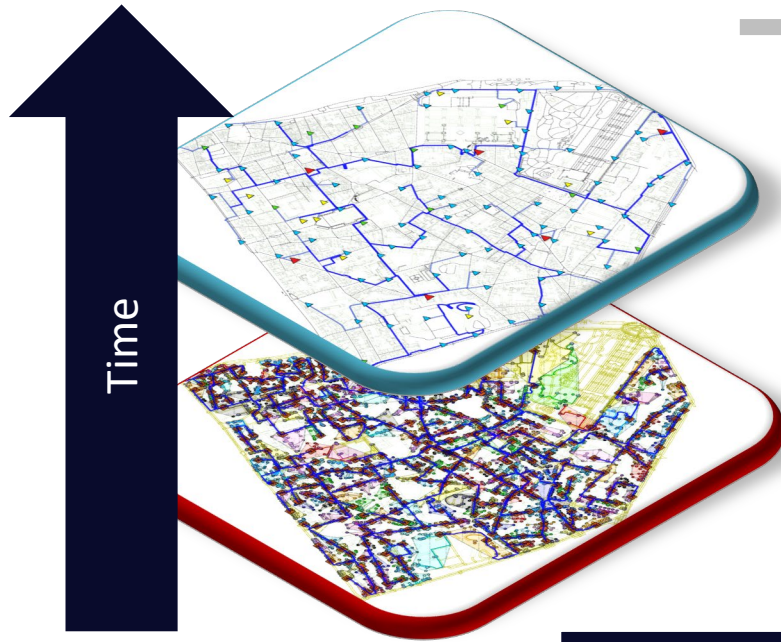
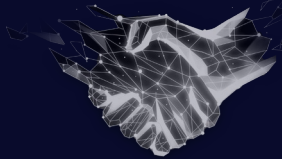
Distribution Ducts:
reserve 2 out of 12
sub-ducts for 5G
(17%)

Feeder Ducts:
reserve 2 out of 7
sub-ducts for 5G
(28%)

Weighted Average
spare for 5G = 24%

5G – FTTH convergence

Example: FTTH with 24% spare, then FTT-5G



Partly Double
Trenching

Partly Avoid
Trenching

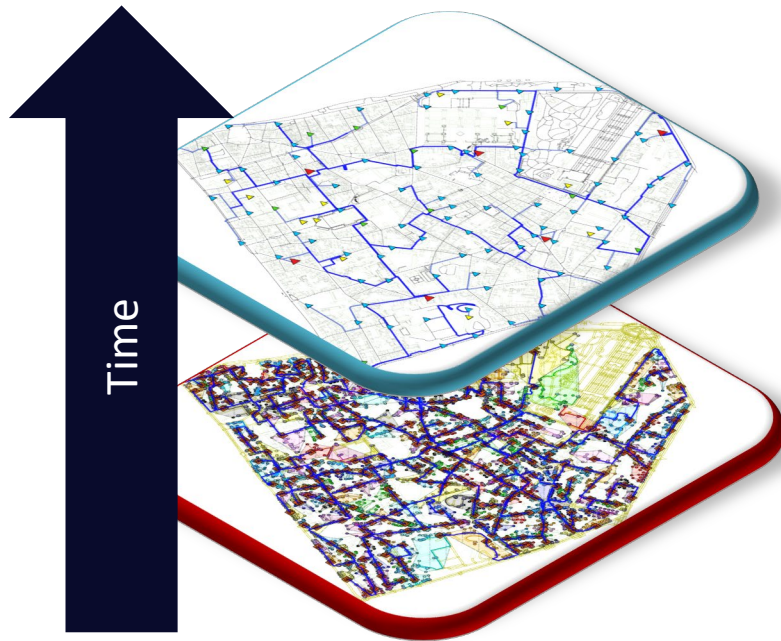
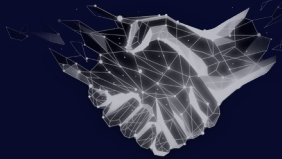
Partly
Separate
Ducts

