Strathclyde Regional Bus Strategy – Technical Report

Appendix F: Indicative network planning methodology

Overview

To inform the development of the Strathclyde Regional Bus Strategy, SYSTRA undertook a review and redesign of the network of local and long-distance services with proposals to improve connectivity, expand coverage, and boost frequencies, in line with the emerging draft SRBS policies. The purpose was to set out indicative scenarios that demonstrate high level benefits and costs to inform future planning and decision-making processes in the delivery of the draft SRBS.

Reviewing the network

The region was split into 12 zones and more than 400 routes were categorised by type, as shown in Figure 1. The baseline network was mapped out using Podaris (a GIS tool) and analysed to identify opportunities for change:

- **Adequacy**: where services require minimal/no enhancement (to avoid the potentially disruptive effects of change for its own sake).
- **Overprovision**: where services overlap or are excessively frequent due to duplication (freeing up resources to be redistributed to underserved areas).
- **Complexities**: where part-time variations run on top of (or separately to) core daytime services, or where routes are unnecessarily circuitous (creating an opportunity to simplify).
- **Deficiencies**: where services do not feed into interchanges, are not frequent enough, or do not have coordinated schedules to facilitate transfers.
- **Gaps**: where direct services or transfer connections do not currently exist.

Holistic planning of the network has the potential to address the effects of fragmented competition among three major and 17 minor operators by ensuring efficiency, consistency and accessibility across the entire network.

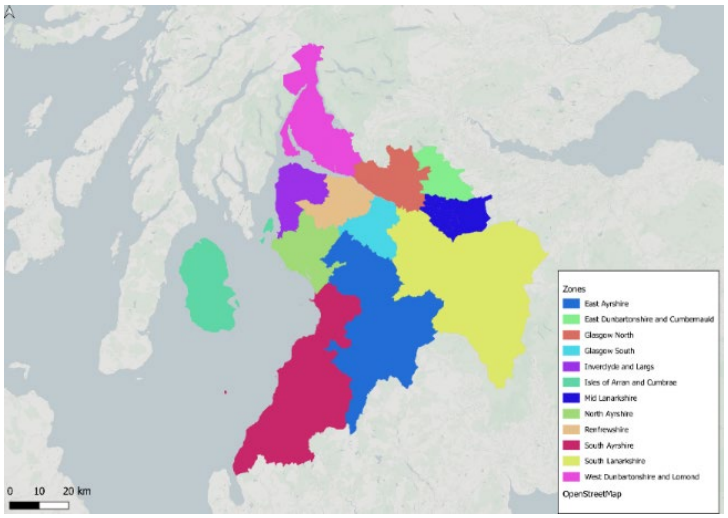

Figure 1: Map showing SPT region split into 12 network zones corresponding with both local authority boundaries and established distinctions between operating areas (© SYSTRA UK & Ireland)

The zones varied considerably in size and scale, ranging from high-frequency radial routes in/around

Greater Glasgow to smaller networks catering for mid-sized towns (like Ayr) and rural communities (such as West Dunbartonshire). The redesign accounted for local and long-distance routes alike, recognising the distinct yet complementary role played by all service types. The presence and purpose of cross-boundary routes (both between zones and out-of-area) were also factored into the process. Zones also correspond with existing depots.

Category	Description
Greater Glasgow	
Radials	High-frequency (every 15 minutes or better) core routes feeding into Glasgow city centre
Supplementals	Lower-frequency (every 20 minutes or more) routes feeding into Glasgow city centre
Orbitals	Routes (any frequency) which do not feed into Glasgow city centre
Outside Glasgow	
Locals	High-frequency (every 15 minutes or better) routes feeding into town centres
Supplementals	Lower-frequency (every 20 minutes or more) routes feeding into town centres
Rural connectors	Routes (any frequency) which connect smaller towns and villages to town centres
Regional	
Inter-urbans	Long-distance, lower-frequency (every 30/60 minutes), limited-stop express routes connecting urban centres, interchanges and other major destinations ***Note**: inter-urban services which must be booked in advance (i.e. those operated by Citylink, Ember, Flixbus, Megabus and National Express) are excluded from this category and this network review*

Table 1: Route classifications (based on frequencies, stopping patterns, and destinations served)

The proposals were built around a set of key principles which set out to achieve quality and consistency across the region, as set out in Tables 1 and 2. This included expanding cross-town connectivity, extending (and standardising) hours of operation, and enhancing access to major destinations such as urban centres, hospitals, and places of work and education.

Timeband	From	Until	Notes
Early morning	04:30	07:30	Run evening-level frequencies until approximately 06:30, with more buses running out and tapering up to full peak-time PVR by 07:30.
Morning peak	07:30	09:00	Peak-time frequencies should be as close to 'main day' as possible, but with necessarily expanded running times to account for slower traffic movements in peak periods.
Main day	09:00	15:00	Timetables should run with even, clockface frequencies throughout the day for simplicity.
Afternoon peak	15:00	18:00	*As above with morning peak.*
Evening	18:00	00:00	Taper down from afternoon peak to evening with buses running off between 18:00 and 19:00, maintaining headways that are as even as possible throughout.
Overnight	00:00	04:30	Run a standard hourly frequency (night services only).

