Blackpool Smart Traffic Corridors

Abstract

Blackpool's Smart Traffic Corridors project harnesses advanced Artificial Intelligence (AI), real-time radar detection, and open data platforms to address the unique traffic management challenges of a major tourist destination. Seasonal visitor influxes, unpredictable traffic patterns, and legacy infrastructure have long hindered efficiency and sustainability. This transformative initiative, funded through the Department for Transport's Green Light Fund, is designed to optimise traffic flow, enhance air quality, and promote sustainable transportation options. By integrating cutting-edge technologies, Blackpool Council is establishing a near-fully adaptive traffic management system that delivers measurable improvements and sets a benchmark for smart urban mobility.

The project represents a bold step towards modernising urban traffic management by solving present challenges and positioning Blackpool as a leader in smart city innovation. By embracing AI and open data, the initiative bridges the gap between traditional traffic systems and the future of intelligent urban mobility. With its focus on real-time adaptability, the project significantly improves the visitor experience, allowing smoother journeys for millions of tourists while ensuring the local community can enjoy less congestion and cleaner air.

Furthermore, the initiative exemplifies how technology can drive a cultural shift towards sustainability. By prioritising public transport, cycling, and walking, Blackpool Council is leading the way in encouraging greener travel habits and reducing the environmental footprint of urban mobility. This integrated approach to traffic management, combined with a forward-thinking vision for future enhancements, underlines Blackpool's commitment to creating a vibrant, accessible, and eco-friendly destination.

Keywords:

Smart Traffic, Artificial Intelligence, Traffic Management, Sustainable Transport, Smart Cities

Introduction

Blackpool, one of the UK's most iconic seaside resorts, is renowned for its vibrant attractions, rich history, and role as a cultural and leisure destination. With a population of approximately 141,000 (ONS, 2021) and a staggering 20 million annual visitors, the town experiences a unique set of opportunities and challenges. Its status as a premier tourist hotspot creates a dynamic environment where thriving economic activity must be balanced against the demands of an ever-changing and often unpredictable traffic landscape.

Over the decades, Blackpool's traffic management systems have relied on traditional approaches, including semi-adaptive Fixed Time Urban Traffic Control (UTC) plans. While effective in their era, these systems struggle to cope with the complex traffic patterns that arise from seasonal surges, major events such as BBC's

Strictly Come Dancing, and the daily needs of a growing community. The limitations of these legacy systems, rigidity, lack of responsiveness, and an inability to adapt to real-time conditions, often result in inefficiencies, congestion, and environmental challenges.

Recognising these constraints, Blackpool Council embarked on the Smart Traffic Corridors project, a transformative initiative designed to modernise the town's traffic network using cutting-edge technologies. By leveraging both historical and real-time data, the project aims to deliver a traffic management system that is not only responsive to current demands but also scalable for future needs. This approach enables smarter, greener, and more efficient urban mobility that aligns with Blackpool's vision of a sustainable and prosperous future.

The project's foundation lies in the integration of 32 state-of-the-art radar detectors and an AI-powered adaptive control system. These innovations collect granular data on traffic flow, vehicle classification, and pedestrian activity, feeding it into a centralised platform to inform real-time decision-making. Historical traffic data further enhances the system's ability to predict and prepare for recurring patterns, ensuring smoother journeys for residents and visitors alike.

Blackpool's Smart Traffic Corridors project embodies a forward-looking commitment to innovation. By embracing the potential of technology, the council is not only addressing today's challenges but also laying the groundwork for a resilient and adaptable traffic network that will support the town's growth and success for years to come.

The Blackpool Smart Traffic Corridors (BSTC) project began in December 2024 and is aiming to be completed and operational by November 2025.

Project Overview

Along its key routes, Blackpool have some obsolete traffic counters, and the projects primary aim is to upgrade these counters with new, innovative above ground radar detection technology which will bring them into general maintenance. The radar detectors comply with Traffic Open Products and Specifications (TOPAS) and will act as data collection hubs providing the Council with real time data such as classification (pedestrian, cyclist, motorbike, car, LGV, HGV etc), volume, occupancy, average and 85 percentile speed, headway, gap, wrong way detection.