Partly
Reused
Ducts

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5G – FTTH convergence

Case 1: FTTH with 0% Spare, then FTT-5G



Total cost = 10.356 kEUR

Total NPV = 9.766 kEUR

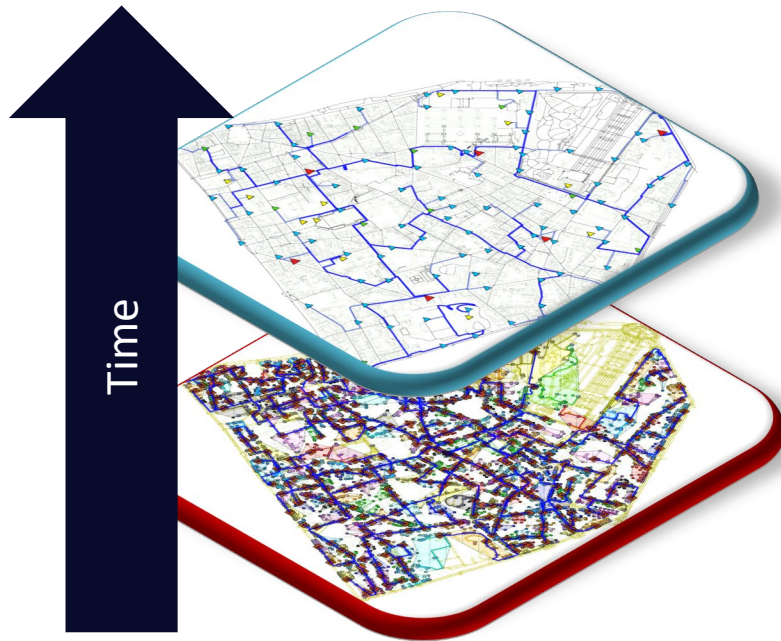
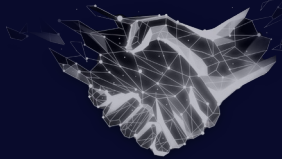
2026: standalone FTT-5G network = 1.846 kEUR

NPV (5Y) = 1.256 kEUR

2021: standalone FTTH network = 8.510 kEUR

5G – FTTH convergence

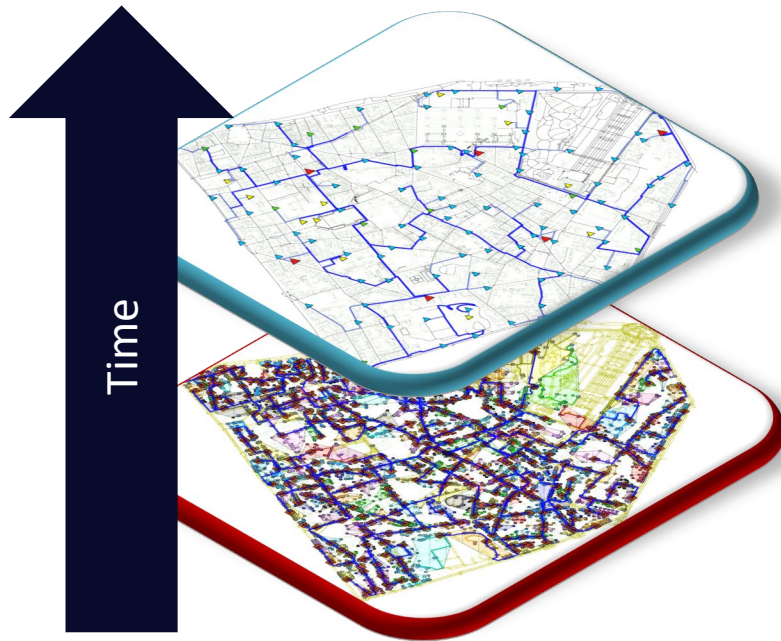
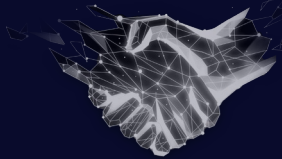
Case 1: FTTH with 0% Spare, then FTT-5G



