

Tramspotting

A new signal
priority strategy



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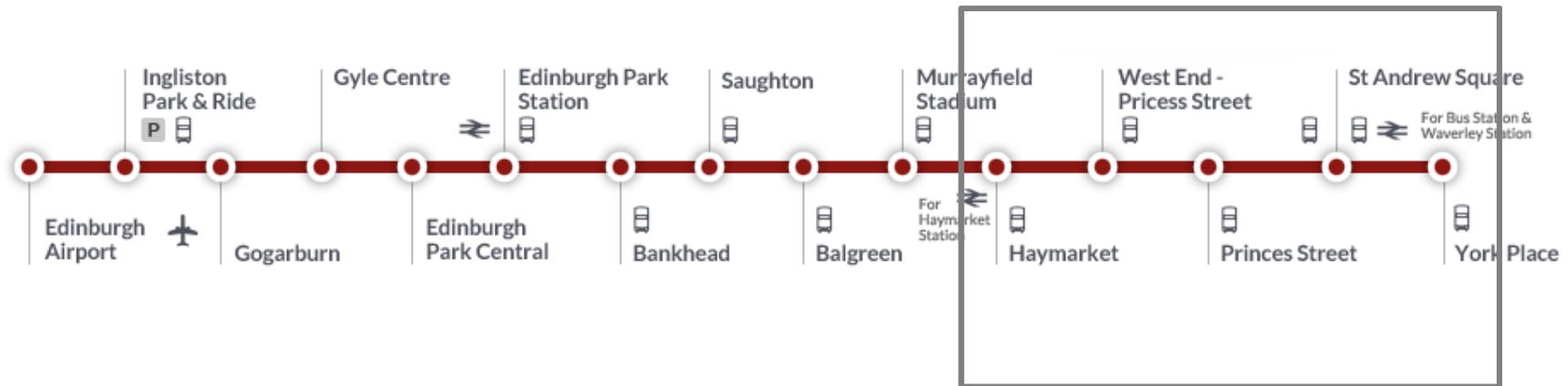
Overview

- Introducing Edinburgh Trams
- Tram signalling
- On street section – problems
- Solution – tram slots
- Still to do - Waverley Bridge junction