Since the PFI began, Blackpool Council have invested in additional smart traffic management systems such as Swarco's ImCity (to be upgraded to MyCity). The data collected from the new radar detectors, will be pushed to Blackpool Council's Smart Cities dashboard (MyCity) and MyCity's Strategy Manager application allows the user to create intelligent strategies which will automatically select preconfigured fixed time UTC plans

based on predefined traffic volume thresholds. Also, the detectors ability to classify sustainable transport modes will allow priority of these modes along the routes making them more attractive to users.

Through automatically changing the fixed time plans using real time data the project is enabling the existing semi adaptive control to be an 'almost' fully adaptive system. This will make the lives of the people in Blackpool better through –

- Improving air quality along these corridors as poor performing corridors mean increased emissions, poorer air quality and increased carbon emissions.
- Making sustainable modes attractive to users through improving bus service reliability and journey times and providing priorities for cyclists and pedestrians.
- Improving journey times for all users through fixed time plans based on real time data and network conditions.

Semi Adaptive UTC Control and its Limitations

Fixed Time UTC plans are a series of plans configured in the UTC central system. The plans are timetabled, so can be changed at different times of day – typically at peak and off peak periods. Each plan is a set of timings for a traffic signal cycle that runs at the traffic signal controller. As they are fixed time they run the same times cycle after cycle. A traffic signal cycle is a complete sequence of traffic signal controller stages. A traffic signal controller stage is a period when one or more non-conflicting traffic signal phases are at green. A traffic signal phase is a separate electrical circuit from the traffic signal controller feeding one or more traffic signal heads.

The plans become semi adaptive when demand dependency and gap out are incorporated. Demand dependency means that the stage will only run in the plan if there is a on street demand for it. If there is no demand the plan will skip the stage in the cycle. The 'Gap Out' facility, if configured, will allow the allocated time for the stage in the fixed time plan to be based on 'on street' extensions e.g. if the plan moves to stage 2 and stage 2 is selected for Gap Out, the stage will end once on street detector extensions have ended or the time for the plan to change stage has been reached.

Given the fluctuating traffic due to tourists and events, ensuring the appropriate semi-adaptive UTC plan for traffic conditions is operational remains challenging as the timetable for plan changes is fixed.

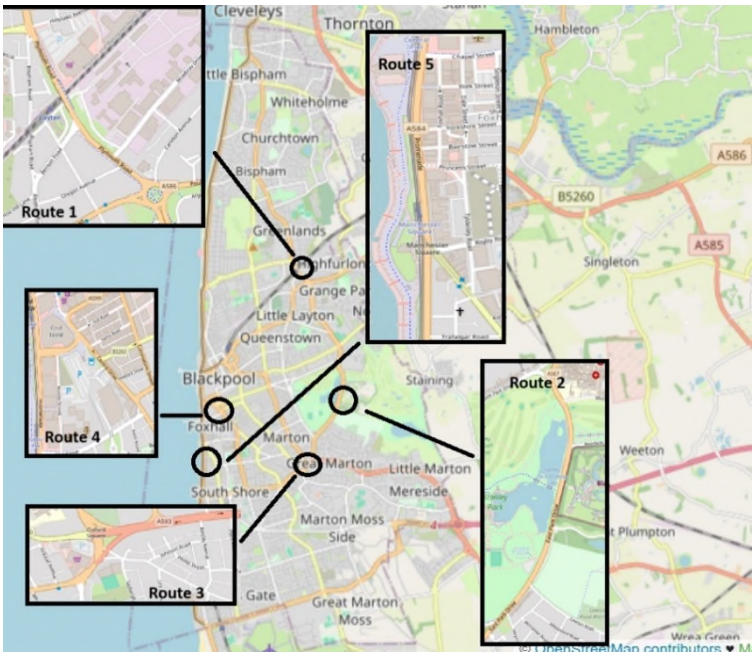

Figure 1 - Blackpool Smart Traffic Corridor Routes (@openstreetmap contributors)

The Routes

Five routes have being selected to be upgraded to Smart Corridors, **Figure 1**. The routes are –

- Route 1 Plymouth Road – Plymouth Road is part of the A587 route which links the north and south of the town and is one of the main routes to the Promenade;
- Route 2 East Park Drive – East Park Drive is also part of the A587 and is the main route for access to Blackpool Zoo, Stanley Park, and Blackpool Victoria Hospital;
- Route 3 Preston New Road – Preston New Road is one of the key routes into the town from the M55 motorway providing access to the A587, the southern Promenade, and the Town Centre;
- Route 4 Central Drive – Central Drive is one of the key routes to the tourist attractions and car parks; and
- Route 5 Promenade – Promenade is a main route serving the tourist attractions and car parks.

The Solution

Figure 2 shows the system architecture diagram being implemented for the BSTC project.

Artificial Intelligence Platform

At the beginning of the project the data from the following applications will be pushed/pulled to the Artificial Intelligence (AI) Platform provided by Simplifai Systems via Application Programming Interfaces (API's) –

- BlipTrack – Blackpool's existing Bluetooth journey time measurement equipment.
- Car Park Systems – Blackpool receives data from existing car park detection.

- Bus Open Data Service (BODS) – BODS provides bus timetable, vehicle location, fares data for every local bus service in England.
- UTC outstation logs – will provide information on how frequent demand dependent stages are called.

The Artificial Intelligence (AI) Platform which will then use the data obtained from these applications to create optimum UTC fixed time plans. Once the radar detectors are installed, they will also pass data to the AI platform via an API allowing the AI to further optimise the Fixed Time plans using the additional data source.

Radar Detectors

32 Smartmicro TRUGRD cameras are being located at strategic locations along each route along with 16 Smartmicro communication hubs (comm hubs). The breakdown of cameras and comm hubs per site on each route is shown in **Table 1** below.

Route	Site	Number of Sensors	Number of Comms hub
1	Bispham Road / Plymouth Road / Warbreck Hill Road / Hollyoake Avenue (B&Q)	3	1
1	A587 Plymouth Road / Benson Road	1	1
1	A587 Plymouth Road / Mowbray Drive	1	1
1	A586 Poulton Road / St Walburgas Rd / Plymouth Rd Roundabout	4	1
2	East park drive / North park drive / Whinpark Avenue (VICTORIA HOSPITAL)	3	1
2	East Park Drive / Hospital Link Road	3	1
2	East Park Drive / Woodside Drive (Zoo Car Park Access Road)	1	1
2	East park drive, South of Zoo entrance	-	-
2	East Park Drive near Model Village	-	-
2	East Park Drive / Lawson Road	2	1
3	South Park Drive / Preston Old Road	1	1
3	Preston New Road / South Park Drive	2	1
3	Preston new road / Waterloo road / Whitegate drive / Park road (The Oxford)	2	1
3	Waterloo Road / Vicarage Lane	2	1
4	Coronation Street / Albert Road (Debenhams)	1	1
4	Central Drive / Bank Hey Street	1	1
4	Central Drive / Chapel street	3	1
5	Promenade / Lytham road / Rigby road (Manchester Square)	-	-
5	Promenade / Chapel street (Central Pier)	2	1
Total		**32**	**16**

Table 1 – TRUGRD and Comm Hubs numbers per site

The TRUGRD cameras will collect the following data which will then be passed to the Smartmicro Cloud via the comm hubs –

- Volume
- Vehicle Classification
- Headway
- Speed (85th Percentile and Km/h)
- Gap
- Occupancy

The data from the Smartmicro Cloud will then be pushed/pulled into the AI platform and the MyCity Smart Cities Dashboard.

