# Objective of BSRF

- Reduce instances of bus bunching and prolonged waiting times
  - From Public Transport Satisfaction Surveys, bus reliability is an area for improvement

- Not easy for bus operations to achieve regular bus arrivals
  - Buses share road space with cars
  - Adjustments have to be made within safety limits
  - Other efforts such as bus priority measures will need to proceed in parallel

- Trial with 22 services to allow evaluation before further roll out

# Considerations in design of BSRF trial

- Holistic assessment
  - Assess bus services as a whole, not each individual bus trip
  - Improvements should be sustained

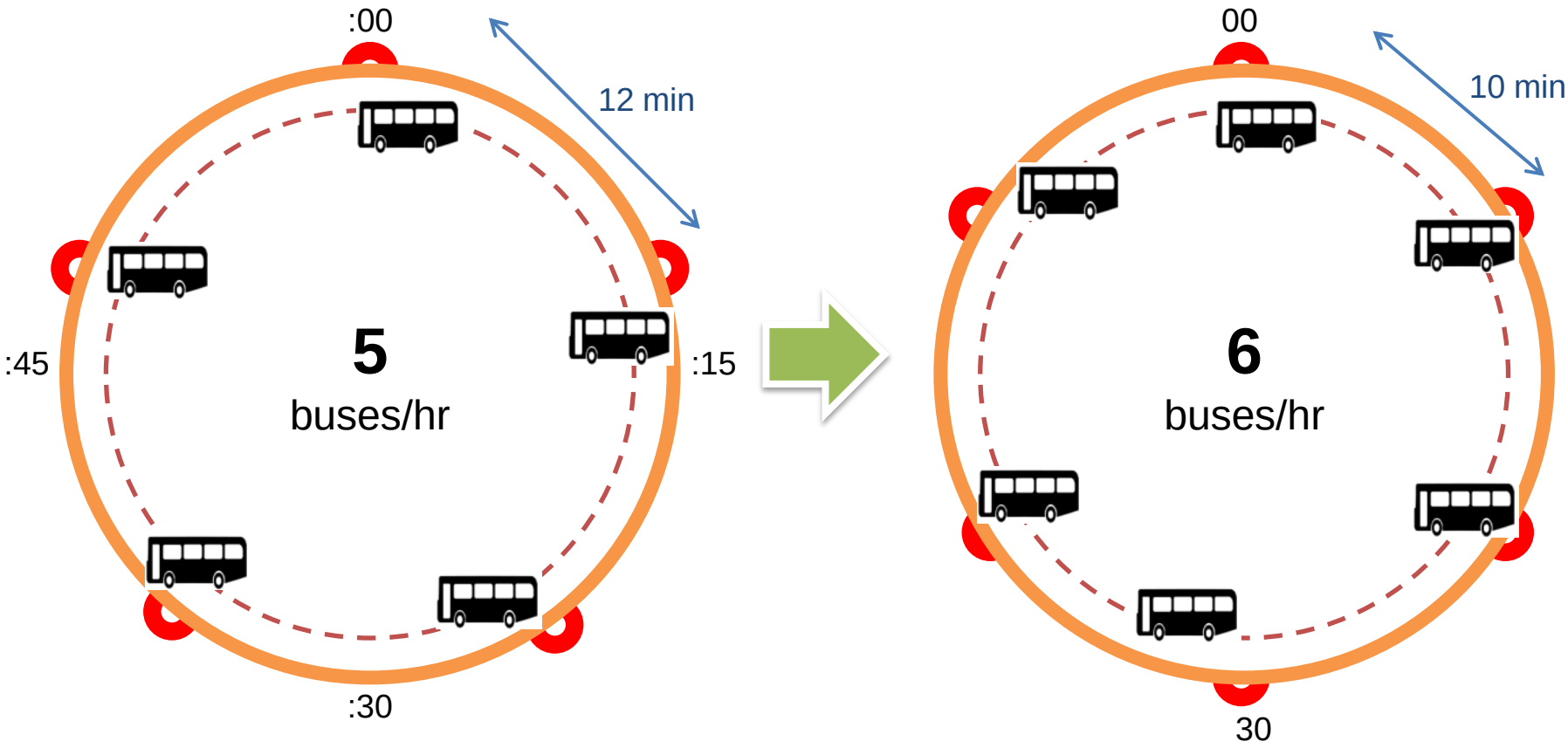
- A reasonable and meaningful trial
  - EWT baselines benchmarked to historical performance to ensure they are reasonable standards
  - Incentives allow operators to re-coup costs if improvements are made

# Learning from successful models overseas

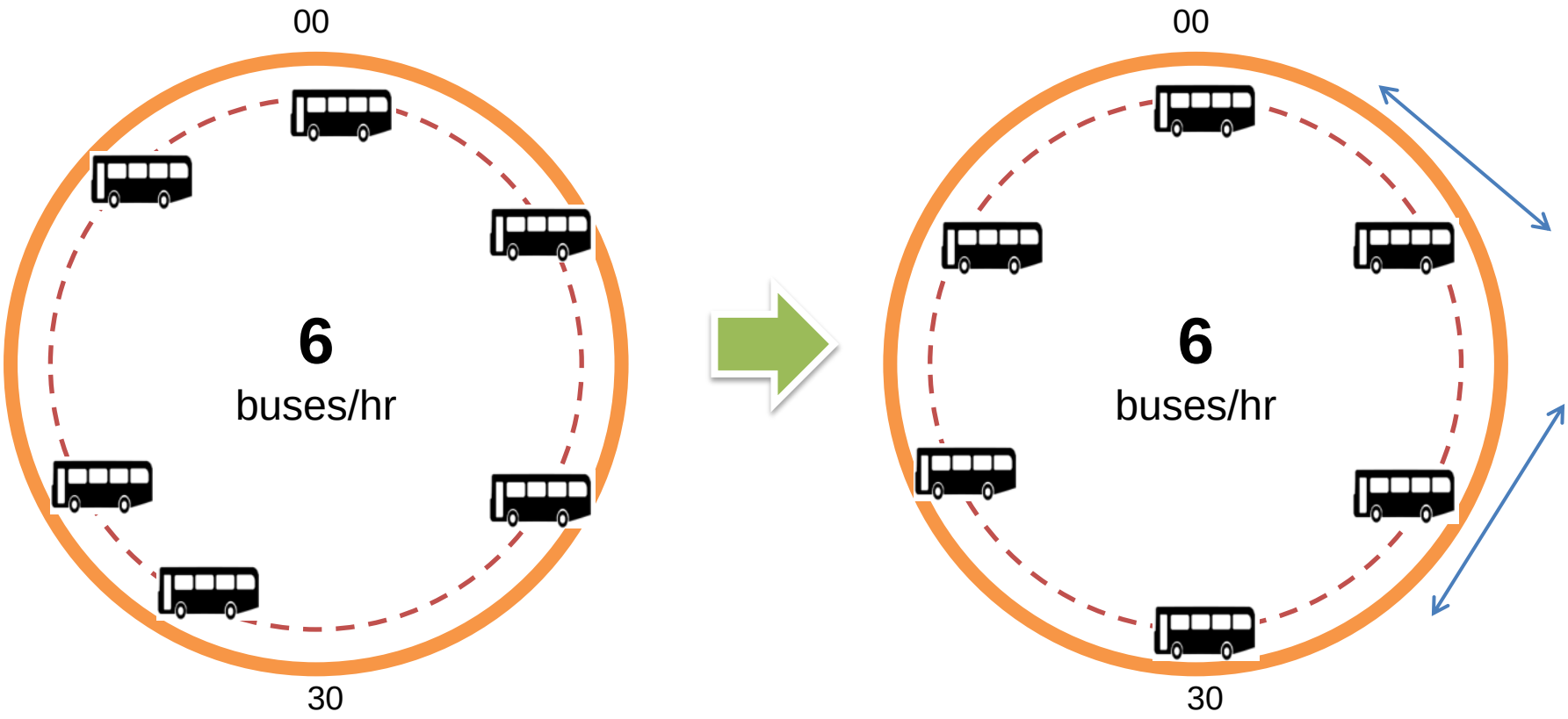
- LTA studied several approaches to improving reliability

- BSRF is modelled after the Quality Incentive Contract (QIC) in London
  - Incentives and penalties are provided to drive improvements in regularity
  - Improved customer satisfaction and increased demand for buses by 60% from 2000 to 2010
  - “Excess Wait Time” indicator for high frequency routes
  - Over last 13 years, the network-wide EWT improved from 2.0 to 1.1

# BSEP has focused on capacity and frequency improvement

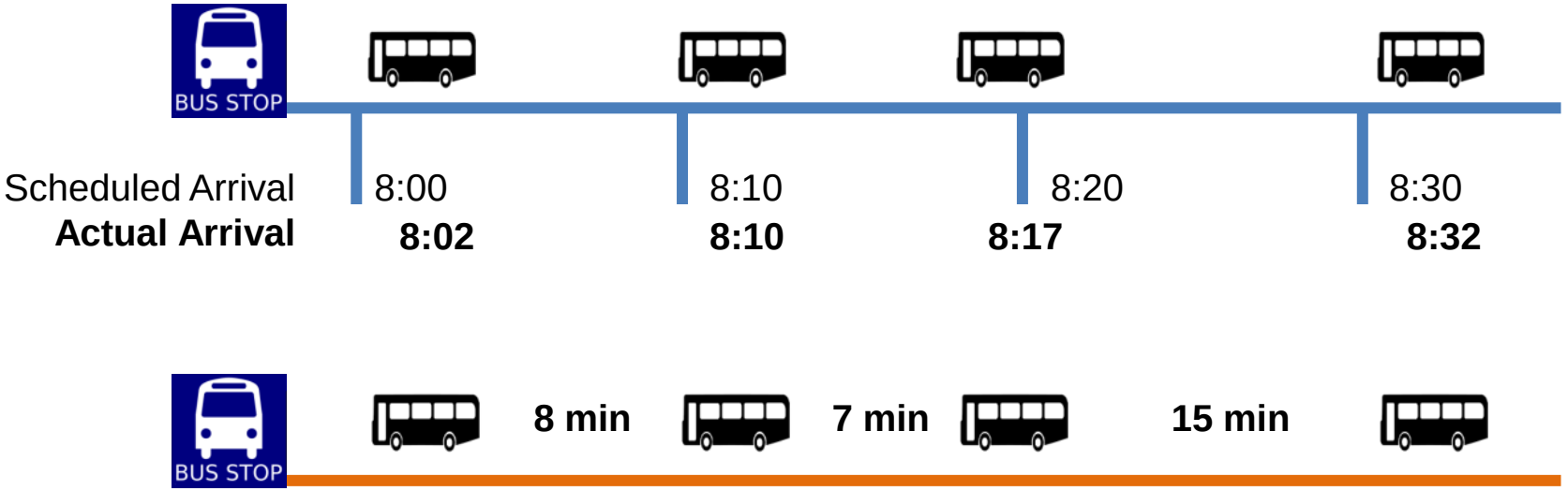


# BSRF focuses on regularity and evenly-spaced bus arrivals




Objective: More evenly-spaced bus intervals and less bus bunching

# Punctuality vs Regularity




Scheduled Arrival Interval of 10 min

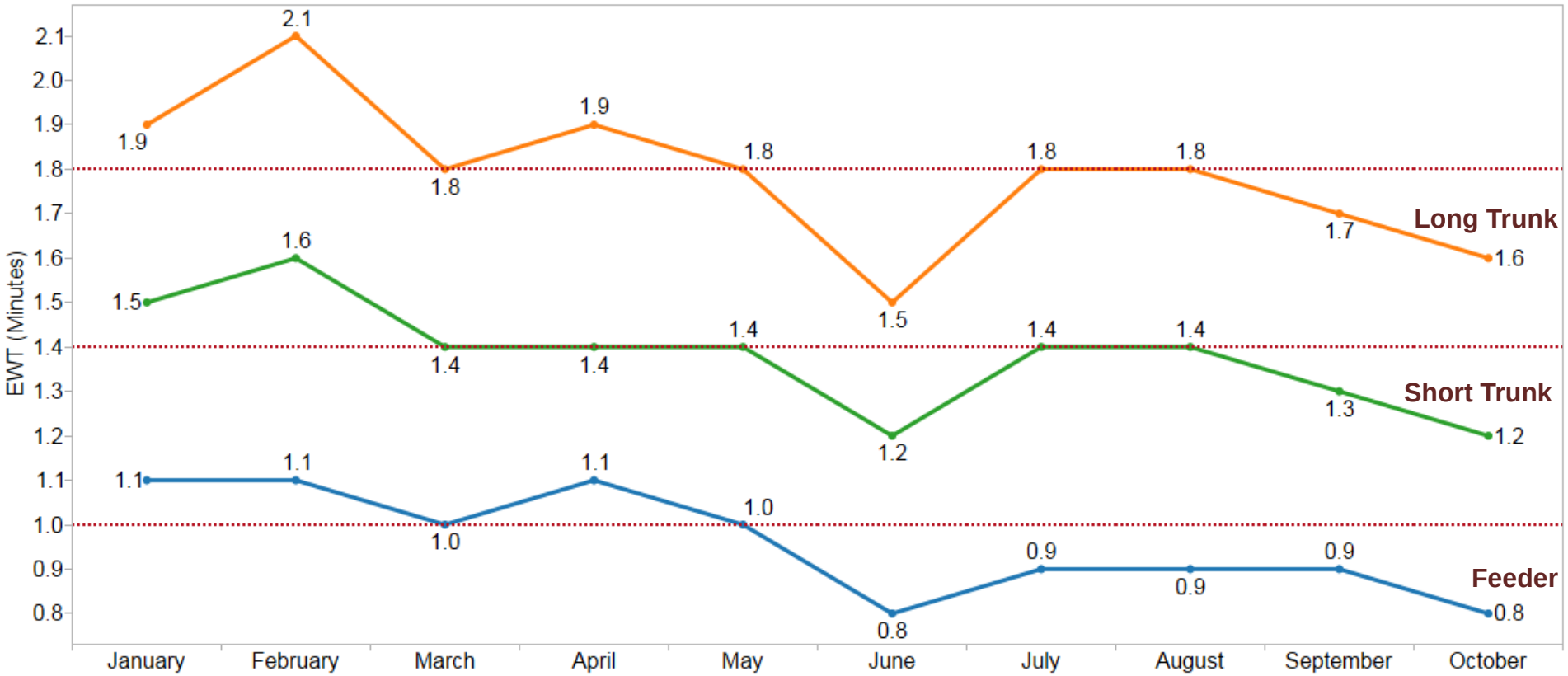
- For high frequency services where passengers “turn-up-and-go”, the focus is on regularity, i.e. even spacing of arrival times, instead of the scheduled arrival times
- The 22 bus services selected for the trial provide a balance of high frequency feeder and trunk routes with some reliability issues

# EXCESS WAIT TIME (EWT)

# What is “excess wait time” (EWT)?

- “Excess wait time” (EWT) reflects the additional waiting time commuters face as a result of irregular bus operations
- EWT of 0 min means buses arrive perfectly regularly at evenly-spaced intervals
- Bus bunching and prolonged waiting times lead to higher EWT scores
- Typical monthly EWT scores range from 1 min to 2.5 min

# 2013 network-wide EWT performance for different types of routes



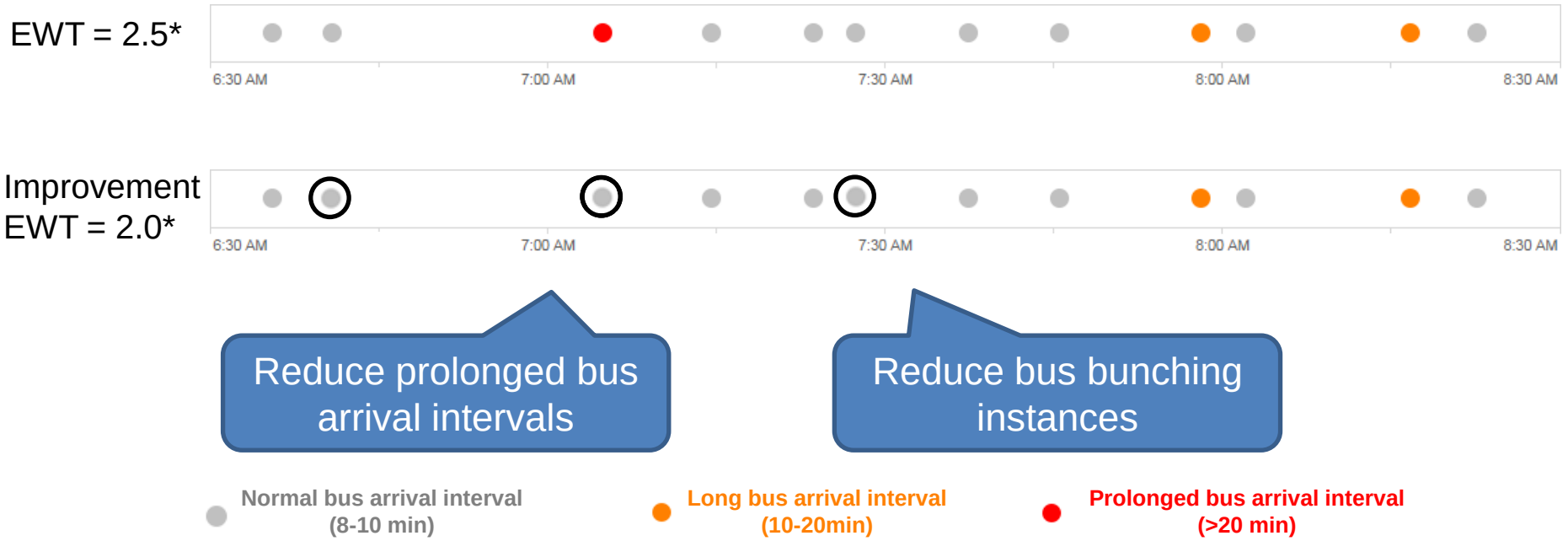
# What do different EWT scores look like?


*AWT = “Actual Wait Time”

* For Svc 858 on 4 different days, at the same bus stop, during AM peak period only.

# How EWT scores may improve

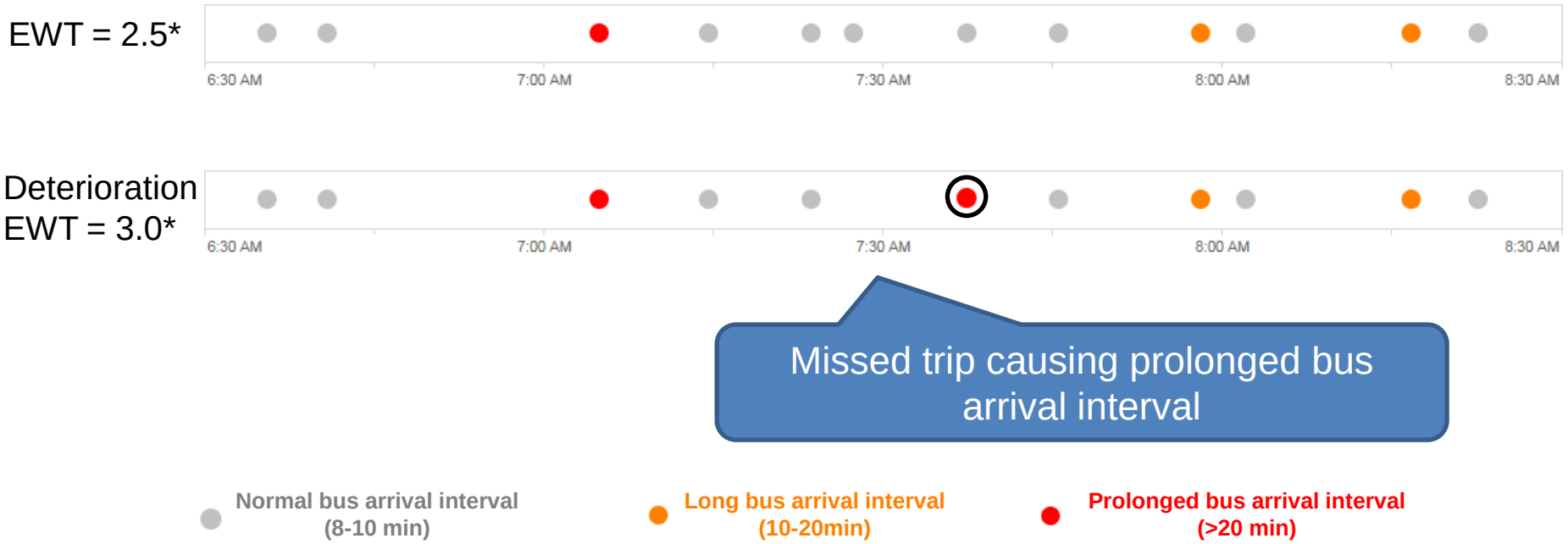
- Improve EWT through reduced bus bunching




