



Savitar Research Group

5 Oversights an Indian operator can make in 3G deployments

A Savitar brief

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5 Oversights an Indian operator can make in 3G deployments

"More Bars in More Places" was the old AT&T slogan. That was all before iPhone and 3G experience. Their expertise in 2.5G turned in to nothing as they struggled like novices on 3G. No operator wants to relive AT&T's experience. One speaker at a recently concluded 3G conference, in Mumbai, proclaimed confidently that we have learnt from other 3G deployments. We will not err on the same issues. But did we learn enough not to commit new mistakes?

It is imperative, however cautious in spending you might be, that 3G subs growth drivers need to be met given the current financial fundamentals of 3G business. The prime driver is "customer experience" as the killer 'app'. Most executive leaders in the aftermath of the high auction price for 3G spectrum are reconciling to the fact that break even points are stretched to 5-6 years. But they must take care not to over exercise caution in spending. And there is not much time as another technology sweep and broadband inflection point is waiting in the wings in next five years- LTE.

Coverage and capacity planning (Business Phase: Planning, deploying)

AT&T initially planned to use their 2G EDGE cell sites to overlay 3G by sharing antennas. First realization- it is a bad idea to share antennas without studying the interference (and thereby by performance degradation), co-existence and co-location issues. Second, it is data uploads and downloads not predictable voice call patterns that you are dealing with. Greater the delivered data rate, smaller is your service radius. If you plan on indoor coverage, service radius is even smaller. So then the coverage holes- islands of data coverage that annoy customers. Subsequent to their original rollout, AT&T had to off load indoor coverage to 850MHz, upgrade to new technology, deploy new towers and then some more capacity fills to satisfy the service demand.

India operators will find it a much tougher problem with all the above factors. In our interaction with vendors who are doing 3G site feasibility studies, it is disconcerting to note that old GIS map data and RF planning methods for 2.5G are still being used. Without new buildings and structures data, data coverage maps will be erroneous.

Dynamic capacity and management (Business Phase: Planning)

Service dimensioning is very important due to limited bandwidth and spectral efficiency of deployed radio technology. 3G Operators were allocated 5MHz paired bands in 1959-1979 (downlink) and 2149-2169 (uplink). HSPA+ Release 7, for example, gives a theoretical data rate of 7.2Mbps. However, there are several operational factors to consider for dynamic capacity in meeting service demand. One, what are the service plans- data rates, application requirements on QOS and such? Two, where is the temporal and geographic location the demand is coming from? Three, the allocated spectrum is not the best range for indoor coverage.

It will quickly become apparent that it is not only the number of active users on the network but simultaneity of QOS service demand along with the signal quality that will start causing network load problems. Anecdotal evidence heard firsthand from a 4G carrier is that 5% of users, network hogs, cause RAN congestion. Another issue is the paired spectrum. It will work very well when the demand is symmetric in downlink and uplink, example as in voice, but is not efficient for data traffic that is inherently asymmetric.

India 3G operators need to strike a fine balance between customer experiences and yet optimally monetize the services in a competitive market. Adequate diligence is required from operator planning department before signing SLAs with outsourced vendor for network operations. A sure competitive edge is derived from such planning. Any lapse in planning here will only compound business outcome within a year of deployment.

Target Segments and impact on deployment planning (Business Phase: Planning)

Good market intelligence on the ground is essential to meet target subscription growth with a phased deployment plan. A parochial view that everyone competes for the same segment of customers will inevitably lead to tariff war. That will be bad for business all around and will unduly hasten industry consolidation. Since voice revenues are well pegged, innovation on service delivery and differentiation has to happen on VAS, information and content while paying attention to service dimensioning the RAN and backhaul as discussed above. Then RF planning and site locations can follow the traffic demand density pattern based on service plans and location intelligence and thereby prudently spend on CAPEX and OPEX.

It is our view that separate segment and service planning be done for urban and suburban & rural.

Traffic offloading (Business Phase: Planning)

Network architecture has to comprehend the seamless handover from WiFi hotspots, 2G and WiMAX overlays. This is also true for future micro/pico cells. This enables smooth traffic shaping and will add to the available capacity. Bad planning will result in call drops or session terminations directly impacting customer satisfaction. A wait and watch game by customers for improved service will offset adoption curve and more importantly will add to opportunity cost in time.

