LINE LAYOUT AND OPERATION SCHEME

The line is y-shaped, composed with a main central segment plus two branches. For each segment, a length, a number of stops and a number of intersections are defined for each segment and sense. These parameters are equal for both senses in every segment, while stops and intersections are uniformly distributed along the segment length.

	A	B1	B2
Segment distance (km)	8.750	2.975	4.600
Number of stops	22	8	13
Number of intersections	61	21	26

Table 1. Line layout key parameters.

Operation schemes are differentiated between conventional and variable capacity. As conventional convoys run the corridor conserving the original convoy configuration with a constant convoy unit length, modular variable-capacity convoys apply two levers to generate a better spatial offer-demand fit. First, convoy splits and reassembles at the bifurcation to operate the two branches at the same headway, but reducing the capacity. Secondly, if the required number of pods for branch service is inferior to the required number of pods for main trunk service, a quantity of pods is allowed to split and keep operating the main segment in exclusivity.

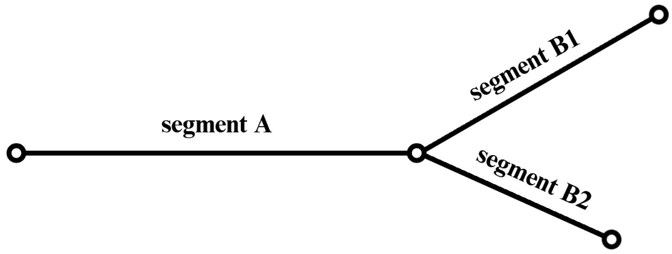

Figure 1. Line layout.

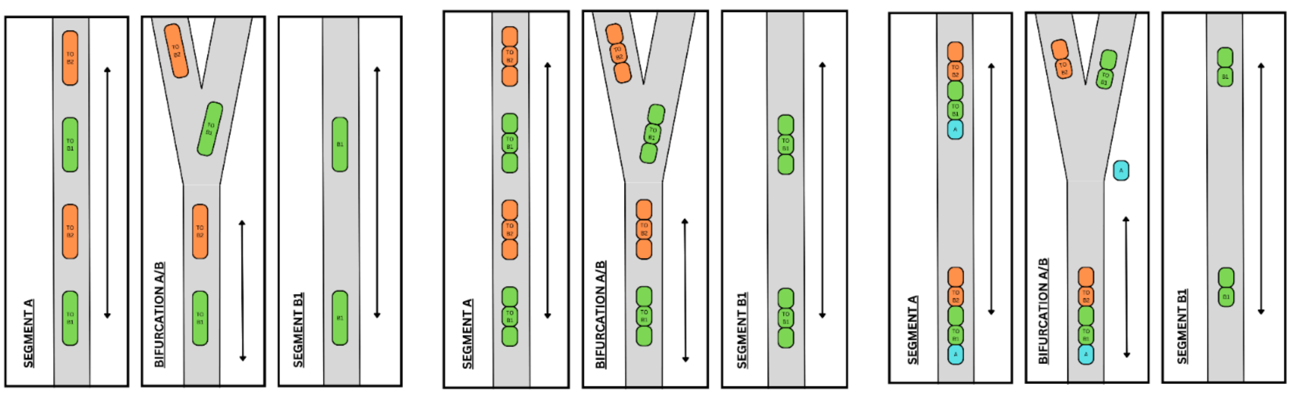

Figure 2. Operation scheme for S0 – S1 – S2 (from left to right).

Relative O/D (%)	A	B1	B2
A	74.00	4.10	4.10
B1	4.10	1.50	0.00
B2	4.10	0.00	8.10

Figure 3. Relative trip generation between segments.

VEHICLE PARAMETERS

Parameter	**Modular pod**	**Minibus**	**Midibus**	**Standard**
Strategy	S1 – S2	S0.1	S0.2	S0.3
Vehicle Length (m)	3	6	9	12
Weight (kg)	2,550	4,600	16,000	20,000
Capacity C (pax)	12	18	44	86
Cons. factor fc (kW-h/km)	0.17	0.31	1.09	1.36

Vehicle price Cveh (EUR)	250,000	357,000	433,000	592,000
Battery capacity B (kW-h)	55	99	345	431

Table 2. Tested vehicle parameters.

MOVEMENT PARAMETERS

Parameter	**Value**	**Units**
Cruise speed (v_c)	50	km/h
Average acceleration (a_u)	1.10	m/s^2
Standard deviation acceleration (a_σ)	0.30	m/s^2
Maximal acceleration (a_{max})	2.00	m/s^2
Traffic light green phase (G)	30	s
Traffic light red phase (R)	30	s
Unit boarding time (τ_b)	3.75	s
Unit alighting time (τ_a)	1.90	s
Daily operation time	18	h
Daily non-operative time	6	h
Minimum headway (H_{min})	3	min
Headway	1 - 2 - … - 10	min
Total demand	150 - 300 - … - 3000	pax/h
Slack time	0 - 3 - 6	min

Table 3. Movement parameters.

UNIT COSTS

	S0.1	**S0.2**	**S0.3**	**S1**	**S2**
Vehicle Type	6-meter bus	9-meter bus	12-meter bus	3-meter pod	3-meter pod
$\$_L$ (EUR/km-h)	0.96				
$\$_V$ (EUR/veh-km)	0.40	0.73	0.95	0.20	
$\$_M$ (EUR/veh-h)	15.17	16.41	18.09	14.48	
$\$_{fc}$ (EUR/chrg-h)	6.68				
$\$_{sc}$ (EUR/chrg-h)	2.61				
$\$_B$ (EUR/veh-h)	0.32	1.12	1.40	0.18	

Table 4. Simulation unit costs.

The model has been implemented in a Y-shaped corridor with a main trunk of 8.75 km and two branches of 2.975 km and 4.60 km respectively. We have tested different levels of demand with the same spatial distribution, where 74% of trips have the central corridor as origin and destination, while the rest have at least one extreme in the branches. In-vehicle travel time (IVTT) and waiting time are weighted by 1 and 2.1 respectively and affected to a value of time of 12.5 EUR/pax-h. All bus typologies are assumed to be automated, that is, no drivers are needed. The kinematic parameters of the bus, the characteristics of the bus corridor and the proxies of the system are defined in the following link. The simulation is run ten times for each scenario.