5G and FTTH: The Value of Convergence
Raf Meersman, CEO Comsof
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FTTH Conference 2019, Amsterdam
5G is a Hype
5G ≠ 4G

Current Study:
Sub-6Ghz (3.5Ghz)
Mmwave (26Ghz)

5G proposed
6GHz 24GHz 100GHz

5G mmWave
(e.g. 24.25-27.5 GHz, 27.5-29.5 GHz)

Future Networks:
60Ghz?
6G? 10G?

* Source: Qualcomm
Impact of frequency on coverage

* Source: Siradel
5G and Fibre

A game changer, where wireless can no longer exist without wireline

- **High BW**
  - Wireless
  - Backhaul

- **Low Latency**
  - Autonomous driving, games
  - C-RAN/FRonthaul

- **Lower Reach**
  - Higher Frequency
  - Small Cells

Densification

Fibre

Convergence

= FTT-5G
<table>
<thead>
<tr>
<th>Objectives of our FCGA Study</th>
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<tbody>
<tr>
<td>Convergence Between Fibre for 5G and FTTH</td>
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<tr>
<td>Range of Savings</td>
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<tr>
<td>Urban vs Rural</td>
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<td>Impact of Assumptions</td>
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<td>Timing aspects</td>
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</tbody>
</table>
36 Scenarios

Area Density
- Urban (High Dense - City Centre)
- Suburban (Medium Dense - Residential)
- Rural (Low Density - Village)

Cell Density
- Conservative (eg. 3.5 Ghz)
- Medium (Mix)
- High (eg. 26 Ghz)

Fibre Count
- High Fiber Count
- Low Fiber Count

Cable Deployment
- Underground
- Overhead

Timing
- separate FTTH and FTT5G
- A fully converged FTTH+FTT5G

Fibre to the Home Council Europe
Today: focus on 9 scenarios

- Area Density
  - Urban (High Dense - City Centre)
  - Suburban (Medium Dense - Residential)
  - Rural (Low Density - Village)

- Cell Density
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- Fibre Count
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- Cable Deployment
  - Underground
  - Overhead

- Timing
  - Separate FTTH and FTT5G
  - A fully converged FTTH+FTT5G
3 Areas

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
Cell Density – Example on City Centre

Current Macro Sites (6)
Cell Density – Stage 1: 5G from Macro Sites (3,5 Ghz)
Cell Density – Stage 2: 5G Small Cells (3.5 Ghz)

- Macro Sites at 3.5 Ghz (6)
- Small Cells at 3.5 Ghz (11)
Cell Density

Source: Siradel (Volcano Model)
Cell Density – Stage 3: 5G Hotspots (26Ghz)

- Macro Sites at 3.5 Ghz (6)
- Small Cells at 3.5 Ghz (11)
- Indoor Hotspots (13)

Low Cell Densification
Cell Density – Stage 4: 5G Small Cells (26Ghz – 50% coverage)

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

6 x 10 = 59
Cell Density – Stage 5: 5G Small Cells (26Ghz – 95% coverage)

Source: Siradel (Volcano Model)
Cell Density – Stage 5: 5G Small Cells (26Ghz – 95% coverage)

- Macro Sites at 3.5 Ghz (6)
- Small Cells at 3.5 Ghz (11)
- Indoor Hotspots (13)
- Small Cells at 26 Ghz (11+87)

6 x20 117

High Cell Densification
Cell Density – FTT-5G

Low Density (30)

High Density (117)

Source: Comsof (Comsof Fiber)
Convergence

Fiber cable
- Homes on FTTH
- 5G Small Cells

Source: Comsof (Comsof Fiber)
## Costs

<table>
<thead>
<tr>
<th>INCLUDED</th>
<th>EXCLUDED</th>
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<tbody>
<tr>
<td>• OSP Fiber Network</td>
<td>• Fiber Active Equipment</td>
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<tr>
<td>• Trenching</td>
<td>• 5G Active Equipment</td>
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<tr>
<td>• Ducts</td>
<td>• 5G Site Acquisition</td>
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<tr>
<td>• Cables</td>
<td>• 5G Spectrum</td>
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<td>• Closures</td>
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<td>• Poles</td>
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<td>• ISP Central Office</td>
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<td>• ODF</td>
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<td>• Racks</td>
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</table>
### Example result (conceptual)

<table>
<thead>
<tr>
<th>Cost FTTH</th>
<th>Cost FTTAll converged</th>
<th>Value of convergence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Extra FTTH investment to be 5G ready</td>
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</tbody>
</table>

Value of convergence

\[
\text{Percentage of the FTT5G cost that could be saved through convergence} = \frac{\text{Extra FTTH investment to be 5G ready}}{\text{Cost FTT5G}}
\]

Extra Investment on top of FTTH to make it 5G ready

\[
\text{Extra FTTH investment to be 5G ready} = \frac{\text{Extra FTTH investment to be 5G ready}}{\text{Cost FTTH}}
\]
65% to 96% of FTT5G cost can be eliminated
Between 0.5% and 7% of extra investment on top of FTTH needed

- 19% of respondents chose this option.
- 26% of respondents chose the option for 12%.
- 11% of respondents chose the option for 16%.
- 16% of respondents chose the option for 20%.
- 7% of respondents chose the option for 24%.
- 6% of respondents chose the option for 28%.
- 7% of respondents chose the option for 32% or more.

Poll is full and no longer accepting responses.
## Results

<table>
<thead>
<tr>
<th></th>
<th>High Dense Cells</th>
<th>Medium Dense Cells</th>
<th>Low Dense Cells</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Dense Area</td>
<td>74% -- 5,6%</td>
<td>75% -- 3,8%</td>
<td>96% -- 0,4%</td>
</tr>
<tr>
<td>Medium Dense Area</td>
<td>75% -- 7,2%</td>
<td>83% -- 3,2%</td>
<td>93% -- 0,8%</td>
</tr>
<tr>
<td>Low Dense Area</td>
<td>65% -- 6,6%</td>
<td>81% -- 2,7%</td>
<td>85% -- 1,9%</td>
</tr>
</tbody>
</table>

% of FTT5G saved by convergence -- % of extra investment to make FTTH 5G-ready
Between 65% and 96% of Fibre costs for 5G xHaul can be eliminated by rolling out an optimised and future proof converged fibre network.
In some cases the cost for fibre to 5G can be virtually eliminated which can potentially decrease the total cost of 5G by order of 50%
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?
Thank you!

Questions?

This study was realized with valuable contributions from all FTTH Council organisations worldwide.

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Thank you for your attention!
Stay tuned for more details about the study via www.ftthcouncil.eu