

## Rationalising bus routes in Pune

This is a compilation of excerpts from an e-mail based brainstorming session on the above topic.

Note: comments not shared during the above process are on pages 8-10.

### Highlights

The conversation above started within an unrelated topic connected with parking / footpaths etc.

9 July AJ -

**Catch 22** is that people will expect better public transport to leave behind their vehicles at home. Recently with some of you I shared how over 117 (of 210 routes) of PMT routes are 15km or less (50 of those 10km or less). I showed how exactly the same mistake has screwed up Bangalore bus transport which has 5k buses and 2k routes.

The city has increased in size but not the route lengths. In reality like Mumbai if buses run longer overlapping routes dramatic differences will be seen in frequency of buses (buses run from Colaba to Vashi / Andheri / Mulund).

Truth is 1000 buses can serve Pune well when basic flaws are corrected. And 100 routes will do it. For example one cannot get to Deccan from Aundh/Baner/Pashan directly!! Overall frequencies are so poor that it is not surprising that people use personal vehicles.

**Attached for everyone's benefit** an excel sheet - I have arranged routes as per distance not route numbers - all data is acquired from PMT website (last week). Click here to download the document <http://spreadsheets.google.com/pub?key=phHUCCCHGAZg5ai8JpxM9AA>

July 11 AK -

The more I think about your point regarding longer bus routes being required, the more sense it makes. The long north-south routes in Mumbai are an excellent case-in-point. They are fantastically convenient. This really is worth taking up.

SJ -

The passenger lead (average distance travelled by a bus passenger) is one of the parameters for working out route lengths. The other factors for planning routes are ridership, feeder services required, frequency vis-à-vis number of buses on the route, cost/revenue per km, etc.

In PMC, the passenger lead is about 10 km and in PCMC, it is about 14 km. These are the figures of 2006. In 2008, the CIRT has come up with a figure for PMR, which is less than 10 km.

As a thumb rule, the route lengths should be at least 1.5 times the passenger lead. Both PMT and PCMT plan most of the routes on this basis. Some routes are short because of political interference. The major reason for short lengths, however, is bus deficiency. E.g., Route Swar Gate-Pune Railway Station needs greater frequency because of heavy ridership but the distance is short, about 6 km or so. If PMPML can extend the same route to Viman Nagar or Airport, it would be operationally more efficient. However, this would be at the cost of the frequency on Swar Gate-Pune Station route because of bus shortage and poor condition.

Generally, the longer routes e.g. Pune-Dehu, Pune-Chinchwad, Pune-Saswad, Pune-Alandi are in profit and run more efficiently. Most of the shorter ones are making losses. In fact, PMPML is unable even to recover the operational costs on some routes. Due to various constraints, PMPML is still running these. However, PMPML is taking corrective measures in conjunction with CIRT.

UK –

I wonder if circular routes for a circular city will be more appropriate so less time is wasted at bus junctions and buses keep going round and round specially in short routes to augment frequency as well as make the route length effectively longer...the driver can pause/change after a specified number of rotations...

SJ –

Some citizens have earlier suggested circular routes but as usual, without hard supporting data. There could be inner, outer and intermediate circular routes, for which PMPML needs to carry out surveys. The problem with PMC and for that matter PMPML is that their entire planning (including for MRTS) is based not on demand but on supply. E.g. CIRT/IITD have worked out the ridership for the new BRTS phases based on supply, i.e. the number of buses that ply on the various routes or the number of 4 and 2 wheelers registered with the RTO. This gives a very wrong picture of the ridership requirements. The teaching is to ascertain the demand by O-D, household, affordability, etc surveys. All this takes time. The decision-makers do not have the time to wait for say as long as 24 months to plan a BRTS. Because their own requirement of funds is urgent! It is the same story for the circular routes. We have supported the idea provided it is found viable based on traffic demand. It is good that you brought up the topic. I shall try to push the PMPML to assess the idea by surveys.

