

The economics of small cells and Wi-Fi offload

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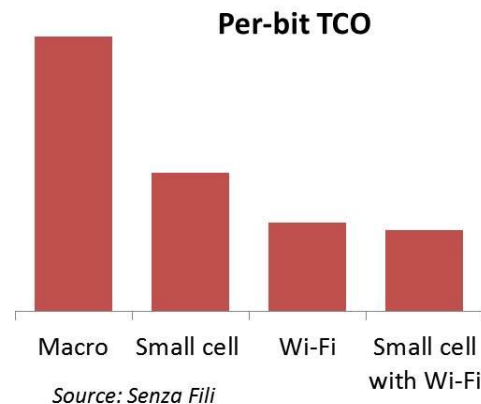


Small cells and Wi-Fi are both crucial to expand the capacity of mobile networks in high-traffic areas. To meet their capacity targets, mobile operators cannot only rely on new spectrum or new technology. They will help, but they are not sufficient. And it is becoming increasingly difficult to increase the density of macro cells.

Yet it is still unclear how small cells and Wi-Fi will coexist in the cellular sublayer and how their economics compare. The business case for small cells and Wi-Fi can be challenging as operators have to deploy and operate a much denser, closer to the ground network infrastructure that they are used to – and they are finding out that it can be an expensive proposition.

Our new report looks at the business case for different sublayer options: LTE, 3G, Wi-Fi and any of their combination. It looks at the total cost of ownership (TCO) and per-bit TCO to compare small cell and Wi-Fi costs to macro cell costs, and across different small cell configurations, from basic single-sector small cells, to multiple-sector, multiple-interface small cells with embedded Wi-Fi.

Our per-bit TCO analysis demonstrates that adding Wi-Fi and multiple interfaces substantially strengthen the business case. In addition, deploying both cellular and Wi-Fi in the same small cell enclosure may translate in faster deployments and fewer locations to manage.



Questions addressed in the report

- Where will the capacity injection in mobile networks come from?
- How small cells and Wi-Fi complement each other? How does their contribution to wireless capacity differ?
- What are the benefits and disadvantages of adding Wi-Fi to small cells – or to add small cells to the existing Wi-Fi footprint?
- What are the advantages of integrating Wi-Fi in the mobile network?
- How does the TCO compare for macro cells, small cells and Wi-Fi? How does the TCO change with the addition of more sectors and interfaces (LTE, 3G and Wi-Fi) to small cells?
- What is the capacity contribution that small cells and Wi-Fi bring to the macro layer, as their density increases?
- How does the per-bit TCO compare for macro cells, small cells and Wi-Fi? And do the per-bit costs vary with different small-cell configurations?

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Main findings

- TCO for small cells and Wi-Fi ranges from 10% to 25% of the TCO for a macro cell, depending on the configuration of the small cell.
- Because opex plays a much larger role than capex in the small-cell business case, configurations that reduce opex – such as multi-sector and multi-interface small cells – lead to a more robust business case. The low marginal cost makes adding Wi-Fi, 3G or additional sectors to an LTE small cell an attractive proposition that reduces the number of sites a network operator must manage and increases capacity more rapidly.
- Even at low densities, LTE small cells and Wi-Fi quickly take on a dominant role, relative to macro cells, in transporting mobile traffic.
- Small cells and Wi-Fi enable operators to slash per-bit TCO by at least half. By combining cellular and Wi-Fi, operators can cut the per-bit TCO to a third of the TCO of macro cells.

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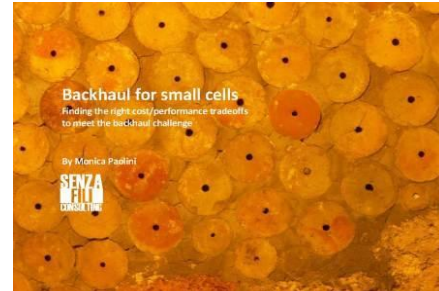
Findings: two (or three) is better than one **Synergies among LTE, 3G and Wi-Fi strengthen small-cell business case**

Acronyms

Another Senza Fili report on small cells

Backhaul for small cells

Finding the right cost/performance tradeoffs to meet the backhaul challenge



Backhaul is crucial to the small-cell business case. Without high-capacity, ultra-compact, low-cost backhaul, the small-cell market will struggle to grow.

Backhaul for small cells requires more than just re-purposing existing backhaul solutions. This is a new market for backhaul vendors – a big opportunity but also a big challenge as they strive to meet a very different set of requirements from what they are used to in the macro-cellular environment. New products are not only required to be smaller and cheaper, but they have to operate in more challenging RF environments.

No single solution will suffice. A combination of fiber, line-of-sight (LOS) and non LOS (NLOS) will be necessary to build the new layer of backhaul infrastructure. Multiple options are available or under development, and they will have to coexist within the same deployment.

Mobile operators and vendors are both confronting these questions. No final verdict is available, but after an extensive interviews and a financial modeling exercise, we have identified a few important emerging trends that are shaping mobile operators' requirements and vendors' roadmaps.

The report presents what we found out in this process. It includes an in-depth overview of the market based on interviews with operators and vendors, and a financial assessment of the business case.

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