Total NPV	9.766	
FTT5G (NPV-5Y)	1.256	
FTTH with spare	8.510	
0% Spare (kEUR)		

5G – FTTH convergence

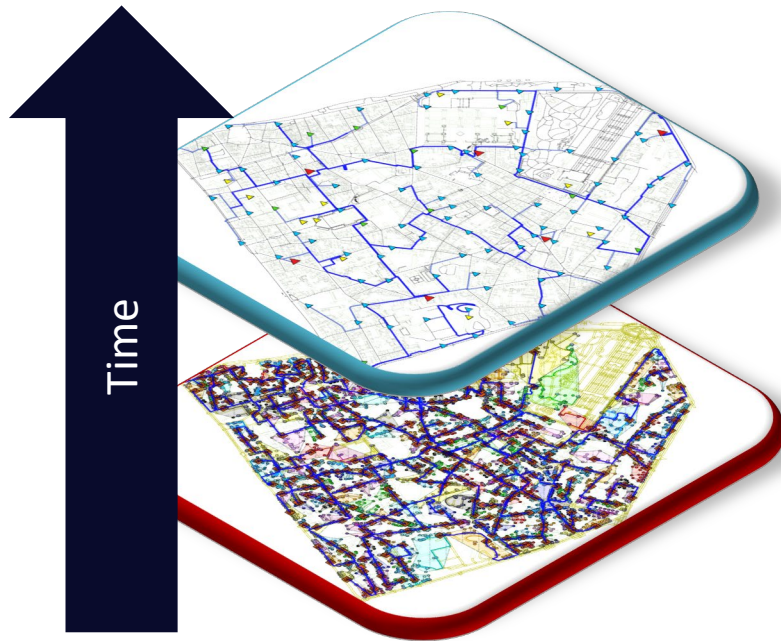
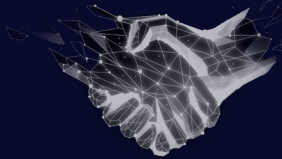
Case 2: FTTH with 12% spare, then FTT-5G



	0% Spare (kEUR)	12% Spare (kEUR)	
Total NPV	9.766	9.543	
FTT5G (NPV-5Y)	1.256	1.030	
FTTH with spare	8.510	8.513	

5G – FTTH convergence

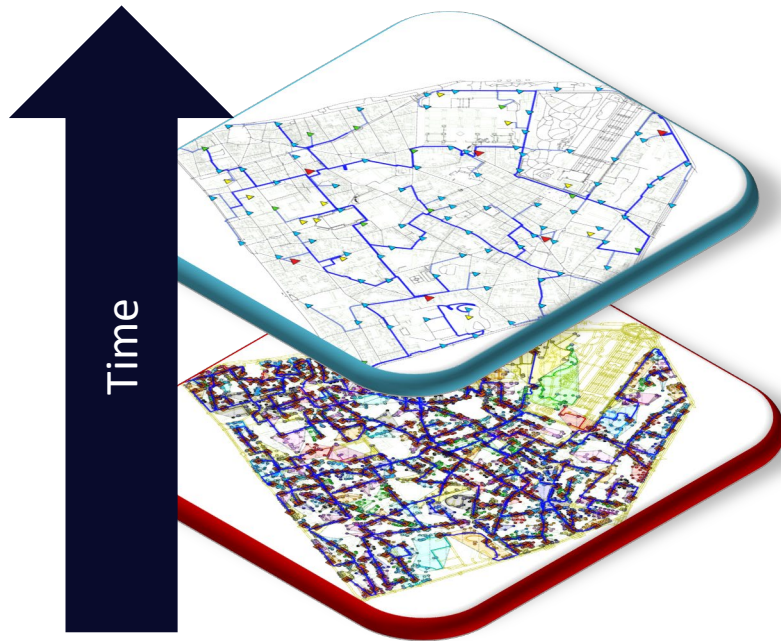
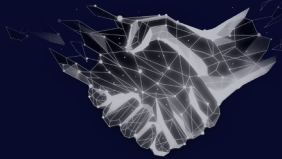
Case 3: FTTH with 24% spare, then FTT-5G