AJ –

**Recently I was told the average passenger distance travelled on a BEST is ~5km.** But their route lengths are several fold long. Having travelled on them up to Nerul (I worked in Panvel for 6 months) I can vouch for this.

The whole point of offering long routes is that BEST by way of simple maths has more buses per route (~10). Given that other factors such as peak times/ passenger load are considered, this means more buses and superb frequencies on routes with high demand.

Circular, or along an axis, the idea is to have significant lengths of important routes served by overlapping services. This is missing in Pune (and as I have found out in Bangalore). The point is for travel to major destinations I should not have to wait more than 5-7 minutes.

Here is a crude but I think valid example, because I am talking of connecting major residential / business places of importance (I have given this example before) -

You can have two routes each from Pashan, Baner and Aundh going to Karve road. But each route will be either via SB Marg or University road. Thus for people on SB Marg and University Road, there are 3 buses that could do the trick (with possible wait of just 5 minutes before next bus) of getting towards Karve road destinations. And they could all have minor variations - the 3 buses on SB Marg could go via LC road (one cutting through Prabhat Rd). Indeed there should be buses from Baner and Aundh going to Karve road via Pashan road, Bawdha and paud road - but it is a matter of thinking through longer overlapping routes unlike the current situation where huge proportion of routes are less than 10km long.

Now imagine buses starting from (Pimpri - Chinchwad) or any of the above (Pashan / Baner / Aundh / surrounding IT hubs) connected to Deccan and Pune Station / Swargate etc.

Imagine how suddenly for some one at University circle wishing to get to Southern locales how many choices are now available.

Bangalore as discussed and analysed has ended adding 5k buses, 2000 routes - the idea being when you get more buses, you add more routes - so on paper there is a huge network but with pathetic frequency (Volvo buses to their airport but one every hour!! - who the hell will wait?).

Chennai, Mumbai and London - the maths is similar - all cities with superb reputation for offering quality network. Bangalore and Pune - cities crying out loud for BRT - the maths is same for these two cities.

When I lived in Bombay at Haji-Ali or Girgaum - If I wanted to go to Dadar, there were as many as 6 buses doing that as this stretch of road was common to several South Bombay buses going in different ways to the suburbs beyond Dadar. I loved BEST as it grew its fleet in 80/90s - There were routes connecting all public hospitals, tourist places and some that took you from Colaba to Vashi.

My premise is that unless we get some absolute basics correct, we will continue to suffer.

My recipe is simple - go along major axis (end to end). Bring the routes down to hundred, we will still cover whole of Pune but will suddenly be offering excellent frequencies.

SJ -

It is difficult to comment on your ideas without data. I am also not sure about the passenger load of 5 km for Mumbai. Looks impossible with such large distances. I am firm on my view not to base any conclusions without hard data. That is the basic difference between India and the Western countries.

UK -

I think if one goes by tickets sold by PMP on various routes we can find out how many tickets were sold for long distances (higher denomination) and how many for short distances (lower fare)..this would be the easiest way on various routes to find out (hard data) how many km is the mean travel along each route by passengers...I cant think of any other way that is specific as well as accurate and easy to compile this info....and from the discussion it seems an important input to the discussion.

SJ -

The data you talk about is available with PMPML. However, this is not demand based but based on supply. I hope you get the difference in the two approaches. There are well established surveys to determine ridership based on 'demand'. Let us not question fundamentals of Traffic & Transportation. I have seen the data for the pilot BRTS based on supply and at first sight, it looks as if the pilot BRTS is a great success in terms of tickets sold and revenue earned and even by the moderate costs per km. However, I am in dialogue with PMPML to get some more evidence before I validate the conclusions.

