

## Route planner

A **route planner** is a **software service** that allows **people** to plan their **journeys** with (typically) **public transport**. Such **systems** are widely available in **cities** worldwide.

A route planner covers some geographical **area** where **passengers** can travel with different **vehicles**, in our case with **buses**, **trams**, **metros** or **trains**. The whole **transport system** includes fixed **vehicle lines**, i.e., **bus lines**, **tram lines**, **metro lines** and **train lines**. Each vehicle line (hereafter called just “**line**”) has a fixed **timetable**, how vehicles on that line depart from their **starting point** and proceed till their **terminus** and vice versa. The timetable is different on **workdays**, **Saturdays** and **Sundays**. There are exceptional timetables for certain **public holidays**.

Each line has a pre-defined **route** in the **city map** and many **stops**, on which the vehicle driving on the line stops. A route is typically from one **place** to another, but some routes can be circular where the starting point and the terminus are the same stop.

For each stop, a timetable of estimated **stopping times** for each passing line has been calculated. The time is an estimate based on **history data**, and how it is calculated is not relevant here.

The passenger can change from a vehicle to another freely on those stops where the vehicles stop. This may include a short **walk** from one stop to another.

The whole area of the transport system is split into different **zones**. The **price** of the **trip** depends on in which zones the passenger enters and exits the vehicle. The price also depends on **the type of passenger**. There are **reductions** for **children**, **retired people** and other **special groups**. Some reductions depend on **time of day**, e.g., travelling is cheaper for retired people outside the **rush hours**. **Tickets** can be bought as **singles tickets** which are valid for a **fixed time**, **day tickets**, or **period tickets** which are valid for a certain longer **period** such as a **month**.

Passengers can ask the **route planning system** to show alternative routes, which vehicles and lines to use to be able to travel from one **address** to another, and on which **exchange stops** one should change from a vehicle to another. The system gives an **estimate** when the passenger should be in the **starting stop** and when the journey should be at the **end stop**.

**Walking times** within the **city street network** are not included in this **version** of route planner.