The Route

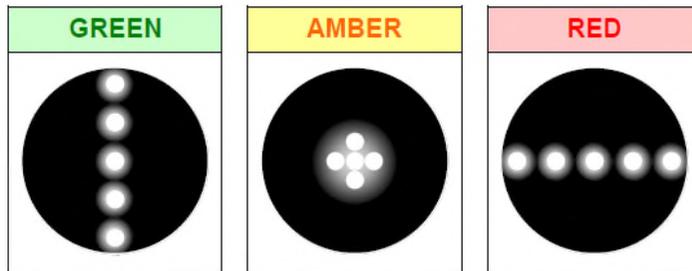
Route Length 14km

On street section 2.9km

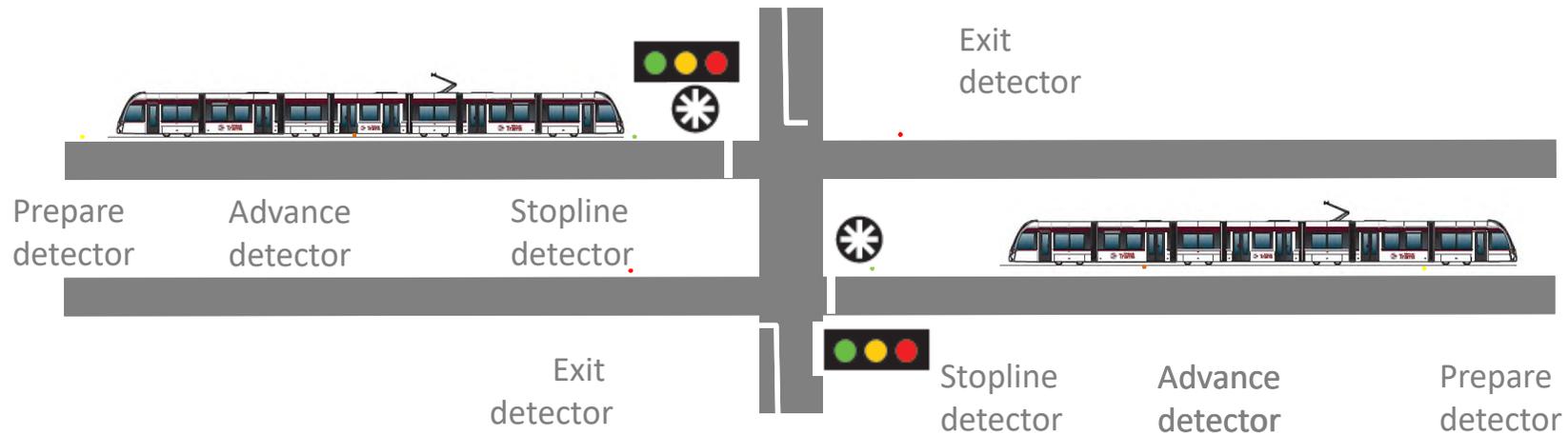


- Opened for Business 31 May 2014
- Longest trams in the UK
- 5.6 million passenger journeys 2016
- 10% year on year growth
- Extension to Leith under consideration

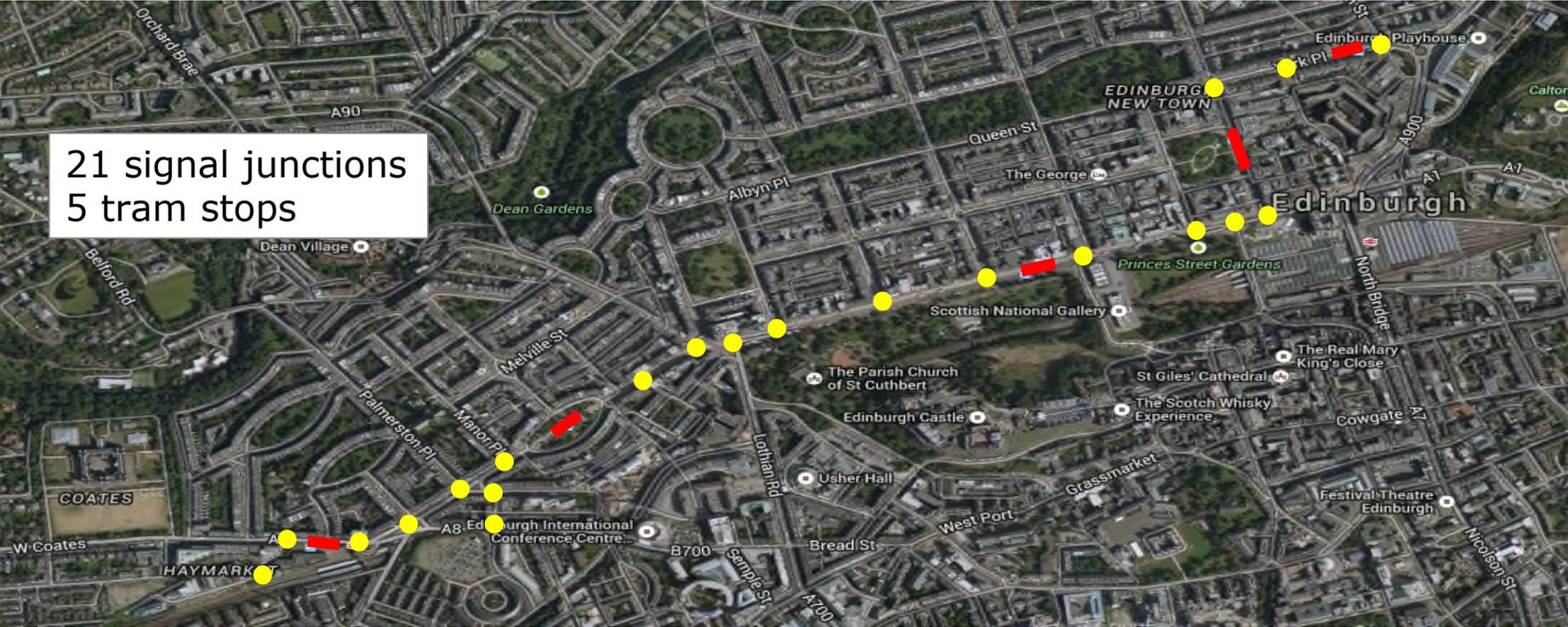
Tram signalling



- Base Fixed Time plans
- Absolute priority
- SPRUCE recalls / extensions
- Higher level strategies
- Linking in neighbouring junctions