Total NPV	9.766	9.543	8.968
FTT5G (NPV-5Y)	1.256	1.030	444
FTTH with spare	8.510	8.513	8.524
	0% Spare (kEUR)	12% Spare (kEUR)	24% Spare (kEUR)

5G – FTTH convergence

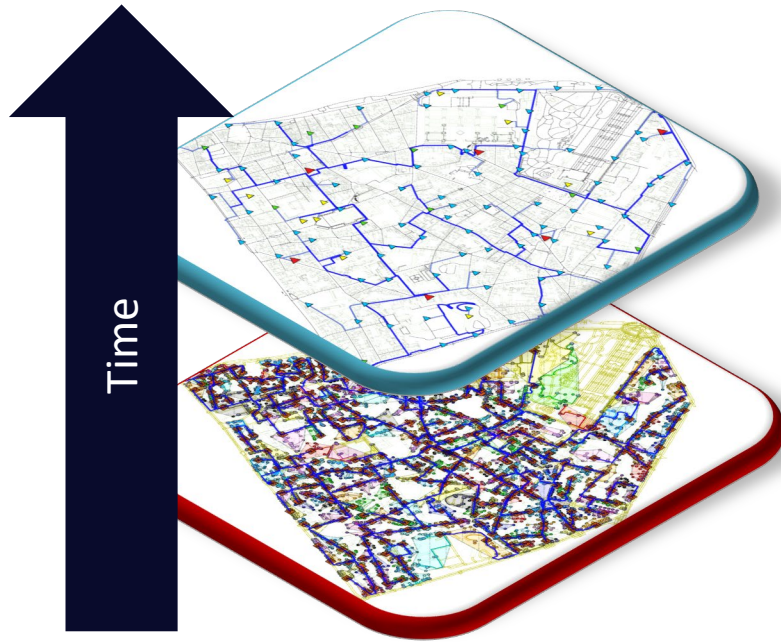
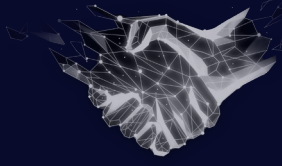
Case 4: FTTH with 48% spare, then FTT-5G



	0% Spare (kEUR)	12% Spare (kEUR)	24% Spare (kEUR)	48% Spare (kEUR)
Total NPV	9.766	9.543	8.968	8.915
FTT5G (NPV-5Y)	1.256	1.030	444	372
FTTH with spare	8.510	8.513	8.524	8.543

