The Frequent Bus Network:
A Model for Improving Bus Services in Indian Cities

A Webinar via The Hub

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The Frequent Bus Network: Rationale & Concept
The Direct Services Model

This is the model for bus services operated by all Indian Cities:

Every location in the city is provided with a direct route to the city centre and other major hubs

Any pair of locations with a certain level of demand is provided with a direct route between them
Issue 1: Exponential Growth in Number of Routes

3 Hubs
3 Locations

9 Routes
Issue 1: Exponential Growth in Number of Routes

3 Hubs
6 Destinations

18 Routes
Issue 1: Exponential Growth in Number of Routes

3 Hubs
9 Destinations

27 Routes
As a result of the direct services model, 4 routes are required to provide services along a single, relatively short stretch of road.
Issue 2: Low Frequencies on Individual Routes

- As fiscal capacities are generally constrained, fleet size cannot keep up with the exponential increase in number of routes.

- Eventually, this system ends up with a large number of routes with only 1 or 2 buses.

- If these routes are long – as routes serving the city periphery tend to be – this results in long wait times on individual routes.
Route 356-B

KR Market
To
Karpur

Route Length: 34.3 KM

Buses: 1

Wait Time till next bus:
~120 Min
Issue 3: Excessive Complexity for Users

- Large number of routes increases system complexity and acts as a barrier to entry for new users.

- System complexity means developing user information systems - like maps at bus stops - becomes very difficult.
An example of a complicated bus route map:
Tracing a single bus route is difficult and confusing.

*In the direct services model with excessive routes, this is the only type of map possible.*
The Alternative:
An example of a simpler, structural bus route map
Plotting journey route is much simpler
This is only possible with a rationalised, transfer based network
The Frequent Bus Network

Direct Services

Integrated Services

Suburbs

Inner city

City centre

India
**Principle #1:**
Individual Routes along Major Roads are rationalised into a small number of Very High Frequency Routes
The Frequent Bus Network

**Principle #2:**
Travel Patterns that require moving beyond the major road are served by routes connecting to the Frequent Bus Network at interchange points.
Principle # 3:
Specific Travel Patterns are served not by direct routes, but by a collection of ‘direction-oriented’ services connected by transfers
Benefits of The Frequent Bus Network

- **Improves:**
  - **System Simplicity**
    - fewer routes, easier to navigate
  - **Quality of Service**
    - more buses per route, higher frequency
  - **System Capacity**
    - higher frequency on specific ‘links’
  - **Flexibility**
    - easier to match supply to demand
Implementing The Frequent Bus Network in Bangalore (BMTC)
BMTC is implementing Two Major Route & Network Structure Reforms:

1. The BIG Bus Network
2. Feeder Services for Peripheral Destinations
1. BIG Bus Network

The BIG Bus Network is a Connective Grid of High Frequency, Direction-Oriented services along Major Roads

BIG = Bangalore Integrated Grid
1. BIG Bus Network
1. BIG Bus Network
1. BIG Bus Network
1. BIG Bus Network – Full Network
Peripheral Destinations - which lie beyond ORR and off arterial roads - will be served with high frequency feeder services connecting them to the main road.
2. Feeder Services for Peripheral Destinations
2. Feeder Services for Peripheral Destinations
BIG Bus Network + Feeders: An Example
BIG Bus Network + Feeders: An Example

- **BigTrunk**
- **BigConnect**
BIG Bus Network + Feeders: An Example

- BigTrunk
- BigConnect
- Feeders
- Transfer Facility
An Example:
Hosur Road Corridor
Hosur Road Corridor

Existing Services:
From City Centre to Electronics City and Beyond

63 Routes

262 Buses
BIG Bus Network + Feeders: Hosur Road

- **BigTrunk**
- **BigConnect**
- Feeders
- Transfer Facility

EMBARQ India
## Routes

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<tr>
<td>Trunk Service</td>
<td>15</td>
<td>BigTrunk</td>
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<tr>
<td>Direct Service</td>
<td>48</td>
<td>BigConnect</td>
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<tr>
<td>Feeder Services</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>63</strong></td>
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*52.4% reduction in number of routes while maintaining same geographic service coverage*
Improving Service Quality (1) – Wait Times

- Shorter length of feeder routes means that waiting times away from the main road are reduced.

