ALTAI
Super WiFi

# THE HIGH USER CAPACITY OF THE ALTAI A8N SUPER WIFI BASE STATION

# WHITE PAPER

Altai uses two different technologies concurrently, namely the smart antenna technologies and the AirFi technology, to increase its WiFi base station capacity by a factor of 10. Further, the smart antenna technologies also provide better interference mitigation which in return will further enhance the user capacity. This white paper will explain in more detail on the technologies.

# 1. Executive Summary

Altai uses two different technologies concurrently, increasing its WiFi base station capacity by a factor of 10:

- **Altai's patented smart antenna technologies**
  Higher antenna diversity supports stronger the signal strength and hence throughput at distance, improving the median throughput by a factor of 5

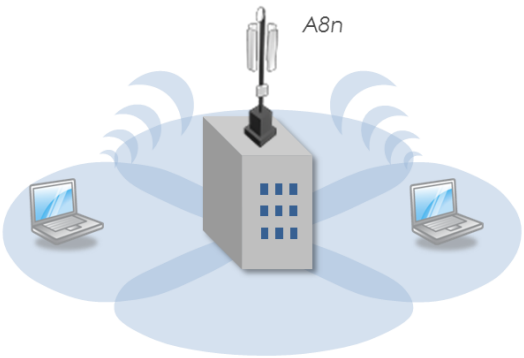
- **Altai's AirFi technology**
  A throughput optimization algorithm implemented at the WiFi layer, increasing its average efficiency and capacity by a factor of 2 and more

The smart antenna technologies also provide better interference mitigation which in return will further enhance the user capacity.

# 2. Smart Antenna Technologies

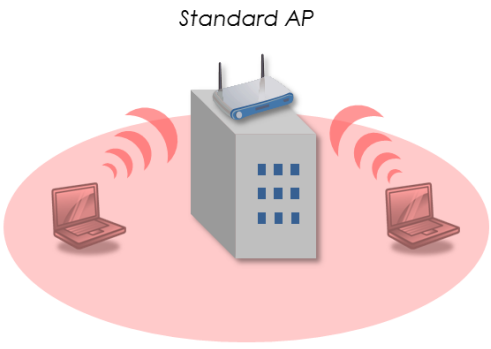
One of the important benefits of using multiple antennas with independent, coordinated radios is to minimize the harmful effects due to packet collisions from hidden nodes, as explained in the figure. Packet collisions from hidden nodes happen very often in NLOS environments. For instance, when two hidden clients send signals to an A8n at the same time but from different directions, the A8n can receive both signals using multiple antennas and radios, and therefore both signals can be processed without collision. In this way, the lost packets and transmission retries are substantially minimized, meaning more time slots are reserved for other clients or additional packets. This is a key reason why the A8n can handle five times the median user throughput of a standard AP. Each A8n typically supports 80 concurrent users and up to a maximum of 256 users.

*Signals from hidden clients can be received by different antenna sectors simultaneously without collision*




*Multiple-radio/sector coverage*

*Signals from hidden clients will be collided and have to be resent resulting in lower active user capacity*

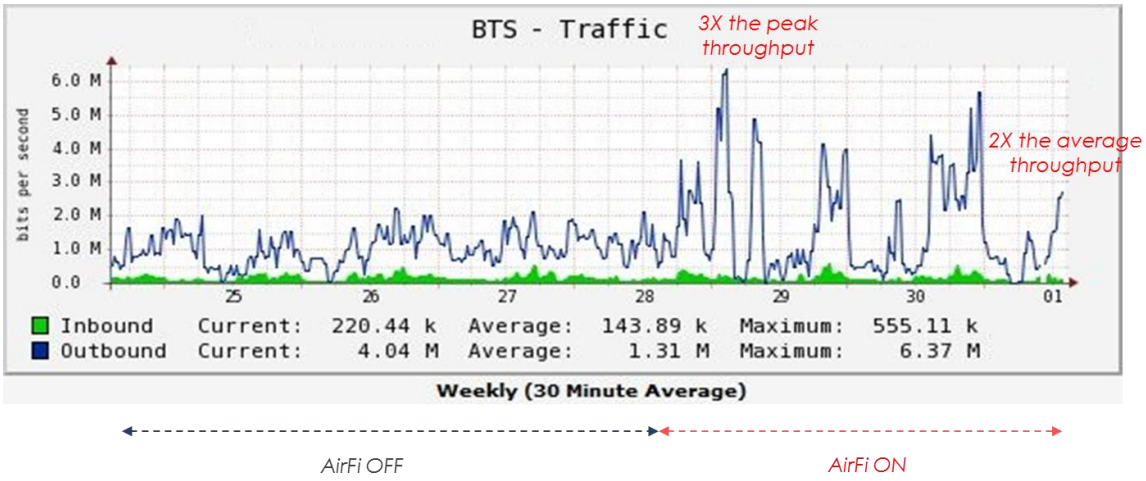



*Single-radio coverage*

## 3. The AirFi Technology

The Altai AirFi technology is the latest advanced software control wireless algorithm developed by Altai for optimizing network throughput capacity performance. Using the Altai AirFi control algorithm can optimize the wireless bandwidth for the high speed clients as well as the low speed clients, and as a result the system throughput can be improved substantially. From our field test results and customer's traffic report shown below, averages of 3 times the client throughput and 2 times the system throughput were found!

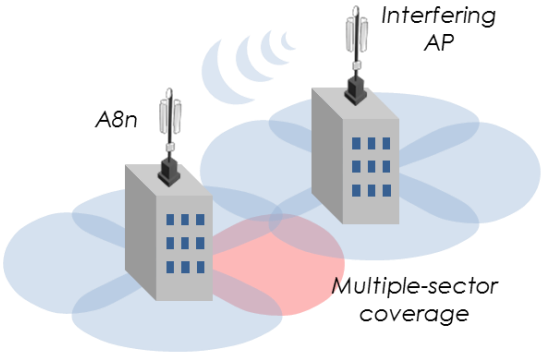
The Altai AirFi control algorithm *automatically* calculates how much bandwidth it is assigning for each and all clients such that it significantly improves the high speed clients throughput and user experience. It also allows the administrator to set different target levels, to find the best settings to suit their particular scenario.



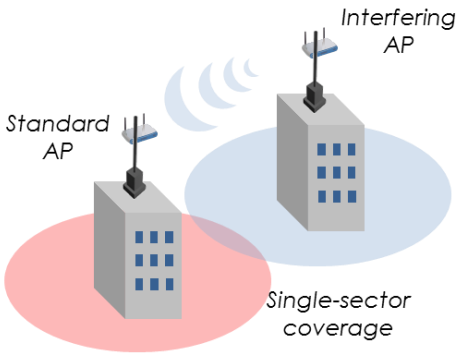

## 4. Interference Mitigation Technology

Another important aspect of improving the user capacity is reducing the effects of co-channel interference. As is well known, in WiFi there are only three non-overlapping channels in the 2.4GHz spectrum and it is highly likely that there will be other users sharing the same channel. Therefore, there is a reasonable probability that there will be other users transmitting on the same channel which will cause interference and reduce capacity. With a standard AP this will affect its reception for the entire cell, but with the A8n only the relevant direction of the interfering source will be affected.

*When the base station is interfered by adjacent site, only one sector affected and other sectors can still work properly*




*When the AP is interfered by adjacent site, the whole omni sector is affected*

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