EXAMPLE OF 'ZERO' DELAY STRATAGY - SHALESMOOR NETWORK, SHEFFIELD

Consisting of:

1NAC1 - Netherthorpe Road / Meadow Street

1NBC1 – Hoyle Street / Malinda Street

1NCC1/6 - Penistone Road / Shalesmoor Roundabout

1NEC1 – Penistone Road / Infirmary Road

1VAC1/2 – Penistone Road / St Philips Road

1VBC1/2 – Penistone Road / Rutland Road

1VDC1 – Penistone Road / Albert Terrace Road

1VEP1/2 – Penistone Road / Gilpin Street Ped

1VFC1/2 – Penistone Road / Flora Street

The tram route comes along Netherthorpe Road, passes through Meadow Street Junction and Malinda Junction before entering a tram stop at Shalesmoor. Here it goes up Infirmary Road bypassing the crux of the traffic network Shalesmoor Roundabout . Sharlesmoor RB defines the linking of the key tram junction of Malinda Street and all the fixed time coordination along Penistone Road. Any STM strategy needs to retain this linking.

Legend:
- Node – Hard linked
- Node – VA
- Tram Stop
- Tram line
- Traffic Linking by TOD
- Traffic Priority
- Tram Priority

Rutland Road

Kelham Island Museum

Shalesmoor RB

Shalesmoor STOP

Netherthorpe STOP

University STOP

EXISTING SITUATION

All the junctions in this network are under fixed time control. There is LRT tram priority at the Meadow Street junction but due to the capacity constraints at Shalesmoor the Malinda junction has no priority and the trams do suffer delay here in both directions. Trams have to wait until the window in the plan and typically the stage splits are consistent, but if a tram arrives late in the window the tram stage can run longer than usual. This isn't matched at the Shalesmoor RB and leads to occasional wasted green as the Netherthorpe Road approach to Shalesmoor RB which could be given back to the internal.

AIMS

- To reduce delay to outbound trams through the Malinda Street junction.
- To give a benefit to traffic by making better use of any wasted green at Shalesmoor RB when the tram stage at Malida Street is running long.

STRATAGY

The tram priority at the Mainda Street junction uses the historic ETA of an approaching tram when it is still minutes away from the junction to alter the timings to match its ETA . For an outbound tram it uses the detectors at the West Street / Fitzwilliam Street junction, Upper Hanover / Glossop Rd junction and then the Meadow Street junction. By examining what the historic typical journey time is between these points STM can predicate with increasing accuracy when a tram is due to arrive and make small incremental timing adjustments over a period of time. Because this process is started so early it minimizes any disruption to traffic because the changes are small and spread over a few cycles. As the tram approaches and passes through new detection points the ETA is updated and the accuracy of the ETA is improved. This means when a tram is on the final approach to the Malinda junction it should arrive to correspond with the window that allows its tram stage to run. This strategy will prioritize outbound over inbound trams as the journey times down from the Brookhill RB are very consistent. Inbound trams have the Shalesmoor tram stop immediately preceding the Malinda junction and so are subject to more variability in journey times.

To make best use of the green at the Shalesmoor RB the STM strategy looks for a tram stage at Malinda that is running long and alters the plans at two of the Shalesmoor RB nodes to hold the Shalesmoor approach and internal to run until the tram priority is complete. This gives a bonus green to traffic from Shalesmoor heading along Penistone Road.

CONTROL DETAILS

- The STM strategy is timetabled to run daily between 0700 – 1900.
- The network is grouped so if any junction between Meadow St and Rutland Rd is not under STM control it will cause the entire group to be dropped.
- The strategy monitors the Tram detector reply watchdog bits (TWF) and if in reply will suspend STM control of the network.

RESULTS

The STM SPRUCE Strategy went live to street on the 27th March 2015. The criteria of improving priority to outbound trams were measured by comparing journey time data between tram detectors before and after the start date. The data below compares 'before' data taken on the 18th & 19th Feb 2015 with 'after' data taken on the 27th & 28th Feb 2015.

- The **outbound** 'before' average time between the tram RTS (ready to start) button at the University tram stop to the tram hitting the Exit detector at the junction - the average delay time **'before' was 12s** and **'after' was 3s** – giving **a reduction of 9s or 75%** (see chart below):

Outbound Journey Time Chart – Malinda Demand detector to Tram Phase
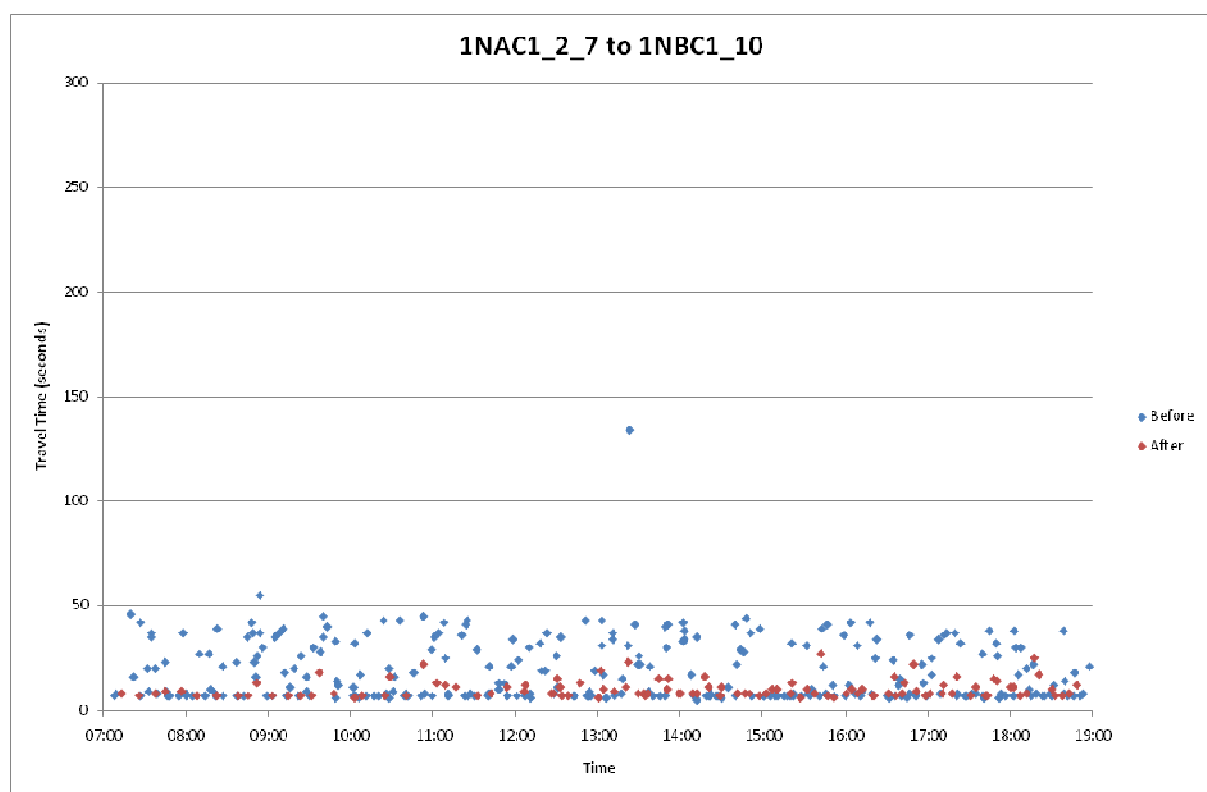
The average after delay has been reduced to near 'zero'. It was noted that any trams that did occur delay were trams with headways to the previous tram of less ten the travel time from the initiating strategy detector at Glossop Road. Hence these trams overlapped with a tram already being given the strategy and STM was unable to begin the optimization until the previous tram had cleared Shalesmoor.

Otherwise the strategy has come very close to delivering 'zero' delay to outbound trams with little or no dis-benefit to other road users.