- However, there is an additional component of waiting time now: waiting for the trunk service.

- But the trunk service is run at a very high frequency (~3 min).

- So the reduction in wait time is still very significant.
Existing Service

Route 356-B

KR Market
To
Karpur

Route Length: 34.3 KM

Buses: 1

Wait Time till next bus:

~120 Min
Proposed Service

Feeder Route:
Route Length: 10.1 KM
Round Trip Time: 72 Min
Average Wait: 36 Min

BigTrunk Route:
Average Wait: 3 Min
Total Wait Time: 39 Min
## Improving Service Quality – Wait Times

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<tr>
<td>TRUNK</td>
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<td>3</td>
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<tr>
<td>FEEDER</td>
<td>120</td>
<td>36</td>
</tr>
<tr>
<td>TOTAL</td>
<td>120</td>
<td>39</td>
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67.5% reduction in wait time for bus service
Improving Service Quality – Wait Times

For all bus stops in the proposed system:

Waiting times reduce by an average of

56%*

*weighted by passenger volume
## Fleet Requirement

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<tr>
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<td>BigTrunk</td>
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<tr>
<td>Direct Service</td>
<td>95</td>
<td>BigConnect</td>
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<td><strong>TOTAL</strong></td>
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Service Quality improvements are achieved without any additional fleet requirement.
Challenges in Implementing The Frequent Bus Network
Will this work? Potential Concerns

3 Major Concerns

1. Transfers:
   A. “People do not want/like to make transfers”
   B. “People making direct trips will be forced to transfer”

2. Fares
   A. “People will have to pay a transfer penalty”

3. User Education
   A. “People will not understand the new system”
Mitigating Concern 1: Transfers
A. “People do not want/like to make transfers”

Bus Stop Access Mode - Chandapura
[n=1650]

Majority of people accessing bus services at major junctions are already making transfers
Mitigating Concern 1: Transfers
A. “People do not want/like to make transfers”

- The main complaint about making transfers is that the waiting time for the next bus is high.

- However, in this case, we will be significantly improving frequencies, resulting in low waiting times for connecting services.
Mitigating Concern 1: Transfers
A. “People do not want/like to make transfers”

- The second major complaint about making transfers is that the physical process of making transfers is uncomfortable.
- However, this can be mitigated by providing high-quality yet small footprint, single-facility transfer hubs at major junctions.
Mitigating Concern 1: Transfers
B. “People making direct trips will be forced to transfer”

Majority already treat existing bus service like a trunk-and-feeder system, making Feeder Trips (i.e. village to major junction only and vice versa) or Trunk Trips (i.e. major junction to city centre and vice versa)
Mitigating Concern 2: Fares
A. “People will have to pay a transfer penalty”

Transfer Penalty is only a concern for those making direct trips – a minority of total bus passengers

Moreover, the majority of those making direct trips use bus passes and will face no transfer penalty
Mitigating Concern 2: Fares
A. “People will have to pay a transfer penalty”

And developing an integrated fare system is an established goal which is already under implementation in Bangalore.
Mitigating Concern 3: User Education
A. “People will not understand the new system”

Unified Branding

Unified and consistent branding will make the system easier to understand and use.
Mitigating Concern 3: User Education

A. “Explaining the new system will be difficult”

User Information at Bus Stops

Simplified network structure allows for the creation of legible user information systems.
Mitigating Concern 3: User Education
A. “Explaining the new system will be difficult”

- User education is, however, a significant challenge

- Appropriate resources must be deployed for intensive marketing, communications and outreach efforts

- In the end, the benefits (improvements in service quality) far outweigh the short-term costs of user education
The ultimate aim is to make the experience of transferring akin to that of a rail-based metro system.