* This EWT score is only for 1 bus stop in this example, on 1 day, during AM peak period

# How EWT scores may deteriorate

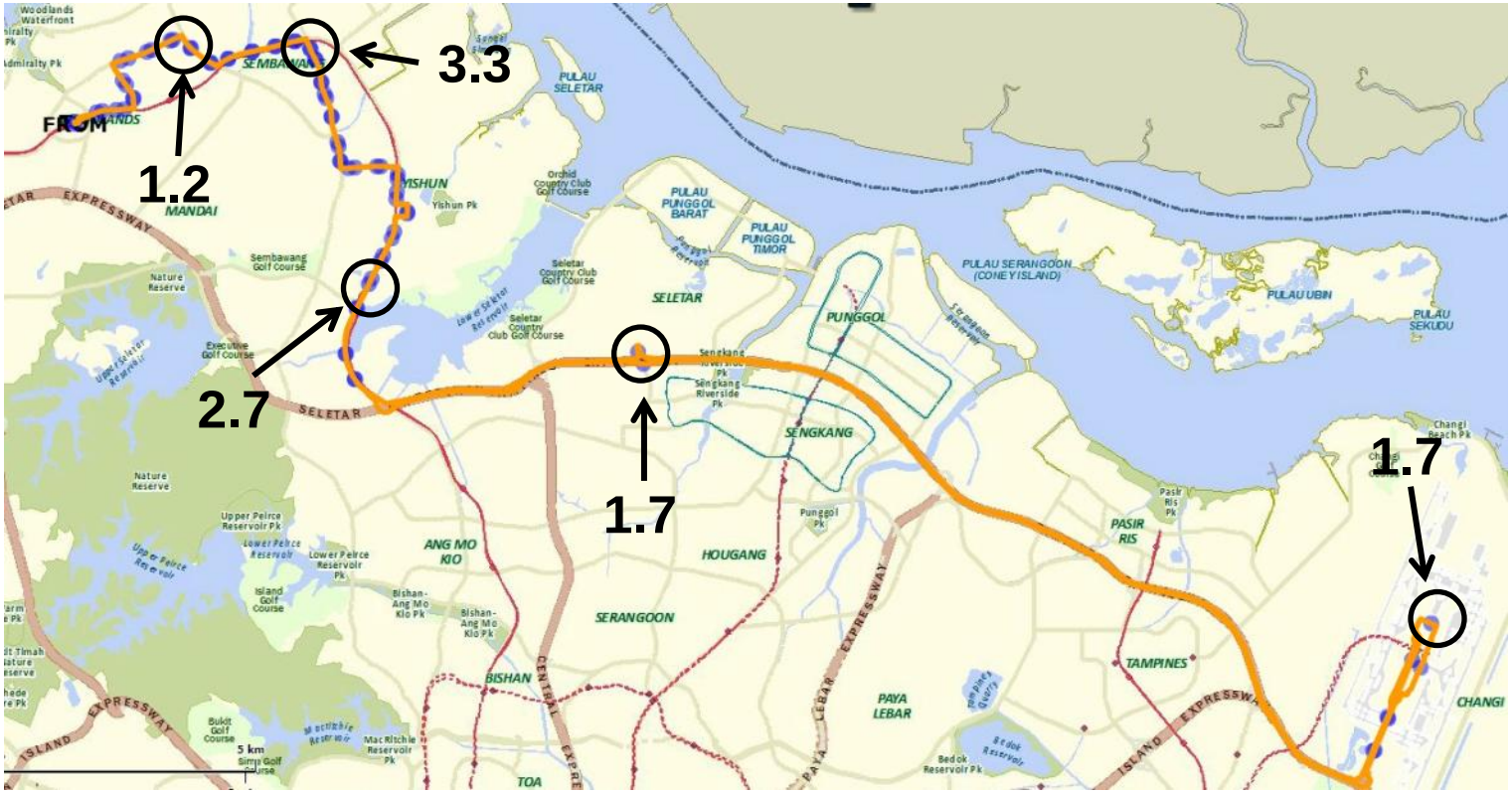
- In the case of missed trips, there will be more instances of prolonged bus arrival intervals