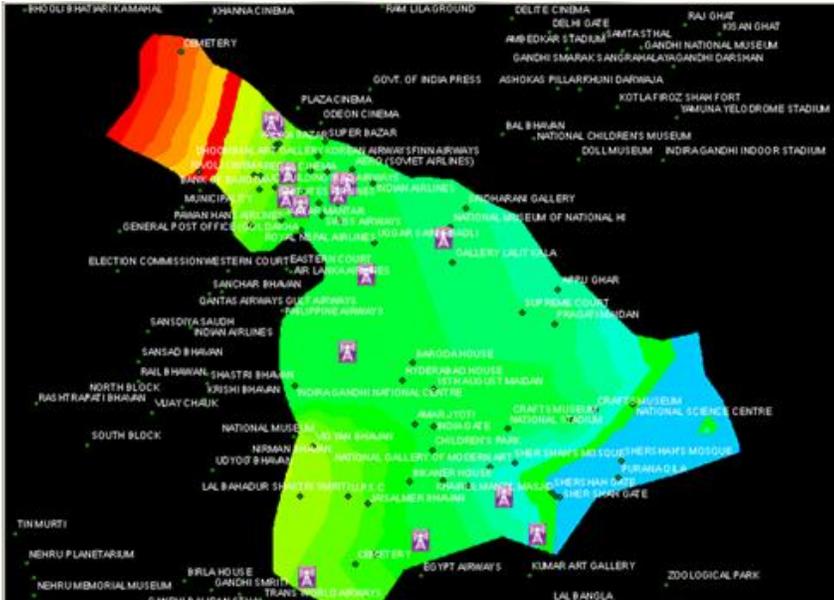
Capacity growth (Business Phase: Planning, Deployment, Operational)

Since 3G is essentially self-interference limited and add to that the paucity of bandwidth, future capacity fills like new site locations or micro/pico cell planning should be planned ahead. Planned interference where in capacity fill locations and method are pre-determined would be a wise thing to do. Such planning will mitigate much scrambling and opex spending later on in a reactive mode. It wouldn't be an overreach in a competitive market to also look ahead for feasibility of site for LTE. Besides software upgrades as the BTS vendor may have promised, LTE will require you to upgrade site electronics as performance is tied to smart antenna techniques. For a start that means, you need to pack more antennas in the given real-estate space on the tower.

As the lesson goes, AT&T didn't get it wrong in the first place. They felt they were acting with great fiscal prudence in the service rollouts given their stretched balance sheet at that point in time. Of course, latest news indicates that they have recovered smartly.

Now, India is a different ball game. It is a totally different market with different considerations. A little foresight and planning will go a long way in prevention of ills. Some among the 3G spectrum winners like Bharti Airtel, Vodafone and Aircel have experience running 3G networks elsewhere. But trust Indian consumer and market to throw in a few surprises.

Connaught Place, New Delhi- A mini case study of usability of 2G sites for 3G deployment



A mini-case study is presented to illustrate the points made in the brief. Eka platform was used to conduct the study. Figure 1 shows the existing 2G cell sites of a leading operator overlaid on a topographic map of the Connaught Place area. Some assumptions are made on tower height and other site specific details for this study.

Many marketing and technology details are not being discussed here. In general, it is assumed that the 2G cell sites are GSM. These cell sites being '3G' ready, will be upgraded to HSPA release 7. The coverage plan is outdoor

Figure 2G cell sites of a lead operator, Connaught Place and surroundings, New Delhi

pedestrian with data rates of >1Mbps.

Simply put, if you compare Figures 2 and 3, HSPA allows more information to be delivered per MHz- spectral efficiency, but causes more interference too. There will be an optimal limit on how tightly you can space the towers for blanket coverage. And conversely, if the towers are too far apart, you will create island coverage. This is what happened with AT&T initially when they over-layed 3G on 2G cell sites. With higher modulation rates you get greater capacity, but 3G coverage footprint is a fraction of 2G. Therefore, when starting from 2G cell site locations for 3G deployment, it would be prudent to note that not all 2G cell sites are optimal.