Smart Cities Dashboard

As part of the project, Blackpool's existing Urban Traffic Management and Control (UTMC) Common Database – ImCity, will be upgraded to Swarco's MyCity Smart Cities Dashboard. As part of this upgrade an API will be developed between the Smartmicro Cloud and MyCity allowing the live rolling traffic data captured by the TRUGRD sensors to be pushed/pulled from the Smartmicro Cloud into MyCity. The MyCity Strategy Manager application will then be used to automatically change the UTC fixed time plans based on predetermined traffic data thresholds. The data thresholds will be developed using the data provided by the AI platform and will be triggered by the live traffic data being received from the Smartmicro Cloud.

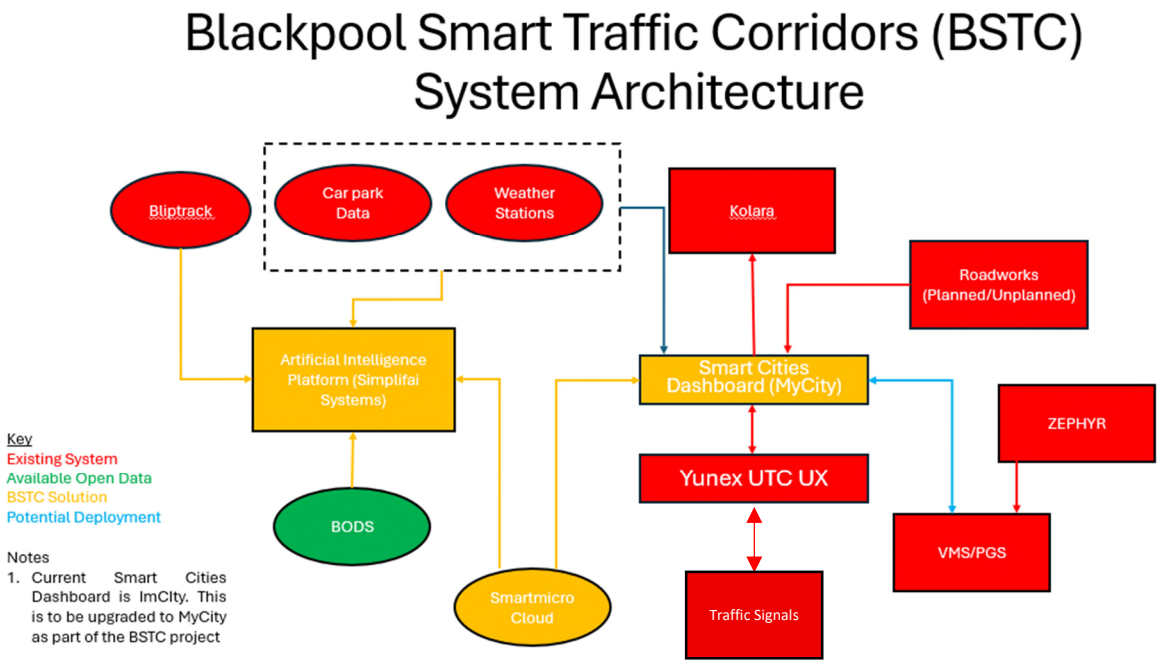

Figure 2 – BSTC System Architecture

UTC System

Blackpool currently have a Yunexc UX UTC system. The optimal fixed time plans suggested by the AI platform will be entered into the UTC system, such that they can be triggered by the MyCity Strategy Manager.

How will we assess the impact of the interventions?