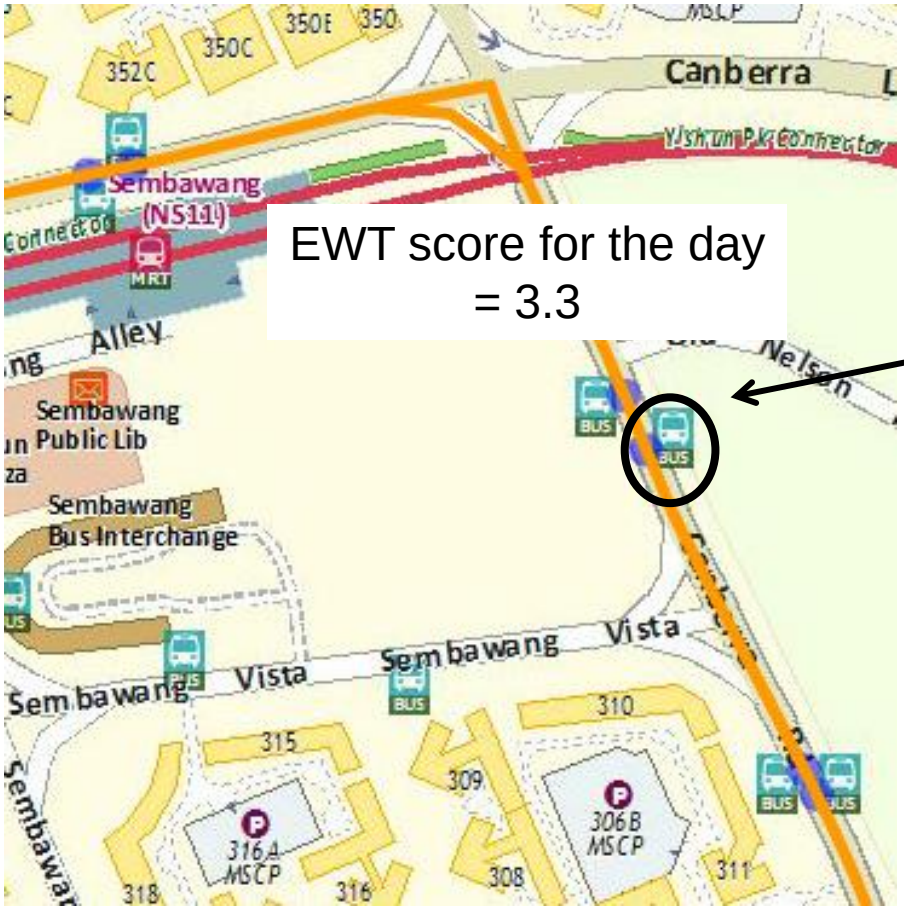

* This EWT score is only for 1 bus stop in this example, on 1 day, during AM peak period.

# EWT scores taken at each monitoring point

- E.g. Service 858 has 5 assessment points (whole day EWT scores indicated)



# EWT scores taken during both peak and off-peak periods




| | |
|---|---|
| AM Peak | 2.1 |
| AM Off-Peak | 2.3 |
| PM Peak | 3.3 |
| PM Off-Peak | 5.0 |

More weight placed on peak periods

# EWT score is assessed for the whole month

| May 2013 | | | | | | |
|---|---|---|---|---|---|---|
| Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
| | | | 1 PH | 2 2.1 | 3 1.7 | 4 |
| 5 | 6 2.3 | 7 2.2 | 8 2.2 | 9 1.7 | 10 2.0 | 11 |
| 12 | 13 1.7 | 14 2.4 | 15 2.3 | 16 2.2 | 17 2.0 | 18 |
| 19 | 20 2.3 | 21 2.1 | 22 1.5 | 23 1.5 | 24 PH | 25 |
| 26 | 27 2.0 | 28 2.2 | 29 1.9 | 30 2.9 | 31 2.3 | |

Baseline = 2.1

Red > baseline

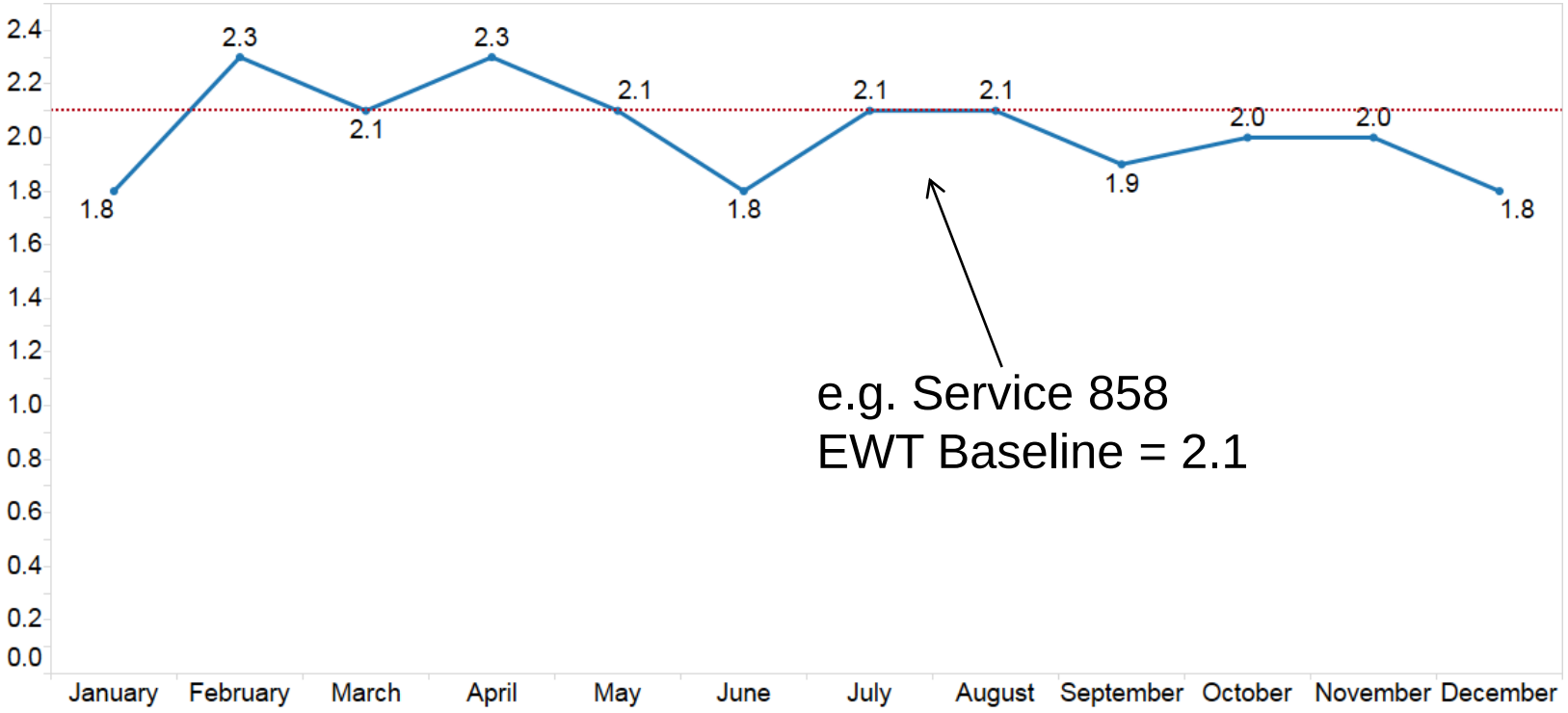
Blue ≤ baseline

* Public Holidays (PH), Saturdays & Sundays are not assessed.