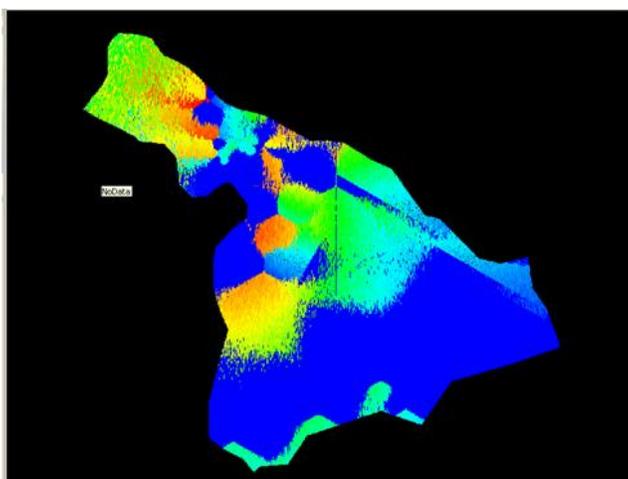


Figure GSM interference from the cell sites

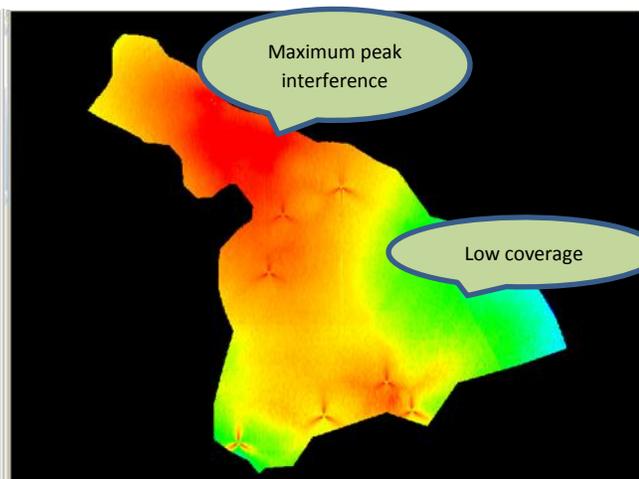
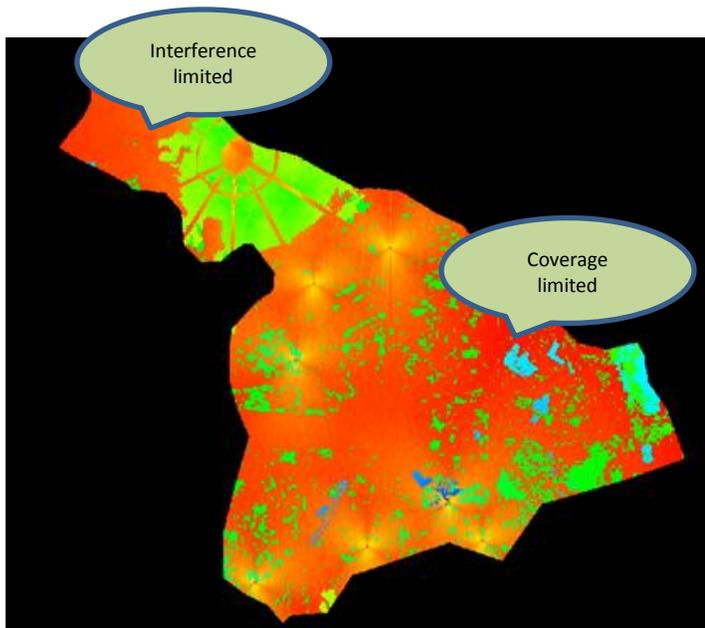


Figure HSPA interference with cell site upgrade



A stark illustration of demand versus supply is shown in figure 4. In the top left of area covered, service fulfillment is low because of interference caused by frequency re-use and tower density. Towards the far right, coverage is not there due to spacing of the towers.



Figure Data capacity deficiency in the service area

In conclusion for the mini-study, we sought illustrate some key considerations with a practical view of existing data. Since we are not privy to RF planning methods and site specifics of the lead operator, it would be wrong to interpret this data literally. The table below in Figure 5 summarizes usability of each site in terms of service fulfillment and over or under utilization of existing 2G towers.

Figure Table illustrating the performance metrics of a 2G cell site usability for 3G

Site Reuse Analysis						
Site Name	Data Capacity (Mbps)	Voice Capacity (Mbps)	Voice Coverage(Sq.Km)	Data Coverage(Sq.Km)	Coverage Service Fulfillment(%)	Capacity Service Fulfillment(%)
Cp B Block	4.35784684078693	3.8081490975099	0.359316	0.2515212	64.1400502840116	92.7891066433879
Patodi House Sch	4.18836026369079	3.74179191698313	1.166364	0.8164548	87.2055769801246	403.670310435242
Hotel Janpath	5.56849228390159	4.77497218747868	0.155232	0.1086624	69.5457754765827	27.2685367932157
Jahidabad	4.14030777860427	3.55030652508782	1.226268	0.8583876	84.6542461432303	513.668652880284
Middle Circle	4.70949278161329	4.11543850467022	0.33192	0.232344	67.8896138624452	67.4418785343281
Uni Coperate Cen	4.38423588661	3.83120943549486	0.252612	0.1768284	47.0887065259867	45.8348256277369
Firozshah Road	4.87490865072371	4.35513963386598	0.521316	0.3649212	77.3446216446807	144.505824751136
Mayapuri Industri	3.57470927870031	3.19356918757953	1.70154	1.191078	87.5286983648504	810.467677138485
Cp Naurang Hous	4.82307301885747	4.13577649910779	0.166356	0.1164492	68.1069467653378	25.9268964554753
Kaka Nagar	3.87440290224258	3.46130909234925	0.709668	0.4967676	80.0685648985811	222.511130990653
Burari Village	5.68272601869861	4.87292741103255	0.09126	0.063882	62.2059390667181	13.9996548081101
Chairmm office N	4.90171424126264	4.37908717793902	0.457488	0.3202416	93.725782414307	156.50059092247
Kaila Bhatta	4.44891196655867	3.97456326289598	0.79524	0.556668	87.5099576537671	279.526742002277
Metropolitan Mall	5.51160943202556	4.72619524359429	0.146844	0.1027908	68.0598432676324	26.3592944791217
Janpath I	4.60577524018501	4.02480386875568	0.370188	0.2591316	73.685245257053	86.8407351689175