



*Thinking outside the sphere*

# Memorandum on New Report from Applicant

March 13, 2014

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To Acton Planning Board

From David Maxson, WCP

Re SBA Application, 5 Craig Road

I have reviewed the report provided by the applicant and authored by C Squared Systems dated March 7, 2014 ("C Squared Report" or "Report"). The C Squared Report confirms my findings regarding the flaws in the AT&T drive test and the flaws in the original data provided to me by the applicant regarding existing coverage. In short, one sector of the network was not on line the day of the drive test, and three sectors of the network were incorrectly described by the applicant to Isotrope. Consequently, Isotrope spent considerable effort parsing the data, and once the inconsistencies with Isotrope analysis were identified, Isotrope conducted further forensic work to determine that it was flawed data from AT&T that was a significant cause of the discrepancies.

Based on the foregoing, it must be clear that we spent considerable time on analyzing the application; time that would not have had to have been spent if the initial information provided by the applicant were not so flawed.

## **Drive Test Data Still Useful, but Was a Distraction**

The C Squared Report downplays the lack of drive test data on the Beta Sector of the Post Office Square facility because that sector "does not reach Route 2 or the areas of Acton defined by the targeted coverage area." While this statement is essentially correct, it does not diminish the time spent by Isotrope and the Board in dealing with it, and it is important nevertheless to recognize that the coverage of this sector is pertinent since it borders the Route 2 area. Isotrope and C Squared Systems both compensated for the loss of the drive test data on this

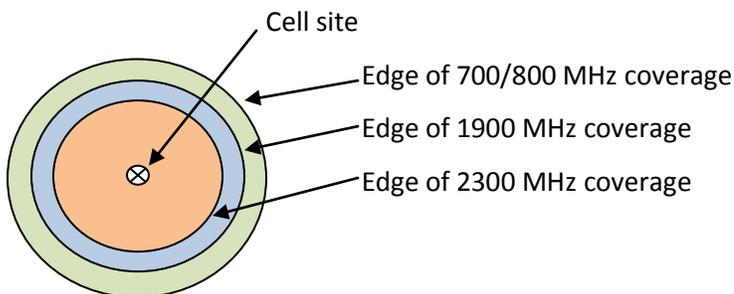


sector by verifying our coverage models with the sector “turned off” on our computer models. While not ideal, this allowed Isotrope to confirm the reliability of Isotrope’s computer model.

## Exclusively 1900 MHz Consideration

The C Squared Report confines its coverage analysis to the 1900 MHz PCS spectrum, as the applicant has done from the start. It acknowledges that AT&T first expanded 3G telephone & data service from the cellular to the PCS band “as an overlay platform to address the ongoing network capacity issues in the market.” The C Squared report also emphasizes purported “gaps that will exist when they (AT&T) deploy their 4G LTE service at 1900, 2150, and 2300 MHz bands.” Meanwhile, the Report acknowledges AT&T deployment of 4G LTE in the lower 700 MHz band, whose coverage is typically broader than that of the higher frequencies (assuming all other things being equal).

The applicant therefore continues to rely on the least effective portion of its radio spectrum (above 1900 MHz) as the reference for whether a significant gap in AT&T service exists. If the Board were to accept the claims that there are substantial gaps in the 1900 MHz band coverage, the “overlay” concept deserves some further exposition. It is a given that the coverage, through general land cover such as foliage, decreases as the frequency bands increase. The way wireless companies utilize the “overlay” model adapts to these coverage differences. In the literature there is a widely discussed concept of the “edge” of wireless coverage from a given cell site sector. Consider the following simplification of coverage overlay:



Assuming an even distribution of population (as part of the simplification), there would be less population in the edges than in the core when the area of the edge rings is smaller than the area



of the core. All three frequency bands serve the core. At the first (inner) edge, where the very high band (2300 MHz) falls off, wireless traffic is given preference to the 1900 MHz and 700/800 MHz bands. At the outer edge, wireless traffic receives preference for the 700/800 MHz band. This kind of preference loading is a component of the capacity planning of multiband wireless networks. Utilization of the various frequency bands is coordinated by the wireless network.

Despite repeated requests, the applicant declines to provide coverage modeling or drive test data (already collected) on the lower frequency bands.