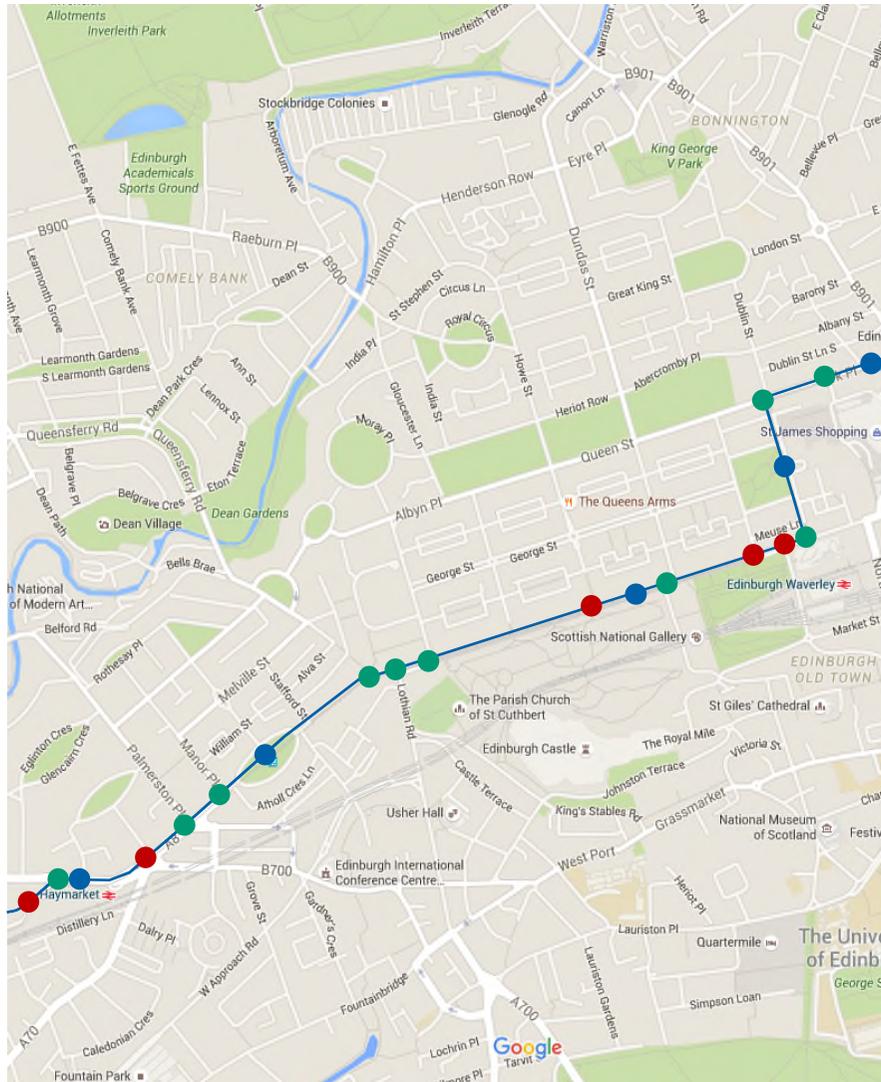
On Street Section



Traffic Conflicts



Junction conflicts

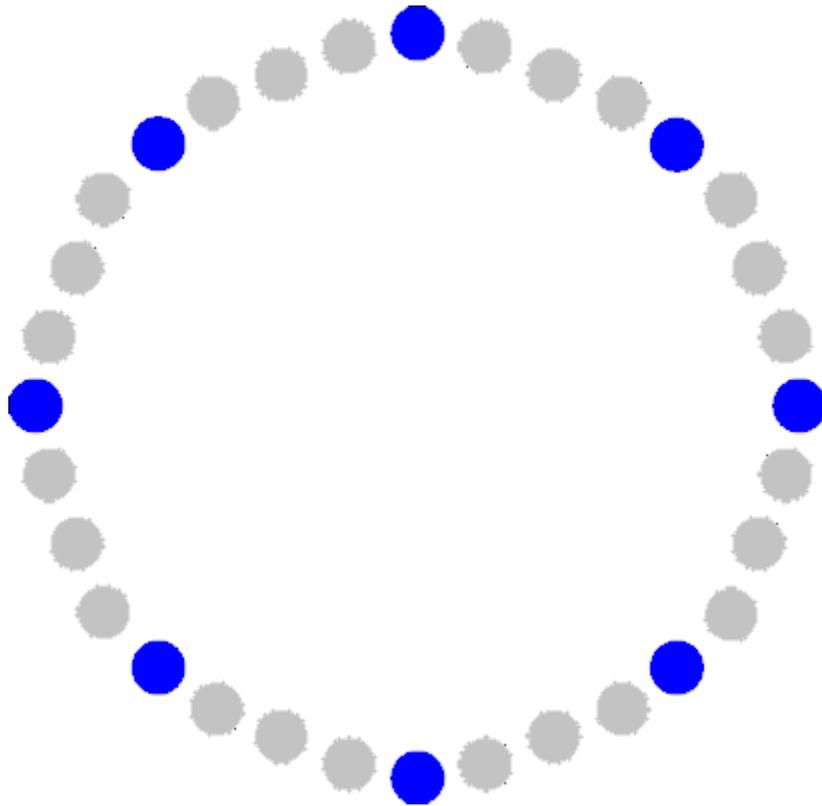


- Right turn conflicts
- Trams run in different stages
- Fight for priority
- Avoid passing trams

Other Problems

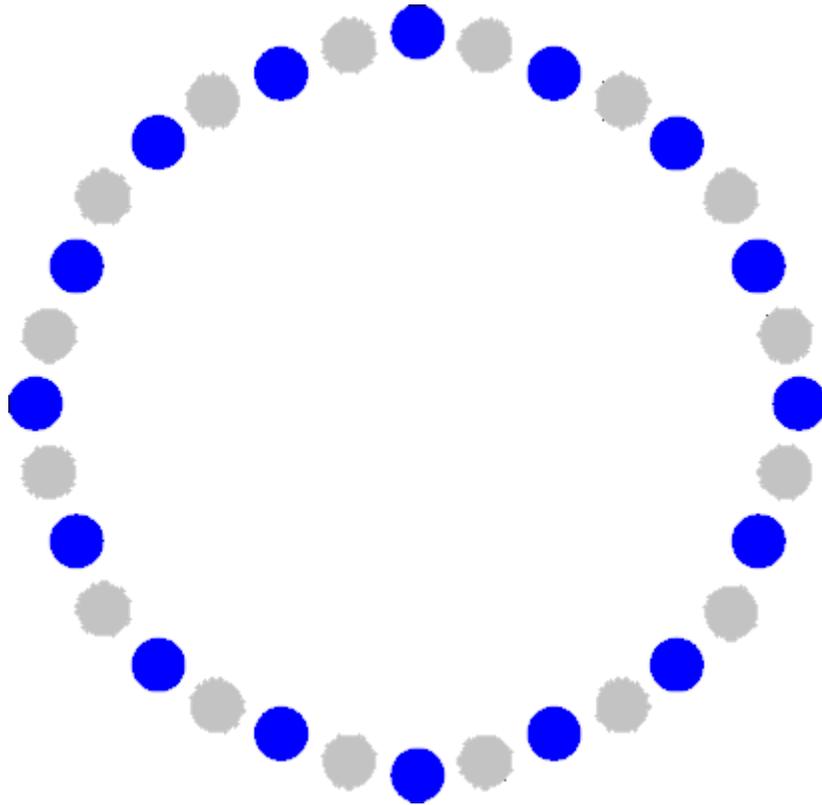
- Complex multistage junctions
- Major conflicting traffic flows
- Interrupts lead to stage skipping
- Ped wait times up to 8 mins recorded
- Disrupts traffic flow and coordination
- Congestion starts to impact on trams
- Proceed can't appear twice in a stage
- Doubling tram frequency

Tram Frequency



- 8 trams an hour
- 7.5 min headway
- 112.5 cycle time
- 1 tram every 4 signal cycles

Tram Frequency



- 16 trams an hour
- 3.75 min headway
- 112.5 cycle time
- 1 tram every 2 signal cycles

Implementation

- New tram timetable taken from model
- Trams regulated at on-street entry
- Start times from stops coordinated
- Fixed time plans derived from model
- Trams operating within allocated slots
- Green wave for trams between stops
- SRUCE optimising up to +/-15 seconds
- **No absolute priority**



Configuartion changes

- Add “Hold” stages at tram stops
- Flashing demand indicators
- West end – staging altered
- Frederick St – changed from separate phasing to ahead and right turn
- Allow tram phase to reappear in stage
- Cope with detection limitations

SPRUCE Strategies

- “Hold” at stops - slow flashing LED
- “Get ready” - 10 second fast flash
- Permit limited recall / extension +/- 15s
- Strategies work from stop to stop
- Offsets tie in with agreed dwell times
- Trams pass where they won’t conflict
- Wait for next cycle if they miss proceed