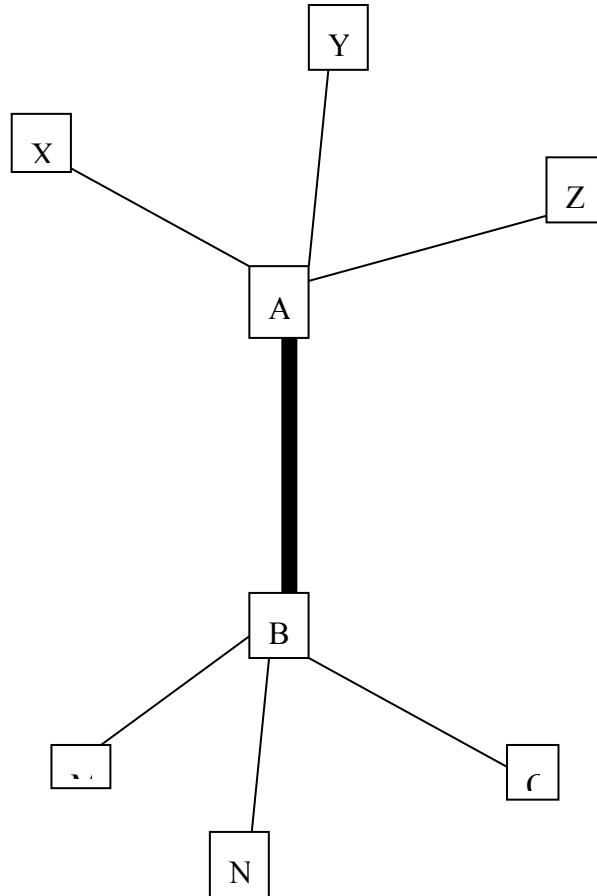
AK -

I think that it's a sort of demand within the supply. If average routes of say 8 km. are available, but the tickets sold still indicate that the average ride is 5 km long, at least some conclusion can be drawn.

AJ –  
One may collate all types of data - demand / supply (actual or imagined) but it the basic principle I am trying to share is that -

1. There is an inverse relation between number of routes and frequencies. More routes means less frequencies. Lesser routes = more frequencies.
2. More routes = more geographical coverage with poor frequencies
3. But longer routes = more geographical coverage with good frequencies.

**Note the diagram below**



Lets, presume Data (which ever way one calculates) may show huge load factor between A and B. But that does not mean we run high frequency service for a short distance between A and B. By doing this other areas suffer. I am suggesting connection between X to M / N / O and Y to M / N / O and Z to M / N / O or other permutations all via A to B (and vice versa). Thus A to B is served perhaps even better than before, but other areas are not left out with frequencies of 1 bus every hour.

UK –

I would keep the start end points common and diverge in between too....thats the way in Mumbai..dadar to Colaba goes from western and eastern suburbs and at a few key points like VT they cross..again some will diverge to cover churchgate so there is a very wide spectrum of buses coming at any one bus stop...the BEST system really works....One does not need a vehicle when one wanted to travel beyond South Mumbai from Naval area in Colaba...unless a family is going together.

SJ –

But the basic factor is the demand (ridership) and not route lengths or frequencies because the latter two are directly proportional to demand. An important fulcrum is the ability of infrastructure and buses to fulfil the demand.

UK –

Actually demand depends on services offered too and there is a huge latent demand waiting to be tapped provided the routes and services are properly planned...which first need planning taking into consideration the "demand" for service....!! So it runs both ways. Demand however can vary depending on quality of service.....and there fore using some intuitive and logical tools, service and routes need to be planned before it translates into growing demand.

RG –

Just trying to see if this works out. Let's assume we run the 9 longest (cross town) routes you mention

X-M

X-N

X-O

Y-M

Y-N

Y-O

Z-M

Z-N

Z-O

Let's assume we have 9 buses. So one bus on each route. Let's assume that each leg X-A, Y-A, Z-A, A-B, B-M, B-N and B-O are all 15 minute runs. Then in your scenario, each route will be (round trip) 90 minutes. Since all 9 routes pass through A-B, there will be a bus every 10 minutes.

## Scenario II

Now let's do the following **4** shorter routes

X-B

Z-B

M-A

O-A

These are 1 hour runs (not 90 minutes, like earlier)

Add **2** cross routes which didn't exist before

M-O

X-Z

These are also 1 hour runs, but do not pass through A-B

Keep **one** the same

Y-N

and do something that you don't recommend, have a

A-B

route, and run **two** buses on it. You'll notice that I still have 9 buses.

If you work it out, you'll notice that you get a 7 minute frequency on the A-B route (if you want I can explain how). Which is better than scenario I? And this is in spite of the fact that 2 routes don't even go on A-B.

If you compare the two scenarios you will notice that we went from longer routes to shorter routes actually went from 9 routes to 8 routes (less routes) and increased the frequencies. **So I buy the less routes is better argument, but not the longer routes are better argument.**

AJ –

I agree with what you say. **But we are still running longer routes than just predominantly running A to B as is the case now.** In addition we are right now doing X to A and Y to A and so on. Fine tuning depends on actual need. Thus in scene 2 a direct route between M to X, Y and Z is lost. So also a direct connection between Z to other 3 ends is lost. Plus N and Y lose direct connection with two end points. A changeover with a small wait means for people travelling between two ends lose out a lot more making the system potentially inequitable. But if we operate a hop on hop off single ticket strategy we will still find many more happy customers.

When I argue to getting basics correct it is exactly this kind of brainstorming. Simple steps and with travel worthy buses at correct pricing of tickets we would be on a sound footing to make most of BRT or any form of bus priority.

With regards to need for hard data - Again the diagram and then permutations of RG do not disregard the demand, which is given full respect between points A to B. As far as I am concerned the demand is there. The example routes I suggested have heavy vehicular traffic (and included in putative BRT map of Pune). If based on data available we believe there is demand sufficient enough to warrant a BRT why is that data not good enough for considering the observation I am sharing?

At a later time I shared an example of bus routes available between two residential / business points in Mumbai (Haji-Ali to Dadar). This data was based on results compiled from the BEST website – BEST website is too humble (actually incorrect) in saying there is no direct service. Closer look and my experience of having used the service extensively made it possible to spot that their results are displayed in complicated manner. In fact there are direct and non-direct services. **Hence I have formatted all direct services in to bold and blue.**

Also I have painstakingly for benefit of those who don't know Mumbai, given start-end points for most of the routes (did not see value in doing this for every route). Another learning point from BEST - they also use LTD buses - essentially express buses that skip some not so in demand bus stops that regular buses stop at. Plus AC bus is available.

**HAJI ALI and DADAR T.T. Getting from HAJI ALI To DADAR T.T.**

Bus No.(Kms)	Change Over At	Bus No.(Kms)
<b>385 (4) – Tardeo to RCF colony beyond Bhandup</b> <b>92Ltd (4) – South Mumbai to BARC</b> <b>305 (4) – Tardeo to Ghatkhopar</b> <b>88 (4) – Hutatma Chowk (south Mumbai) to Kurla</b> <b>93Ltd (4) - South Mumbai to Deonar</b> <b>A-4 (5) – Colaba to Ghatkhopar</b> <b>521Ltd (5) – Tardeo to Airoli via Vashi</b> <b>85 (5) – World Trade centre to Kurla</b> <b>357 (5) – Bombay Central – Tardeo – Shivaji Nagar (well beyond Deonar).</b> <b>351 (6) – Bombay Central to Chembur</b> <b>151 (5) – Breach Candy to Wadala</b> 83 (4) – Colaba to Santacaruz BRTS-2 (4) – Backabay to Dahisar 87Ltd (4) – Mantralay to Bandra 86 (5) – Backbay to Bandra 33 (5) – Opera House to Goregaon 84Ltd (5) – Fort to Oshiwara (well past Jogeshwari) A-2 (5) – Backbay to Oshiwara 28 (5) – Fort to JVPD Juhu 125 (5) 37 (5)	WORLI (CENTURY BAZAR)	<b>A-4 (3)</b> <b>357 (3)</b> <b>351 (3)</b> <b>305 (4)</b> <b>85 (4)</b> <b>385 (4)</b> <b>92Ltd (4)</b> <b>88 (4)</b> <b>93Ltd (4)</b> <b>521Ltd (4)</b> <b>151 (3)</b> 161 (3) 169 (3) 165 (3) 164 (3) 27 (3) 110 (4) 171 (4) 172 (4)
<b>305 (1)</b> <b>385 (1)</b> <b>93Ltd (1)</b> <b>A-4 (1)</b> <b>92Ltd (1)</b> <b>88 (1)</b> <b>357 (2)</b> <b>85 (2)</b> <b>521Ltd (2)</b> <b>151 (2)</b> BRTS-2 (1) 83 (1) 87Ltd (1) 57 (1) 81Ltd (1) 80Ltd (1) 86 (1) 125 (2) 33 (2) 91Ltd (2) 28 (2) 89 (2) A-2 (2) 37 (2) 166 (2) 84Ltd (2)	WORLI (NEHRU PLANETARIU M)	<b>305 (7)</b> <b>93Ltd (7)</b> <b>385 (7)</b> <b>A-4 (7)</b> <b>521Ltd (7)</b> <b>357 (6)</b> <b>151 (6)</b> <b>92Ltd (7)</b> <b>88 (7)</b> <b>85 (7)</b> 166 (11)
77 (2)	SAAT RASTA	76 (4) 30Ltd (5) 66 (5) 61 (6) 165 (7) 164 (8) 172 (8) 110 (8)