## **Population**

The C Squared Report provides no residential population counts. We previously reported on population estimates of our own and of AT&T in the original analysis. There is no new information that would prompt Isotrope to revise its population estimates.

## **Vehicular Traffic**

The C Squared Report asserts that there is “heavy commuter traffic” on Route 2. The C Squared Report provides a prediction of the existing AT&T coverage for its 3G 1900 MHz subsystem in Exhibit 3.<sup>1</sup> A ¼ section of Route 2 in Acton and one of School Street are depicted as having 3G 1900 MHz service above the AT&T -82 dBm in-vehicle threshold. The addition of the proposed facility (Exhibit 4) adds about ½ mile of above -82 dBm coverage on Route 2 to the existing coverage. This level of coverage on School Street is increased perhaps by ¼ mile. No proposed in-building/in-vehicle service is depicted as reaching Hosmer Street, Foster St, Laws Brook Road, the connecting portion of School Street, and all but the terminus of Russell Road.

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<sup>1</sup> Without passing judgment on the accuracy of the C Squared Report’s findings, in this section we discuss the coverage maps to explain what the Report is depicting.



## LTE 1900 MHz Submittal

The C Squared Report does not present the signal strength threshold it chose in its best server maps (exhibits 5 & 6) than in the other maps. When presenting the best server, one signal strength threshold is chosen. The colors are used to identify which cell site sector delivers the best signal at each location (within the chosen threshold).

A point-for-point comparison between the existing 3G coverage on Exhibit 3 and the coverage on Exhibit 5 reveals mostly a perfect match at the 3G -92 dBm coverage, except from the Annursnac facility. Why Annursnac coverage differs between Exhibits 3 & 5 while the others substantially do not is unexplained. The Exhibit 5 map is not specifically labeled as an LTE analysis, but its mate, Exhibit 6 is, so we assume both are intended to represent LTE 1900 MHz coverage.

The Report indicates the Annursnac Hill sector facing Route 2 in Acton is overloaded at peak times and provides traffic counts that illustrate the roads where the commuters rely on this sector (Route 2, Great Road, Commonwealth Avenue). The proposed facility, in this scenario, would relieve Annursnac Hill facility demand along about ½ mile of Route 2 in Acton, according to a comparison of Exhibits 5 and 6.

The Exhibit 4G 1900 MHz “best server” on the westerly facing sector of the proposed facility is shown to extend across Russell Road and Hosmer Street into the Brucewood Road area. This is in contrast with the Report’s prediction that in-vehicle coverage at 3G 1900 MHz would not even reach Russell Road. The same is true in the other sectors of the proposed facility on Exhibit 6.

Assuming, for discussion purposes, the best server threshold is reasonably presented for in-vehicle coverage, Exhibit 5 shows there is substantial existing coverage on Route 2 and School Street in the vicinity of the proposed facility. This existing 4G 1900 MHz coverage comes from Annursnac Hill. Consequently, there is significant overlap between the coverage of the proposed Alpha sector with the existing coverage from Annursnac Hill. This implies that a



facility located farther west along Route 2 would provide more improvement to the Route 2 coverage, while also offering to offload Acton traffic from Annursnac Hill.

Also, under the foregoing assumption about the chosen coverage threshold, Exhibits 4 and 5 suggest that even at 1900 MHz, the existing and predicted 4G LTE coverage is greater than the 3G coverage. This best server information on the 4G LTE coverage provides no new information that would prompt Isotrope to revise conclusions about current availability of AT&T LTE service or the population that would be served by the proposed facility. The only new disclosure is the suggestion that the proposed facility would relieve peak traffic demands on the Annursnac beta sector – to what extent is not indicated.

The discussion of “offloading” for the 3G service (in contrast to the 4G analysis above) would differ due to the fact that there is reportedly less existing 3G coverage in Acton than LTE coverage, so the benefits of offloading Annursnac in Acton, if any, diminish.

### **Coverage and Capacity on the Record**

A key measure of actual network performance is in field testing. The C Squared Report makes no comment on the field tests performed by Isotrope and independently by a resident. There is no new information that would prompt Isotrope to reconsider these field tests. If the reported need for relieving Annursnac of peak wireless traffic is an alternative rationale for there being a “gap” in service, the evidence is presently based on an assertion by the new C Squared Report that was not stated originally by AT&T and is not backed up by any quantitative assessment of the problem or the proposed solution.