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INSTITUT FÜR
## WIRTSCHAFTSINFORMATIK

BUS STATION DESIGN

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Bus Rapid Transit (BRT) is a 'bus-based rapid transit system that can achieve high capacity, speed, and service quality at relatively low cost by combining segregated bus lanes that are typically median-aligned with off-board fare collection, level boarding, bus priority at intersections, and other quality-of-service elements (such as information technology and strong branding) [ITDP, 2016, The BRT Standard 2016]. Often, BRT systems, such as Trans Milenio in Bogotá, Columbia (Bus No 5 in Hamburg, Germany, is not exactly the same, though), suffer from operational problems, such as bus congestion causing station overcrowding and delays in serving passengers or driving safety issues related to possible bus collisions due to lane-changing manoevres. We analyze the bus station design and rules for entering and leaving stations.

EXAMPLE: INCORRECT STATION APPROACH

A problem occurs if bus drivers block two lanes in order to block following buses from entering the station. Simple ideas to solve this problem are as follows:

- Regulate access by means of traffic lights with subsequent penalties in case of violation
- Change the wage system or incentives of bus drivers
- Automatic guideway transit
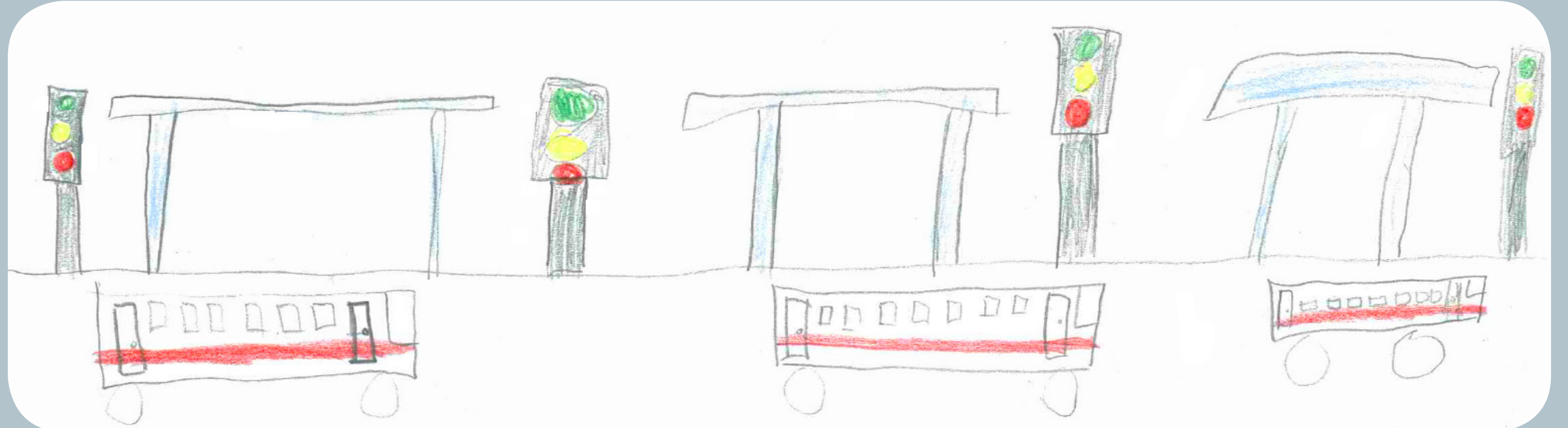
EXAMPLE: MULTIPLE PROBLEMS AND THEIR SOLUTIONS
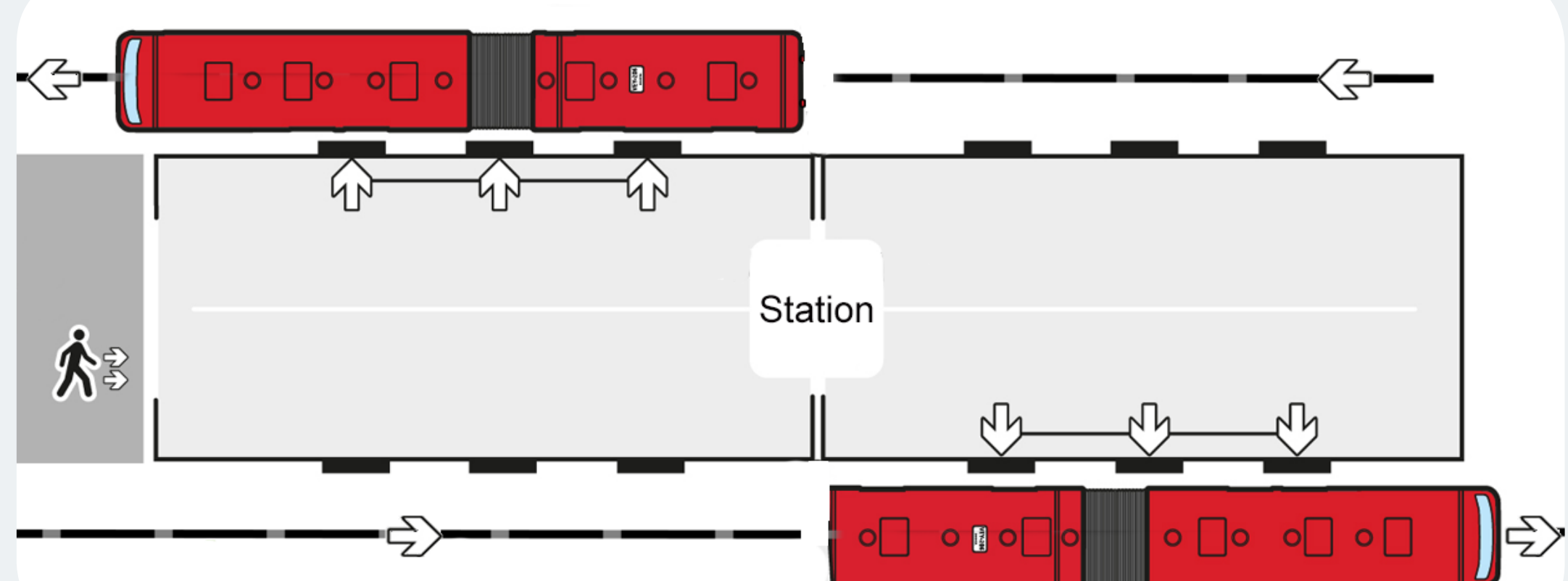
Left: A typical bus station layout, as it exists in many (not only) Latin-American countries. The Trans Milenio System, nevertheless, partly