

# Business Case for Wireless Broadband Access



Leveraging patented Smart Wi-Fi technology that delivers unprecedented reliability within the unlicensed spectrum, the new Ruckus WBA solution delivers operators dramatic coverage and capacity benefits over other broadband wireless alternatives.

The model described in this note, demonstrates how leveraging Smart Wi-Fi, operators can cover a square kilometer at one fifth of the cost of a WiMAX alternative (WiMAX is used as an example for a 4G broadband technology).

Then, when taking capacity into consideration, Smart Wi-Fi delivers 30x reduction in the cost to deliver one megabit-per-second of capacity.

The model focuses on the CapEx cost of infrastructure equipment and deployment for a square kilometer. Spectrum costs and the availability of cost-effective CPEs make the real-life difference between Wi-Fi and other wireless broadband alternative much higher.

## Model Assumptions and Methodology: WiMAX

For the purpose of this model we assumed a WiMAX base station includes 3 sectors in addition to antennas. Backhaul options vary and were assumed to be \$5,000 per base station. In addition, the cost of a base station deployment, also includes installation labor cost (licensed-spectrum equipment typically requires specialized and expensive labor even in emerging countries).

For a typical one-square kilometer, focusing on coverage, and assuming an urban environment and typical penetration, WiMAX range was assumed to be 250 meters. Based on that we assumed 5 base station in a square kilometer.

For capacity, we assumed a 20MHz spectrum with 2Mbps spectral efficiency resulting in 40Mbps throughput per sector (120Mbps per base station). These numbers are inline with existing industry deployments that estimate the capacity at 30-50Mbps per sector.

## Model Assumptions and Methodology: Wi-Fi

For the purpose of this model we assumed a Wi-Fi node is an outdoor 802.11n Access Point. Wi-Fi installation labor cost tends to be much lower — small cell sizes, inherent 802.11 mechanisms dealing with interference in the unlicensed spectrum, and SmartWiFi's RF adaptiveness and interference mitigation techniques, allow unskilled labor to be used to mount APs on rooftops and other available locations. We assumed \$50 labor cost per AP which is very conservative in emerging countries.

For a typical one-square kilometer, and assuming an urban environment and typical penetration, Wi-Fi range was assumed to be 90 meters — a conservative number based on real-life deployments. Based on that, we assumed 41 APs in a square kilometer. When focusing on coverage, a single 802.11n backhaul can be shared across eight APs in our model.

For capacity, we assumed each AP will have its own backhaul, providing real-life throughput of 180Mbps.

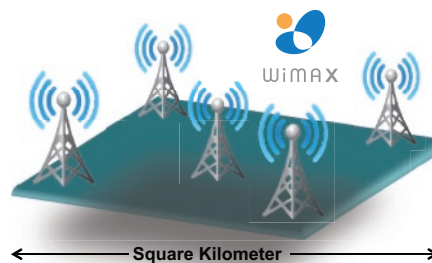
## Other Model Assumptions

All product prices are estimated based on MSRP. We expect volume pricing to be lower irrespectively of the technology.

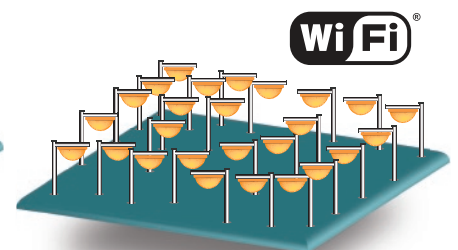
We assumed a typical user, using broadband for data consumes 50kbps on average. When streaming is used the per-user bandwidth consumption climbs to 500kbps.

## Comparing CAPEX (for coverage and capacity)

Business model assumptions for wirelessly outfitting one square kilometer.



Five WiMAX base stations for a square kilometer at a total cost of \$485,000



41 802.11n APs for a square kilometer at a total cost of \$96,700

# Business Case for Wi-Fi Broadband Access

| <b>Wi-Fi vs. WiMAX<br/>Deployment Cost Comparison</b>  |                  |                           |
|--|------------------|---------------------------|
| <b>SITE COSTS</b>                                      | <b>WiMAX</b>     | <b>Ruckus Smart Wi-Fi</b> |
| Base station, per sector                               | 25,000           | 2,000                     |
| Sectors per site                                       | 3                | 1                         |
| Total base station                                     | 75,000           | 2,000                     |
| Antennas (6 for WiMax)                                 | 6,000            | N/A                       |
| Backhaul equipment (coverage) + other site electronics | 5,000            | 300                       |
| Backhaul equipment (capacity) + other site electronics | 5,000            | 2,400                     |
| Site acquisition and installation costs                | 5,000            | 50                        |
| Total CAPEX per site (coverage)                        | 91,000           | 2,350                     |
| Total CAPEX per site (capacity)                        | 91,000           | 4,450                     |
| Capacity per site, Mbps                                | 120              | 180                       |
| WiMAX  |                  |                           |
| spectrum allocation                                    | 20 MHz (TDD)     |                           |
| spectral efficiency                                    | 2.0 Mbps/MHz     |                           |
| capacity per sector                                    | 40 Mbps          |                           |
| capacity per site                                      | 120 Mbps         |                           |
| <b>COVERAGE</b> (Coverage per site at 2.3 and 2.4 GHz) | <b>WiMAX</b>     | <b>Ruckus Smart Wi-Fi</b> |
| Typical range in urban setting, m                      | 250              | 90                        |
| KM <sup>2</sup> per site                               | 0.2              | 0.024                     |
| Nodes per KM <sup>2</sup>                              | 5                | 41                        |
| <b>CAPEX \$ per KM<sup>2</sup> (2.3 GHz WiMAX)</b>     | <b>\$485,500</b> | <b>\$96,700</b>           |
|  | 5x Ruckus        |                           |
| <b>CAPACITY</b>  | <b>WiMAX</b>     | <b>Ruckus Smart Wi-Fi</b> |
| Data   | 50 kbps          |                           |
| Streaming  | 500 kbps         |                           |
| <b>CAPEX \$ per Mbps</b>                               | <b>\$758</b>     | <b>\$25</b>               |
|  | 30x Ruckus       |                           |
| <b>CAPEX \$ per User</b>                               |                  |                           |
| Data   | \$38             | \$1.24                    |
| Streaming  | \$379            | \$12                      |
|  | 30x Ruckus       |                           |