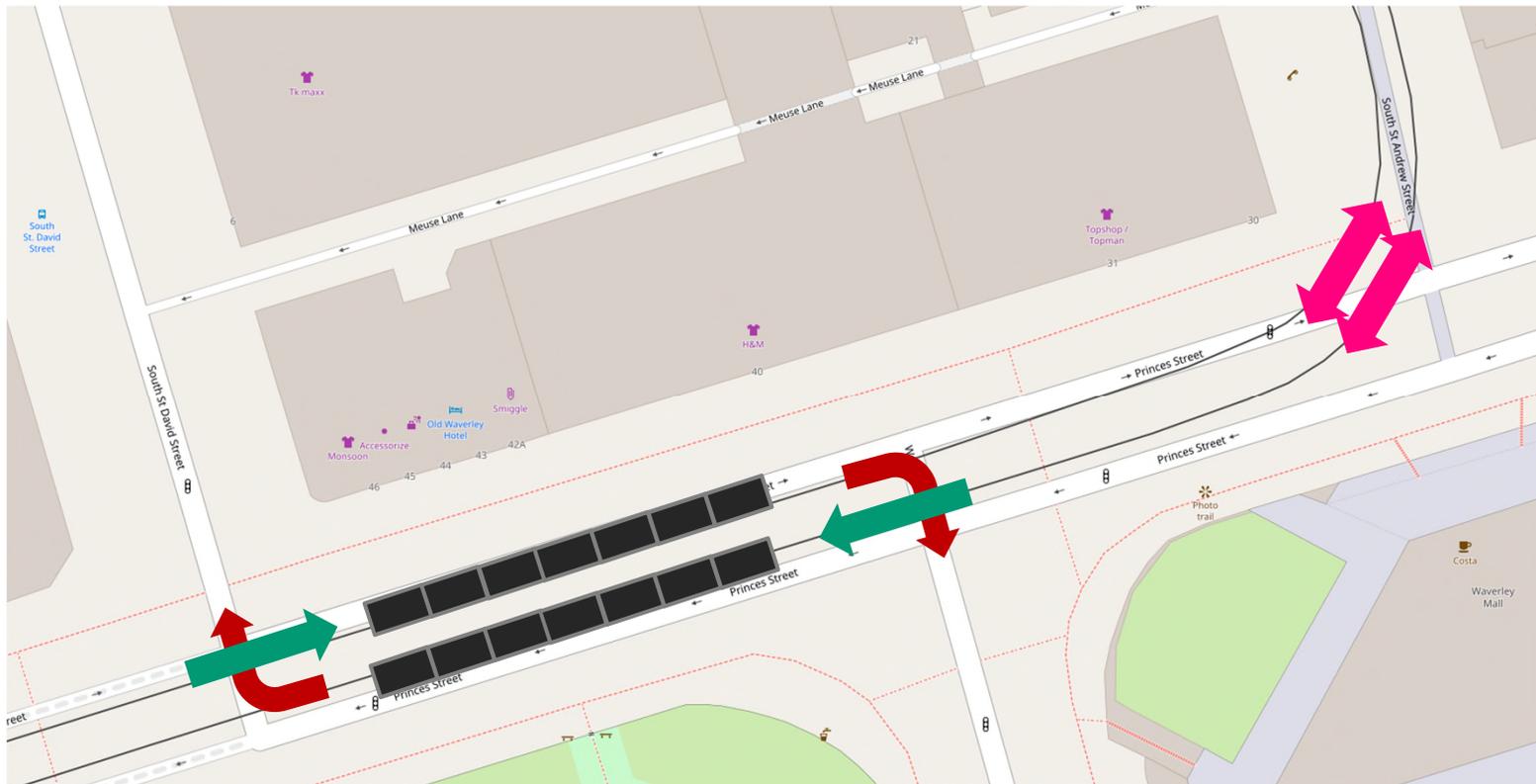
Still to do – Waverley Bridge

- Very close to next junction
- Both have separate right turns
- Most challenging junctions on the route
- Tight bend – slow trams – 50s journey
- 6 stages – including 2 tram only stages
- Heavy traffic movements, busy peds
- Well used bus stops

Stuck!



Potential crossing point



Conclusions

- On street section – significant conflicts
- Desire for 3.75 minute service
- Absolute priority – significant problems
- Fixed time with slots, tram green waves
- Full implementation on first two sections
- Teething problems but positive benefits
- Experience gained for Leith extension

A photograph of a tram at night, featuring a large pink banner with the hashtag '#Tramspotting' in white. The tram also displays the 'Choose Edinburgh Trams' logo. A person is walking on the platform in the foreground. The tram's identification number '251-B' is visible on the side.

Thanks

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