To assess the impact of the interventions, indicator sets aligned with broader Blackpool Council policies, including the Local Plan, Bus Service Improvement Plan, Air Quality Strategy, Climate Adaption Action Plan, and the forthcoming Local Cycling and Walking Infrastructure Plan will be used. These policies collectively aim to enhance air quality, promote modal shift, improve sustainable transport, optimise the highway network, integrate public transport, and manage congestion. Throughout the project lifecycle, we will monitor and measure the following indicators:

1. Air Quality - Monitoring air quality on key routes using Blackpool Council's air quality monitors. The replacement of traffic counters and the implementation of automatic fixed time plan selection are anticipated to improve air quality.
2. Congestion - Officers will monitor congestion on strategic routes using queue lengths, and journey time data from Bluetooth devices. The interventions are expected to alleviate congestion, particularly during peak tourist seasons, optimising the transport network and enhancing air quality.

3. Public Feedback (Compliments and Complaints) - The frequency and nature of public compliments and complaints will provide insights into the local community's sentiments regarding the interventions.
4. Traffic Count Systems Upgrade - Tracking the number of traffic count systems upgraded.
5. Automatic Strategies by Smart Cities Dashboard - The Smart Cities dashboard will record the frequency of automatic strategies activated using traffic count and classification data. This is likely to contribute to improved air quality and sustainable transport provision.
6. Journey Times - Utilising Bluetooth journey time systems or Floating Vehicle Data to monitor journey times along routes. Expectations include improvements during weekends and summer months, managing congestion, optimising the transport network, and enhancing public transport.
7. Sustainable Transport Provision: Introducing above-ground radar to classify pedestrians and cyclists, allowing prioritisation of these modes, promoting modal shift, sustainable travel, and contributing to improved air quality.
8. Bus Journey Times and Reliability: Bus operators and BODS will provide data on bus journey times and reliability. Planned interventions aim to improve these aspects, facilitating modal shift and supporting sustainable transport policies.

Where available, base indicator sets along each route will be collected and assessed against post-intervention data to gauge success. Successful interventions will be incorporated into future maintenance programs and renewals, ensuring the longevity of Smart Traffic Management and Smart Corridors in Blackpool. Additionally, this innovative approach could extend to implementing intelligent dimming and trimming strategies for street lighting assets, reducing energy consumption using data collected by above-ground radar detectors and traffic signal site data hubs.

Future aspirations and next steps

The Blackpool systems ensure that any future mobility ideas and policy changes can be supported. The MyCity Smart Cities Dashboard supports the opening up of data as the data collected within the application can be published. Blackpool’s plan to replace their obsolete count sites with above ground radar and move from semi adaptive coordinated UTC control to Smart Corridors using data gathered from these detectors will allow the count sites to collect a greater dataset, including but not limited to headway, count data, vehicle speeds etc, than traditional count sites. In addition, data from other platforms and systems such as air quality, floating vehicle data, Bluetooth data etc can be collected. All collected data can be stored in the MyCity application. This data can be used to provide additional data and intelligence to manage the network even more smartly using the MyCity Strategy Manager application e.g. the data can be used to trigger fixed time signal plans within the UTC system using predetermined strategies based on weather conditions, air quality etc. The additional data can also feed into the Simplifai Systems AI platform, allowing it to optimise the already developed plans further by considering optimimal network performance based on weather conditions, events, sustainable transport modes etc.

All the signals and urban ITS infrastructure within Blackpool is connected by Internet Protocol (IP) communications to their associated hosted instations such as UTC, MyCity etc. This ensures that Blackpool are set up for future technologies as data can be received to/from connected vehicles e.g. GLOSA. IP connectivity enables the implementation UK Manual for Smart Street principles in the future, providing flexibility of how the signals operate as the infrastructure is already in place for new smart signalling systems such as Fusion and SCOOT7, but at the same time are set up to implement smart traffic management through MyCity.

Blackpool's traffic signal infrastructure is due to be replaced as part of the existing PFI arrangement, this means that all equipment at each traffic signal site will be the latest model and operating the most suitable control strategy such as MOVA, ensuring that all sites are compatible with new innovative technologies like Artificial Intelligence (AI) above ground radar detection, multi lane radars, and the MOVA version 8 control strategy etc. Blackpool are currently installing the latest radar technologies at newer sites over traditional inductive loops. This allows traffic signal sites to also operate as data collection hubs on our network and increase the number of smart corridors on the Blackpool network.