5G – FTTH convergence

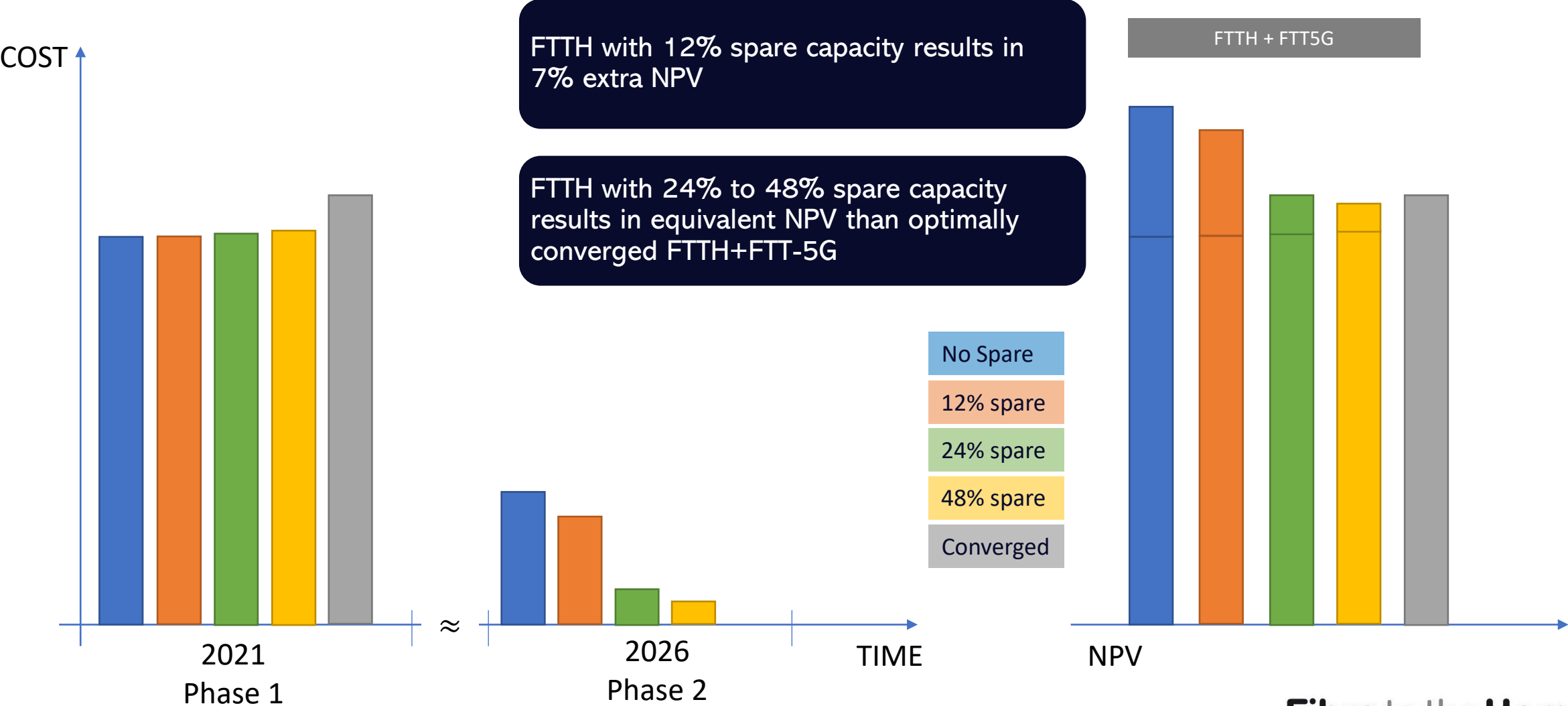
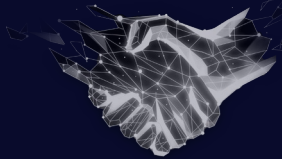
Case 5: Optimally Converged FTTH/FTT-5G network



	0% Spare (kEUR)	12% Spare (kEUR)	24% Spare (kEUR)	48% Spare (kEUR)	Optimally Converged (kEUR)
Total NPV	9.766	9.543	8.968	8.915	8.991
FTT5G (NPV-5Y)	1.256	1.030	444	372	0
FTTH with spare	8.510	8.513	8.524	8.543	8.991

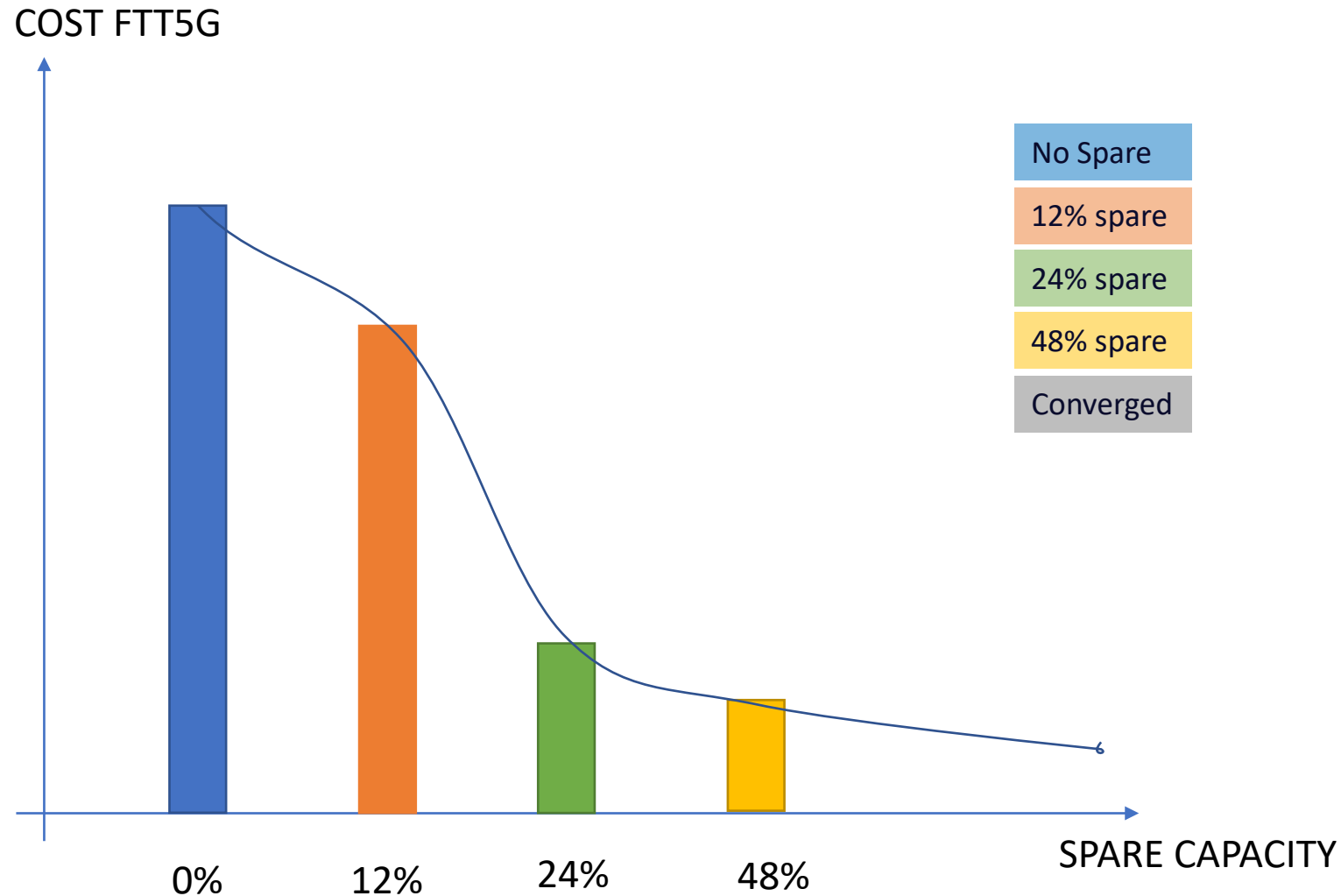
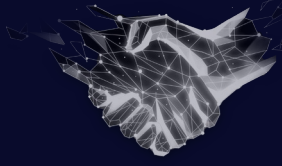
5G – FTTH convergence

Results Phased rollouts



5G – FTTH convergence

Results Phased rollouts



Conclusions



Key findings

Deploying FTTH today should include enough spare capacity for future 5G applications

Deploying FTTH today with limited spare capacity will result in significant additional costs for future 5G

If 5G needs are not yet known, a flexible 5G ready network based on sufficient spare capacity can be built that will not cost more than the ideal case

Numbers from use case

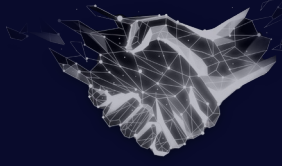
The extra costs for the necessary spare capacity in FTTH is limited (less than 1%)

The cost of FTT5G when build on top of an FTTH network with limited or no spare capacity, is 2 to 3,5 times more expensive than with sufficient spare

The total NPV with sufficient spare capacity is similar to the ideal converged network cost

Thanks to the 5G working group 2020 Within the D&O Committee

Rudy Musschebroeck (Commscope)
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Barbara Tonarelli (Adtran)
Tom Bambury (Fujikura)
Michael Timmers (Nokia)
Raf Meersman (Comsof)



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Thank you for your attention!

**Raf Meersman, CEO Comsof
Board Member, FTTH Council Europe**
raf.meersman@comsof.com



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