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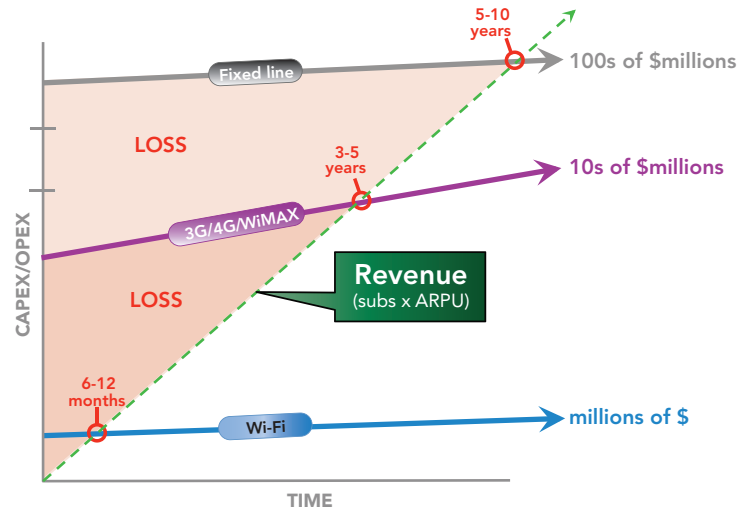
## Summary

A typical broadband deployment starts with a focus on coverage (home-passed). In this case, a WiMAX solution will mount to \$485,300, while Wi-Fi provides the same coverage for \$96,700 one fifth of the cost! Combined with saving the need to pay for licensed spectrum, Wi-Fi presents an attractive option for an operator to reduce the need to raise capital and reach profitability in a matter of months instead of years.

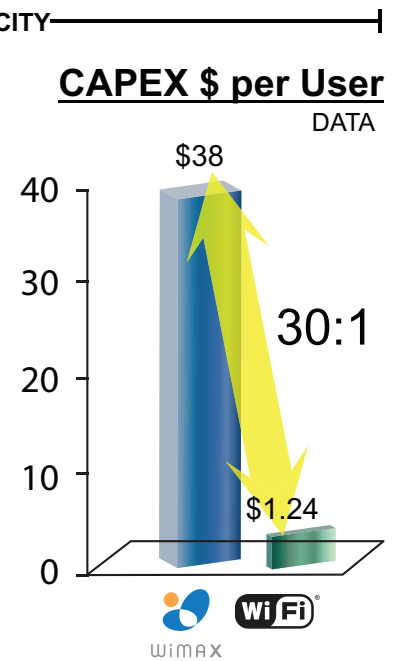
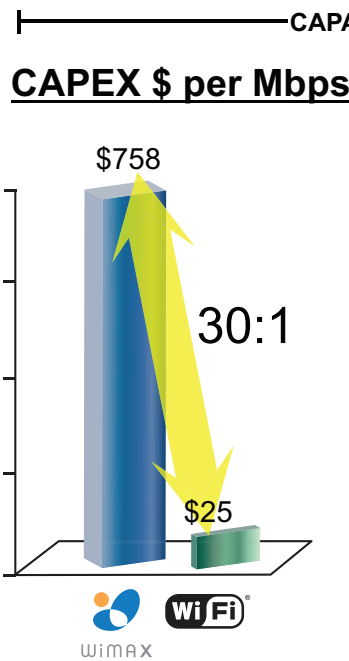
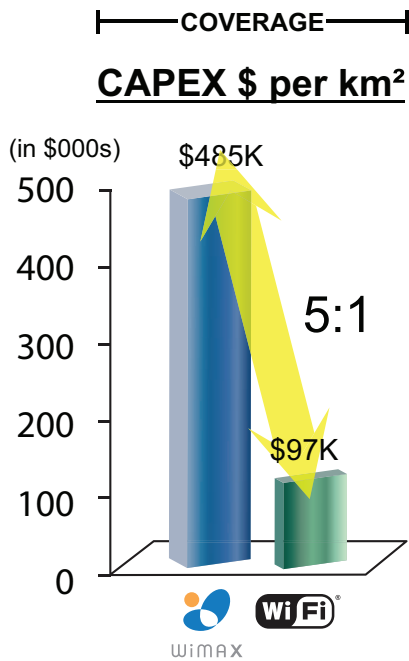
As operators scale and require more capacity, the difference becomes much higher. The cost of delivering 1Mbps of throughput in the WiMAX case is \$758, while Wi-Fi can deliver the same capacity at \$25 — savings of 30x! Another way to look at this data is to consider CapEx per user — for both data (\$38/user vs. \$1.24/user) and streaming (\$379/user vs. \$12/user), Wi-Fi savings amount to 30x.

## The Cost of Today's Broadband Options

With Smart Wi-Fi Operators Reach Profitability in Months, not Years



## More Coverage/Capacity at Lower Cost



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