# INCENTIVE STRUCTURE

# EWT baseline is based on performance in 2013

Monthly EWT Score



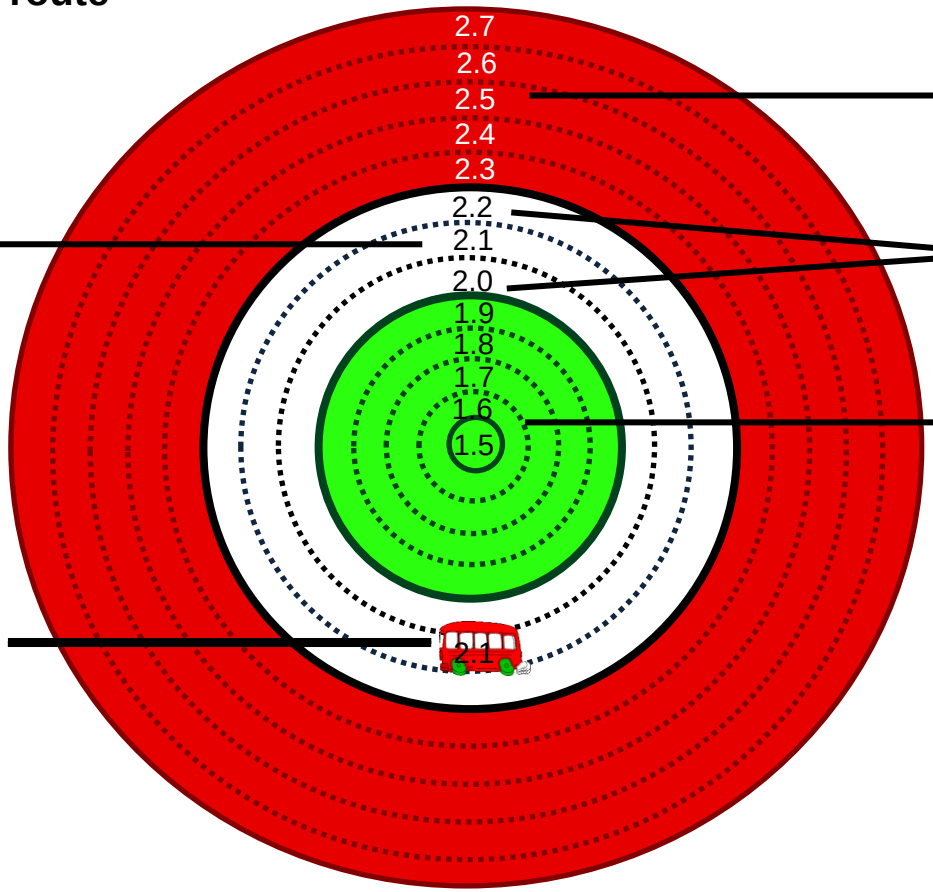

2013

# Incentives and penalties will be imposed based on performance compared to 2013 baseline

**Each bus service will have its own existing "baseline" EWT depending on the characteristics of the route**

e.g. Service 858

**EWT Baseline = 2.1**




Penalties zone

Neutral zone with no incentive or penalty

Incentives zone

BSRF: Incentivise operators to improve reliability; penalise operators for poorer reliability

# How EWT improvements or deteriorations translate into incentives or penalties

**Service 858**

| | EWT | Incentive/penalty ($) per month |
|---|---|---|
| **Incentives** | 1.5 | $30,000 |
| | 1.6 | $24,000 |
| | 1.7 | $18,000 |
| | 1.8 | $12,000 |
| | 1.9 | $6,000 |
| | 2.0 | $0 (Neutral zone) |
| | 2.1 | $0 (Baseline) |
| | 2.2 | $0 (Neutral zone) |
| **Penalties** | 2.3 | -$4,000 |
| | 2.4 | -$8,000 |
| | 2.5 | -$12,000 |
| | 2.6 | -$16,000 |
| | 2.7 | -$20,000 |

← **Earn $6,000 for each 0.1 min EWT improvement**

← **Penalised $4,000 for each 0.1 min EWT deterioration**

London also adopts a incentive-penalty ratio of 3:2

# Transition period and assessment

- Transition period until 31 May 2014 when no incentives or penalties will be applied

- Subsequently, monthly EWT score will be averaged over 6 months before incentives and/or penalties are determined
  - To smoothen out seasonal fluctuations

# BSRF TRIAL ROUTES

# How were the BSRF trial routes selected?

- Selection based on routes where we have received feedback on reliability

- Different types of routes selected in order to facilitate the learning purpose
  - Feeder vs Trunk

# BSRF routes with different characteristics – Long trunk

# BSRF routes with different characteristics – Short trunk

Service 176:

- Bi-directional short trunk
- Slow traffic along Upp Bt Timah, Bukit Batok Ave 1, Jurong East Central, Telok Blangah Road

# BSRF routes with different characteristics - Feeder

Service 325:

- Feeder
- Heavy traffic segment along Upp Serangoon Rd & Buangkok Green

# EWT Baseline for 15 BSRF services starting in Feb and Mar

| Launch Date | Fleet size (< 10 buses) | | Fleet size (10 to <20 buses) | | Fleet size (≥20 buses) | |
|---|---|---|---|---|---|---|
| | Service No. | EWT Baseline | Service No. | EWT Baseline | Service No. | EWT Baseline |
| Feb 2014 | 228 | 1.1 | 52 | 2.0 | 858 | 2.1 |
| | 302 | 1.0 | 17 | 1.8 | 176 | 1.6 |
| | 901 | 0.9 | 184 | 1.3 | 188 | 1.4 |
| | 242 | 0.8 | 911 | 1.3 | | |
| Mar 2014 | 241 | 1.2 | | | 3 | 1.5 |
| | 325 | 0.8 | | | 39 | 1.2 |

^ EWT baseline will be updated on a yearly basis.

# OPERATIONS AND EVALUATION

# PTO operations to regulate headway

- How PTOs will regulate headways
  - Buses to slow down to avoid bus bunching
  - Hold at bus stops as long as it does not impede traffic
  - Greater role of Operations Control Centre (OCC) to space out intervals between buses

- How will safety be ensured
  - Bus drivers to adhere to speed limits on the roads
  - Buses equipped with speed limiters set at 60km/h
  - Disciplinary actions will be taken against those who are found driving recklessly
  - PTOs to comply with QoS Standard on accident rate
    - LTA will monitor closely the trend on BSRF services

# Evaluation of BSRF

| **Learning points from BSRF trial** | |
|---|---|
| <u>Structure</u><br>• How much EWT improvement is achievable?<br>• Are there differences in EWT improvements across types of routes and operators? | <u>PTO</u><br>• Operational constraints<br>– e.g. bus holding, bus speeds<br>• Safety performance<br><br><u>Public</u><br>• Feedback |

# End