Blackpool are also set up to prioritise different users at traffic signal sites. Due to the high number of visitors that come to the town in the summer months Blackpool can provide the flexibility required for policy changes, supporting Local Cycling and Walking Infrastructure Plan (LCWIP) and sustainable transport modes though the use of AI in radar detection, enabling sites to be prioritised for specific user types as per the hierarchy of needs e.g. pedestrians, cyclists, public transport etc. Furthermore, Blackpool can support policy changes towards sustainable transport as the IP communications network supports bus prioritisation through the centralised system.

If the initial BSTC project is successful we are looking to develop the technology further increasing the intelligence on the Blackpool network and using emerging technologies to inform travellers, providing seamless journeys, and mitigating the impact of tourist travel on the Blackpool residents. **Figure 3** shows the future architecture that could be adopted as the BSTC project evolves. Future aspirations for the BSTC project are the introduction of –

- Automatic AI plan selection – develop an interface between the AI platform. MyCity, and UTC UX which will allow the AI to automatically change the plans in UTC. This will considerably reduce the manual intervention time that is required to enter the plans
- Green Light Optimal Speed Advisory (GLOSA) – As Blackpool's corridors operate using UTC Fixed Time Plans it is the perfect place to introduce GLOSA in the UK.

- Connected Vehicles – Working with Swarco and Simplifai the architecture allows for the introduction of connected vehicles on the Blackpool network as information can be passed/received between MyCity and in vehicle devices.
- Events data – By working with companies such as Data Thistle to pass events data into both the AI platform and the Smart Cities dashboard then further data can be used to prepare and manage events held in Blackpool.
- Weather station data – by passing weather data into the AI platform and MyCity, plans can be optimised and triggered based on weather conditions improving network efficiency even further.
- Light Rail Transit (LRT) timetable and position data – this will allow for more informed travellers to Blackpool. It will also allow signals to prioritise late running trams instead of traditional first come first served.

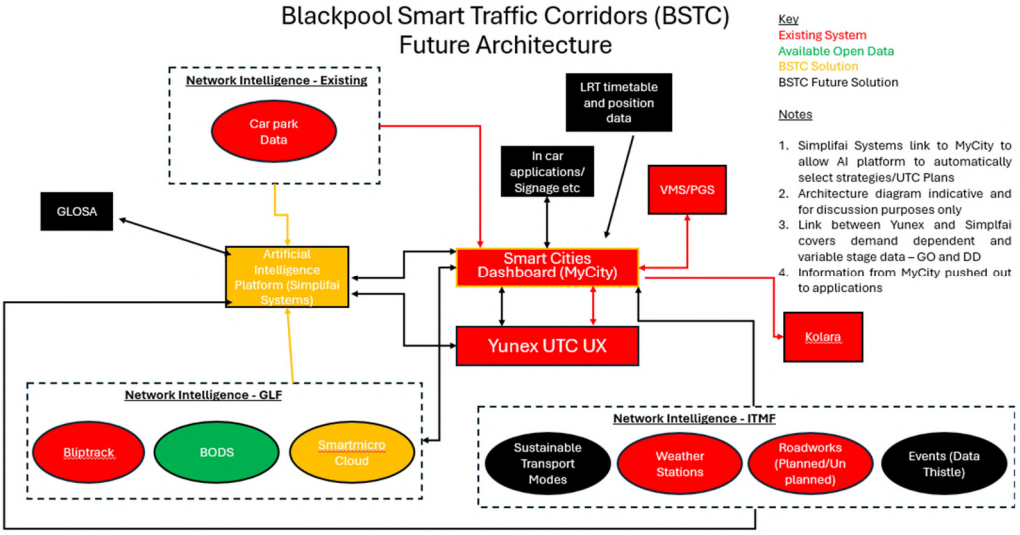

Figure 3 - BSTC Future Architecture

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