Table 2: Timebands for scaling frequencies up and down, and standardised hours of operation

It was proposed to consolidate overlapping or disjointed routes into simplified, direct services, as well as to introduce circular routes to improve orbital connectivity with fewer transfers. Where transfers were still required, however, several transfer points were designated at major destinations such as hospitals, retail parks, and town centres – where routes would converge, and schedules would align (particularly for less frequent services). Bus routes were also tied in with multi-modal destinations such as train stations and active travel hubs to facilitate multi-modal integration.

A new route numbering convention could simplify and organise the identification of bus services. A numerical hierarchy would also position high-frequency radial services with numbers 1-99 at the top of a list (making them quicker to find), and others would be grouped by zone.

A new frequency scale was created, as set out in Table 3, with early morning, evening and Sunday headways systematically linked to daytime levels on weekdays and Saturdays. Consideration was given

to joint frequencies on common corridors (to ensure simplicity and convenience) and the potential for interworking (as a means of maximising efficiency).

	If...	Then...		
	Weekday daytime	**Saturdays**	**Sundays**	**Evenings**
Hyper	**5 mins**	5 mins	10 mins	20 mins
High	**7-8 mins** **10 mins**	7-8 mins 10 mins	15 mins 15 mins	20 mins 20 mins
Moderate	**12 mins** **15 mins** **20 mins**	12 mins 15 mins 20 mins	20 mins 20 mins 30 mins	30 mins 30 mins 30 mins
Low	**30 mins** **60 mins**	30 mins 60 mins	60 mins 60 mins	60 mins 60 mins

Table 3: Standardised frequency scale

Scenarios were developed as follows:

- '**Basic**': embedding a new structure by introducing route changes (and some new routes, where replacements or amalgamations are required) with minimal frequency adjustments.
- '**Moderate**': increasing frequencies to intermediate levels to grow capacity.
- '**Ambitious**': increasing frequencies to maximum levels (i.e. 'best case scenario') and introducing new routes for areas that are currently/historically unserved.
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The extent of changes to the base network for each scenario are summarised in table 4.

Type of change	**Number of services changed**		
	Basic phase	**Moderate phase**	**Ambitious phase**
Re-routed	98	98	98
Higher frequency	48	76	113
Re-numbered	141	141	141
New service (brand new, amalgamation, or replacement)	52	52	114

Table 4: High-level outcomes of the network redesign compared to the baseline (current) network

The scenarios could be considered as phases in the case where funding, demand and/or supply within the market required a phased approach to network enhancement. For example, improvements may begin with a 'basic' scenario at the point franchising is implemented, progressing to the 'moderate' and 'ambitious' scenarios as demand and funding allows.

A high level estimation of demand, fleet requirements and operating distance was carried out for the indicative network redesign scenarios, as set out in Table 5. The purpose of this work is to demonstrate indicative relative impacts to inform further work and decision making.

It is important to note that these indicative estimates do not take into account the impacts of other policies and measures, such as fares and ticketing. The estimates also only consider an initial impact of level of service change and do not consider impacts over time (i.e. year-on-year growth).

	Base	Level of service		
		Basic	Moderate	Ambitious
Patronage demand (numbers of trips)	118m	+16.5m	+37.8m	+50.4m
Bus kms (excluding empty running)	80.5m	+27.0m	+55.3m	+98.5m
Bus kms (including empty running)	88.5m	+29.7m	+60.8m	+108.3m
Peak vehicle requirement (excluding spares)	1,356	+30	+140	+642
Peak vehicle requirement (including spares)	1,561	+34	+158	+737
Number of people within 400m of a high frequency stop	1.6m	+220,000	+283,000	+345,000
Number of households within 400m of a high frequency stop	825,000	+104,000	+131,000	+160,000

Table 5: Indicative estimated level of service impacts – demand, fleet requirements and operating distance

Engagement with local authorities

Council officers were engaged to understand drivers of demand, community plans and the local development plans to ensure scenarios were cognisant of key social and economic priorities in each area.

Use of Podaris

Podaris is a cloud-based GIS platform that can be used to undertake bus network analysis and planning projects. Its capabilities include route mapping, timetabling, resource planning, stop-level demand modelling, and assessing accessibility with isochrone maps. It is also integrated with feeds such as TransXChange and GTFS, allowing for the seamless import, edit, and export of data.

Team expertise

In addition to using Podaris as both an analytical tool and a repository for proposals, the network review has been informed by SYSTRA's technical team, which includes people with experience in designing bus networks for operators and local authorities.