No one complains about making transfer in a metro system because:
- The next train arrives quickly
- The physical environment while waiting is comfortable
- High quality user information makes the system easy to understand and navigate
Implementing the BIG Bus Network in Bangalore: Progress and Impacts
The BIG Bus Network has already been implemented on 3 of 12 major arterial corridors in the city, serving ~1,50,000 people daily.
BIG Bus Network launched by CM Siddaramiah
BigTrunk Bus on Road
Impact: Performance Evaluation Survey

- Conducted in August, 2014
- Sample Size: 2,500
- Population: Existing BigTrunk & Feeder service users across all 3 corridors
BigTrunk: How did you make this trip before?

- Other Bus, 38%
- 2W, 18%
- Auto, 14%
- Van, 9%
- Car, 9%
- Other, 0%
- Didn’t make this trip, 1%
- More than one response, 1%
- No Response, 11%
- More than one response, 1%

BigTrunk services are very successful in attracting users to Public Transport.
BigTrunk: Why did you switch?

- Better Frequency, 41%
- Good Bus Quality, 25%
- Easier to understand new service, 15%
- Cheaper, 15%
- No Response, 3%
- Other, 0%
- More than one response, 1%

High frequency and ease of understanding new service are major attracting factors.
BigTrunk: Would you recommend this service?

- Yes, 68%
- No, 14%
- Maybe, 17%
- No Response, 1%
- More than one response, 0%

Majority of users would recommend the service to people they know.
BigTrunk: Would you support expansion?

- Yes, 63%
- No, 13%
- Maybe, 23%
- No Response, 1%
- More than one response, 0%

Majority of users support expansion.
Feeder: How did you make this trip before?

Other Bus, 55%

- Car, 7%
- 2W, 16%
- Auto, 15%
- Van, 2%
- No Response, 4%
- More than one response, 1%
- Didn’t make this trip, 0%
- Other, 0%

Feeder services are also very successful in attracting non-bus users, though not as much as BigTrunk
Feeder: Why did you switch?

- Better Frequency, 34%
- Good Bus Quality, 20%
- Easier to understand new service, 35%
- Cheaper, 7%
- Other, 0%
- No Response, 4%
- More than one response, 0%

High frequency and ease of understanding new service are, again, major attracting factors.
Feeder: Would you recommend this service?

- Yes, 65%
- No, 12%
- Maybe, 21%
- No Response, 2%
- More than one response, 0%

Majority of users would recommend the service to people they know.
Feeder: Would you support expansion?

- Yes, 48%
- No, 4%
- Maybe, 46%
- No Response, 2%
- More than one response, 0%

Majority of users support expansion.
Feeder: Do you know about Samparka Sarige? (Potential users waiting at major junctions)

- Yes, 57%
- No, 42%
- None, 1%
- More than 1, 0%

However, there is a significant lack of awareness of the feeder service amongst existing bus users.
Next Steps for BIG Bus Network

- Expand Structural Services:
  BigTrunk (on additional Arterial Corridors)
  BigCircle (on ORR)
  BigConnect (connecting Arterial Corridors beyond ORR)
  BigCity (High demand inner city routes)

- Complete implementation of complimentary initiatives
  (i.e. Integrated Fares + Transfer Facilities)
  before full scale expansion of Feeder Services
Conclusions

➢ The Frequent Bus Network promises a step-change improvement in the quality of urban bus services, particularly for large cities.

➢ In principle this concept can be extended to any city with a well defined road network with a hierarchy of public transport demand.

➢ There are some significant challenges, but the ‘how’ of overcoming these is known, and the long-term benefits significantly outweigh the short term costs.
Thank You!