**Note that BEST actually offers over 10 direct options plus many more indirect option.**

**Below I add to the above thoughts with respect to route planning – these were not a part of the above email trail.**

**The model I propose is based on my observation of well run bus services Vs. not so well run services.** The model is actually very similar to a well known principle of HUB-SPOKES used by transport industry.

<http://singaporebuspage.wordpress.com/public-transport-review-part-1-bus/> offers a lot but also focuses on the use of above principles – I am copy-pasting a relevant part of the document here -

### **Making our Hub-and-spoke System Seamless**

17. First, we will enhance our hub-and-spoke system to address the key problems of waiting time, travel time and over-crowding. It is the right model for our public transport system. The alternative is to have many direct services, which cannot work in a compact city state like Singapore.

18. Let me illustrate the difference between the two approaches. Let us take 20 origins and 20 destination points with a hub in the centre. With a hub-and-spoke system, you will have 20 buses going into the hub from the origins and 20 buses leaving the hub to the destinations, or 40 bus services to run this system. Take away the hub, replace it with direct services, and you will need 400 bus services.

19. A direct service between every origin and destination point is thus inefficient and expensive. There would be long waits between buses as the passenger volumes would not be able to justify frequent services for many of the services. Our hub-and-spoke model is not only much more efficient, but also delivers better outcomes for commuters.

20. Transfers are part and parcel of a hub-and-spoke system. They can in fact reduce overall travel time, especially for longer journeys using rail, because trains travel faster than traffic on the roads. But unfortunately, transfers today are not as seamless and easy as they should be.

21. Ms Jeanne Conceicao, a participant at one of the focus group discussions, told us about her experience with the daily commute. She gave up on the MRT in favour of the taxi. Taking the bus or MRT was just too wearying. Too many decision points, she said. She had to take a feeder bus to the MRT station, hop on the North-South line, then transfer onto the East-West Line, and then hop onto another feeder bus that took her to Heng Mui Keng Terrace where she worked. The uncertainty of the journey time - how long it would take for the feeder bus to arrive; whether taking the MRT to Raffles Place or Jurong East interchange to transfer would be faster - it took too much out of her. In the end, she decided to take a taxi, and would be buying a car.

22. This really drives home the point that we need to improve the connectivity of our hub-and-spoke system, in particular the integration between the feeders, trunk buses and the MRT. Only then can we ensure seamless transfers and make the whole public transport journey as convenient as possible.

23. System unity is thus critical: the entire public transport system should be planned and operated as a whole and not as separate parts. The choice for the commuter should not be between bus or rail but between public transport and the car. But this is not the case today.



24. Currently, the two public transport operators plan the bus routes within their areas of operation based on commercial considerations, subject to minimum service obligations.

25. This has led to a situation where out of more than 250 bus services, only 35% are run at intervals of 10 minutes or less. Some even run at intervals longer than 30 minutes.

26. Then there are the feeder buses that make huge, circuitous loops before they get to the MRT station or bus interchange.

### **Concluding remarks:**

In reality getting the **balance** right is vital.

1. Technically one could have 200 buses running long tortuous routes serving length and breadth of the city. On paper there will be connectivity but lack of reliability and poor frequencies.
2. Equally, you may surplus of buses and on paper cover huge geographical coverage by way of grid model or multiple-hub-spoke model but still dissatisfied customers. In fact there is plenty of evidence to show that a poorly planned hub – spoke model where there are too many short haul routes to a spoke can be problematic. This is mainly because the short routes covering huge areas are beset with poor frequencies and also imply multiple changes which are very unpopular with travellers
3. Surveys show that people want a bus to do what their cars do for them – an almost door to door service. While no model will cater to every individuals needs, the principles described above offer a better chance at success in this regard. Even when transfers are needed, when balance between route lengths and numbers is correct frequencies can be good enough to reduce waiting times during transfers/inter-changes to the minimum.

### **The Plan ahead**

1. There is no doubt PMPL/PMT needs rethinking and rationalising routes / frequencies as described above.
2. To expect people to start using buses when they offer frequencies from a bus every 20 minutes to one every hour (on some routes its one bus / 1.20 hours) is unfair.
3. Ideally a working group should use table top A3 size maps for each region of Pune and draw every route on it to get a clear picture of what is happening currently.
4. Pune map below shows that it is possible to plan a service along above lines. The NH4 and 9 are like a bifid spine. Pune once may have grown along the river, but over past 3 decades growth has been along highways and elsewhere.
5. It may be possible to consider having 4 – 5 zones (NW, NE, SW and SE) all connecting to central Pune.
6. Routes could span across zones cutting through city centre / along arterial routes. Orbital routes may also be a consideration (for example to connect Aundh all the way round up to

Kothrud). This vital because parts of Pune are un-inhabited due to hilly terrain. In effect roads and routes will orbit around in such cases.

7. As stated before, successful bus services have a ratio of 10 buses for a route (e.g. London has 6.5k buses with 650 routes, Mumbai 3.5k buses with 350 routes and Chennai is similar). Pune could do well by reducing the number of routes from 210 (possibly more as this is pre-merger data relating to PMT) to ~100.

Adhiraj Joglekar

**Addendum** – further analysis of PMT routes shows following anomalies -

Approximately 180 + routes have their details published on the PMT website. The average frequency is one bus every 57 minutes!!! Average km per route is 17 km (but as I have pointed out - over 50 are 10 km or under and up to 77 12km or under). About 36 start points exist (I have not bothered to find out if there are end points not counted in this list). If you live around certain areas you are damn lucky. If PMT was the only transport facility these areas would have been real estate gold mines. Cinema lovers who fancy Alka, you will never be failed by PMT. Pashan and Baner are given a Cinderella treatment in comparison to Aundh - where again most buses reach from city centre via Ganesh Khind Road - as if the SB road was carved out exclusively for private vehicles. In fact from my personal point of view (living along a very busy SB Road) I have about 4 buses, 2 around Gokhle Nagar and 2 near Model colony (with usually pathetic frequencies). I have no idea what data has informed these routes!!! BRT or Bus Priority or neither - the real challenge is what the above figures bring up. I also think the local trains can serve better rather than expecting buses to connect with Khadki, Dapodi, Pimpri, Chinchwad, Talegaon (why connect with the latter? is it even within city bounds?). There are routes where buses run every 2, even 3 hours. Two routes are run thrice a day and one 4 times a day. I have not included these in above average.

Acknowledgements: the above would not be possible without inputs from various participants (initialised above) .

Pune Map below for reference