consists of more complex bus stations (right). The stations include two sub-stations, can be accessed by two-plus-two busses and two lanes per direction. On each bus berth various bus lines can halt.
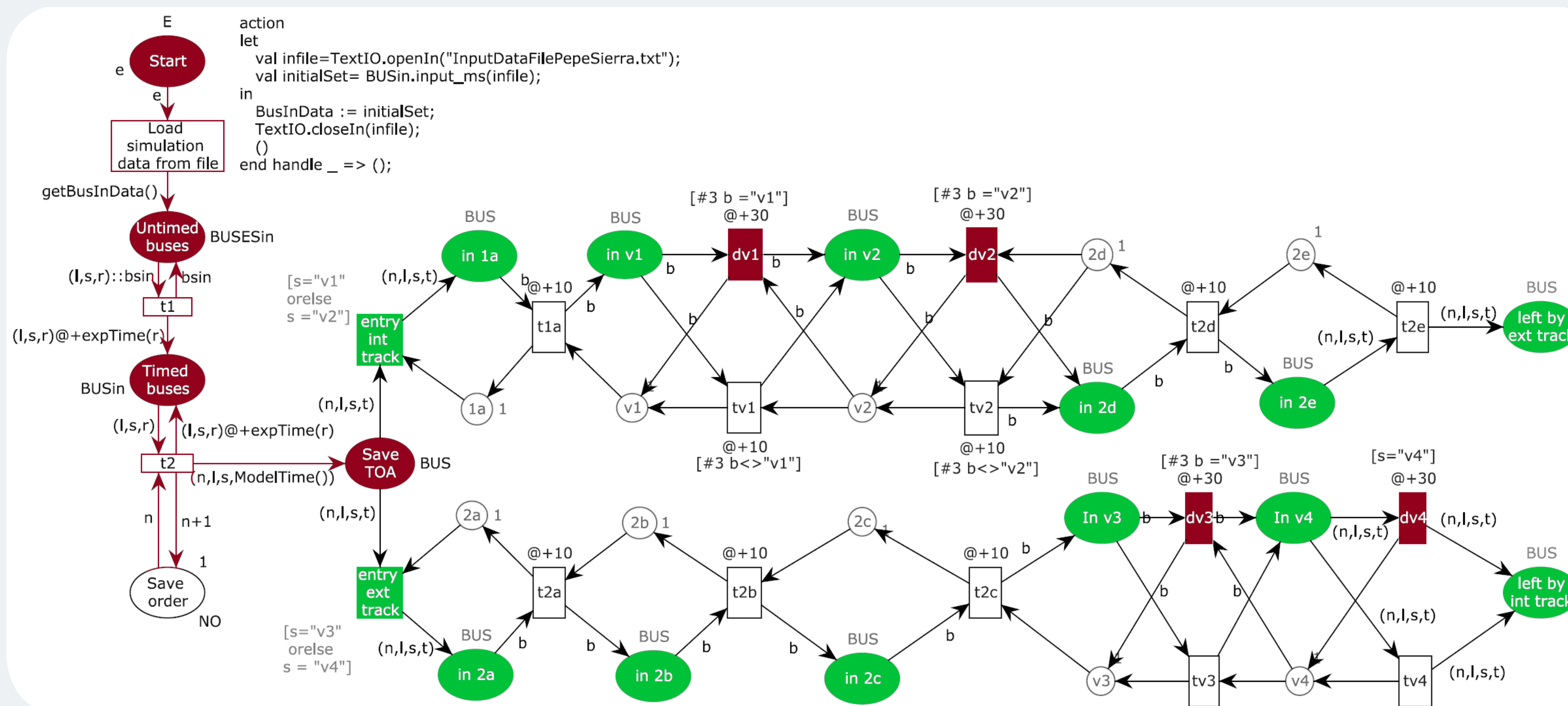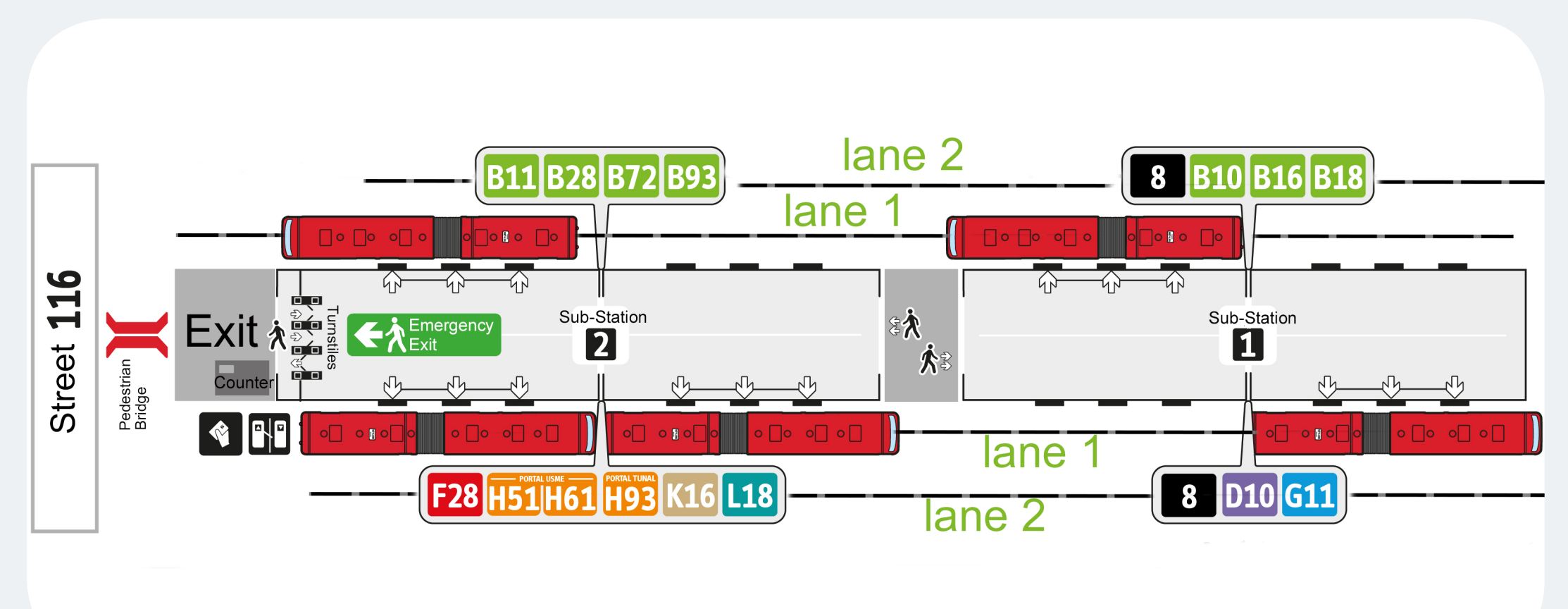
To assess the performance of the TransMilenio system while considering multiple objectives (minimizing

- passengers' transit time within the station
- buses sojourn time in the station
- bus collision risk at the station)

a colored stochastic petri net model is designed. Based on this model, simulation scenarios can be built, e.g., by changing the station layout in terms of stopping bays assigned to different bus routes.

For further information on similar transport-related topics we recommend the journal PUBLIC TRANSPORT: