globalreach
WHITEPAPER
SECURE, SEAMLESS GUEST WI-FI FOR RAIL

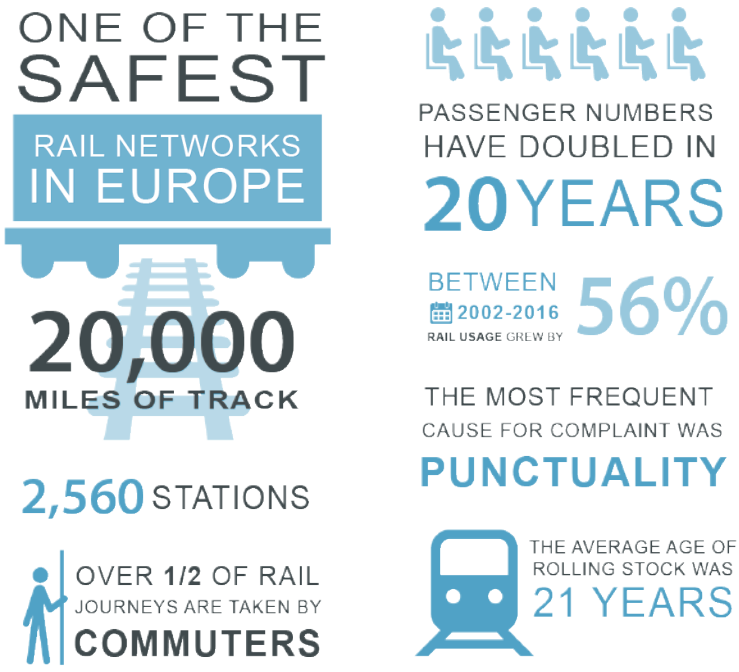
INTRODUCTION

Our review of the Wi-Fi customer experience on passenger railway services, identified a number of areas that contributed to making the passenger experience stressful. Consistent access to passenger relevant and timely information is a key element in improving the customer experience and addressing areas of passenger stress. This is best achieved by ensuring the customer is in a position to receive or connect to information sources as they wish.

Making sure the customer can be 'always on' is key to enabling the connected journey. Continuing the current practice of asking the passenger to enter an email address or phone number each time they wish to use the Wi-Fi service or switch to an onboard train Wi-Fi service introduces unnecessary friction for the user.

Upgrading existing Wi-Fi infrastructure and services to the Passpoint standard* provides the opportunity to enable passengers to connect with minimum friction and more securely via an encrypted radio link. Wi-Fi access points that support this standard have been widely available from leading manufacturers for many years. The connected customer experience should be consistent irrespective of whether the user is on a train, which part of the train, on the platform, the station concourse, retail area or car parks.

THE UK RAIL NETWORK



HOW Passpoint CAN IMPROVE THE RAIL CUSTOMER EXPERIENCE

SECURE:

Secure Wi-Fi service protects customers from in-air and man-in-the-middle attacks.

SEAMLESS

- Provision devices onto Passpoint Wi-Fi in seconds.
- Use Online Sign Up server that allows for easy online & offline signup e.g web link via QR code or NFC chip.
- One-time simple provisioning takes the complexity out of getting connected and enables in-pocket connection across all locations.
- Customers will automatically and securely connect in locations anywhere along the rail infrastructure enabling seamless access to multiple TOCs at one station with the single sign on.
- Provide a cellular-like experience.
- Support for staff or multi-tenant support with hidden SSIDs (Wi-Fi network Identifier). Enables separate use of the Wi-Fi network by all user groups e.g.: passengers, operating staff, security staff and contract staff.
- Seamless roaming enabled between different Wi-Fi networks (and operators) whilst retaining individual brand identities (SSIDs).

MONETISE

Third party partners such as carriers, aggregators and service providers can be allowed to roam or offload data onto the Wi-Fi network. This provides service operators and rail enterprises with additional revenue opportunities and extends service use.

DETAILED RECOMMENDATIONS

The Autumn 2018 National Rail Passenger Survey showed that the availability of Wi-Fi at a railway station and the reliability of Wi-Fi on-board trains has made a slight improvement but these are still two of the lowest scoring satisfaction metrics.

Research also identified reliable free Wi-Fi availability on the train as one of the top five rail passenger priorities for improving customer experience. However, recent wireless procurement tenders from a number of TOCs suggest a limited ambition to improve on capabilities and coverage of the Wi-Fi services being deployed. Without reliable Wi-Fi, a significant channel for customer communication is impaired or lost completely, impacting direct and real time access to important information such as train journey status.

> **Not since the railway transformed from steam to diesel in the 1960s has a technological breakthrough held such promice to vastly improve our railway for the benefit of the millions of people and businesses who rely on it every day. The age of a digital railway has today moved from the drawing board and into reality as we reveal a blueprint that will improve the lives of millions of passengers and freight users across the country. Today's commitment is to adopt and roll-out new digital technology, for both trains and track, that will deliver faster, more frequent services for passengers and business alike, giving our economy a massive boost.**
>
> ***Mark Carne***
> *Former CEO, Network Rail speaking in May 2018*

Even if coverage may be improving although slowly, the user experience remains poor and inconsistent. A single sign-on experience across trains, lounges and platforms would provide a greatly improved passenger experience. Once the user returns or roams to another part of the network, the device can be 'remembered' by the Wi-Fi service, removing the need to re-enter credentials.

The introduction of a consistent minimum service standard across the railway system is required. The provision of a straightforward one-time online sign up process for passengers before they travel can be a key enabler to achieving a better customer experience.

Passpoint is an 'over the top' service i.e. delivered as an enhancement to existing Wi-Fi hardware. Most hardware is Passpoint ready and integration is straightforward via changes to the network configuration. Through this technology, customers, staff and contractors can all benefit from seamless and secure connectivity to mirror today's cellular experience.

Legal compliance is ensured as the subscriber's connection is authenticated using credentials provisioned by the mobile operator on the user's SIM or via online sign up validation - this allows greater traceability of who is on the Wi-Fi and where, balancing GDPR and security responsibilities. Hence, TOCs can meet all CSP (Communications Service Provider) and ISP (Internet Service Provider) regulations for providing the service.

Each device receives a one-time provisioning file to automatically configure Wi-Fi settings and encryption without manual intervention. When registered, the user is provisioned with a Passpoint credential which allows them to automatically and securely connect.

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For users with devices without a mobile SIM, the onboarding sequence can be shortened further with the use of QR codes or NFC tags to direct the customer to the online sign p server (OSU). This can be embedded in collateral to drive greater customer awareness, (e.g. tickets, posters, leaflets).

The maturity of the technology is such that once a profile is downloaded, seamless connectivity, as enabled by Passpoint, is as easy as taking a phone out of pocket and noticing that the device is connected to Wi-Fi. Seamless, frictionless login improves the passenger experience and thereby passenger satisfaction, while the operator can use the technology for improved passenger engagement.

HOW TO IMPROVE CUSTOMER SATISFACTION AT A REASONABLE COST

Using Wi-Fi on a consistent basis may reduce the need to build more cellular towers close to tracks. This may help to mitigate any coverage obligations for cellular operators from Ofcom when it auctions 5G spectrum.

In Germany and France the regulator is obliging the operators to build thousands of new towers next to tracks to improve coverage on trains – while this may appear to improve service, it is not clear that this is the most cost effective way of enabling coverage onto a train. Putting in better backhaul and then improving Wi-Fi could be a more cost-effective approach, where backhaul is a mix of cellular and other technologies such as Wi-Fi 6 (i.e. 802.11ax, the latest generation of Wi-Fi).

> **We need a railway that is sustainable, reliable and delivers a better experience for our passengers - one which accommodates more trains, faster journeys, with improved safety and reliability... that is exactly what the digital railway will help us do.**

The Rt Hon Chris Grayling MP
Former Secretary of State for Transport, during a key policy announcement in June 2018

Passpoint supports location-aware, customer-segmented communications, providing the ability for train operators to send appropriate, in some cases time-sensitive messages such as train delay information to customers depending on for example who they are (customer type) or, where they are (location). Conceivably a message could be sent to all Wi-Fi users on a train to alert them of imminent arrival at the next station to supplement on board PA announcements. One can imagine similar use cases on the platform or station concourse.

Some Wi-Fi operators have used an authentication method for seamless login using the MAC (Media Access Control) address of a previously connected device. Communications between the device and the Access Point is unencrypted in this situation. Moreover, the latest mobile handset operating systems updates are randomising MAC authorisation on many devices for other security reasons, meaning that returning users may have to re-authenticate each time. Passpoint overcomes this issue by using encryption between the Wi-Fi access point and the user device and is therefore more secure.

ROAMING & DATA OFFLOAD

Passpoint can be used to provide enhanced roaming services for all customers. This may enable an integrated roaming service that could deliver frictionless access across all Hotspot

2.0 Wi-Fi networks at the stations and on trains, regardless of the network operator by providing single sign on (SSO) nationwide. This could transform the passenger journey and customer experience by greatly reducing the frustrations customers feel.

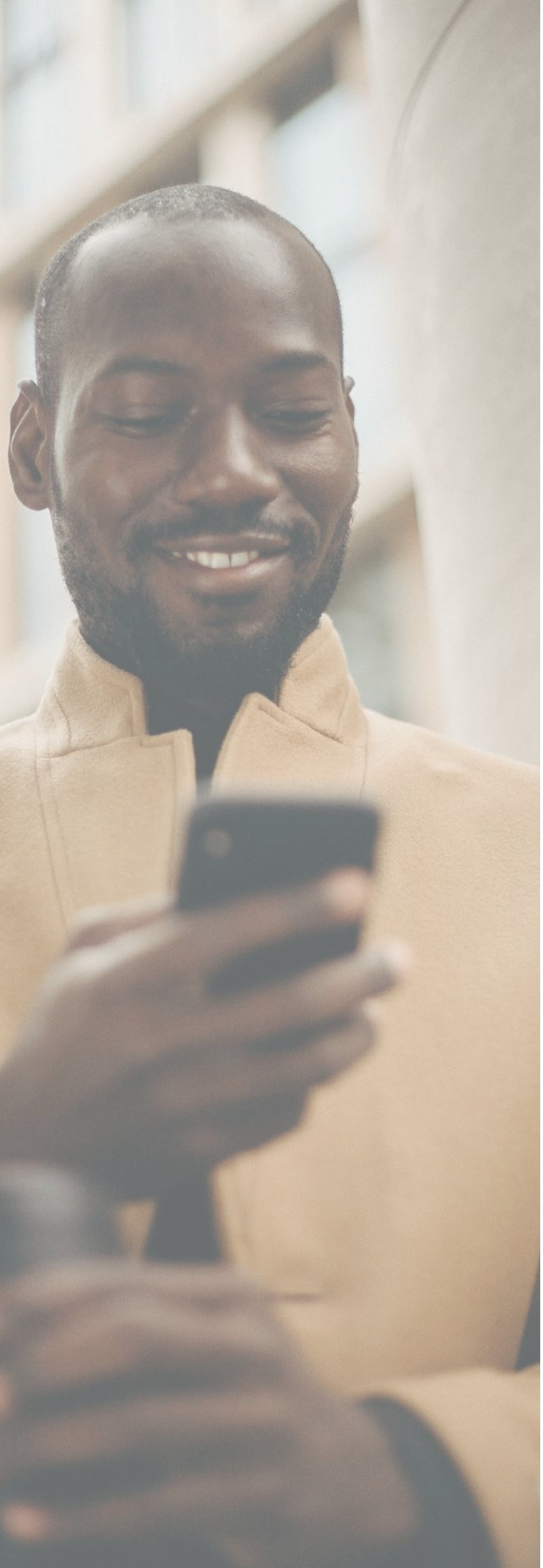
Currently passengers arriving on a train to a station that may serve multiple TOCs, could find that their connection to the on-board Wi-Fi may be disrupted as their device attempts to connect with the SSID on the platform or another train from another TOC. This can also cause issues when leaving a train and connecting to the station Wi-Fi network.

The opportunity exists to create a seamless roaming experience across all passenger serving parties in the rail stakeholder community. This may enable users to roam seamlessly across environments without the need to reconnect or re-enter registration details.

WI-FI ROAMING

Wi-Fi service providers across the network could retain their existing SSID, portal and user experience by using a Passpoint roaming feature called RCOI - roaming consortium ID which allows all parties to roam across different Wi-Fi networks. This would require a policy to be accepted by participating Wi-Fi operators and may involve a commercial roaming agreement between the Wi-Fi service providers and network operators.

Passpoint would enable network providers to further monetise their Wi-Fi footprints through commercial roaming agreements and working with roaming partners to seamlessly offload traffic. This in turn may help fund the infrastructure needed to provide an adequate user experience.



MOBILE DATA OFFLOAD

The mobile-like, Passpoint connection increases the appeal of these Wi-Fi networks to mobile operator roaming partners. By leveraging carrier grade Wi-Fi networks the mobile operators can grow their service coverage including ‘hard to reach’ locations, where cellular network performance may be poor. This may open up a new revenue stream for the Wi-Fi network provider and help fund the investment needed to support an improved user experience.

It may be more cost effective in many cases for a mobile operator to implement Wi-Fi ‘offload’ in this manner and pay fees to the Wi-Fi network provider than to attempt to carry the traffic direct and invest in greater capital spend.

ENABLING IOT

Research estimated that 25% of all M2M SIMs deployed in Europe were exclusively supporting roaming use cases (source: Machina 2015). The use of Wi-Fi remains the most prevalent means of connectivity for IoT devices because of the existence of large networks, relatively low cost and ease of deployment.

IoT can be used to improve the passenger journey and experience. Simple examples like identifying when the onboard catering is running low of cups or tea bags. Staff can then message ahead to the next suitable station to be ready to restock when they arrive or monitor light bulbs in the carriage or toilet rolls, all part of the passenger experience.

To understand and benchmark IoT network activity, demands carrier-grade network authentication and logging as a minimum. It is key to spotting abnormal operations and traffic patterns over these devices.

A cloud-based AAA / RADIUS platform is required that delivers fit-for-purpose IoT authentication, access, policy and audit solutions for tens of millions of ‘traditional’ and Internet of things (IoT) devices.

CONCLUSION

The use of the latest Wi-Fi technology including authentication and policy management tools across the UK Railway infrastructure (trains, stations, platforms and depots) on a consistent basis would greatly enhance the passenger and customer experience.

To achieve this vision will require a holistic approach to the customer journey, so that as passengers move from station to train and across TOC trains they remain connected securely without the need to re-authenticate. With the latest Passpoint technology it is possible to achieve this without the different entities losing their brand identity (and SSID) and through roaming agreements may create an equitable way of contributing to the funding of a world class connected passenger journey.

**Passpoint specification (also known as Passpoint™ by the Wi-Fi Alliance) is based on IEEE standards for Wi-Fi network and user devices.*

ABOUT GLOBALREACH TECHNOLOGY

GlobalReach has designed and built some of the world's most sophisticated Wi-Fi services such as the award-winning London Underground Wi-Fi service (as a white label supplier to Virgin Media), with proven performance serving over 2.5 million user sessions a day, 75,000 concurrent authentication requests and hundreds of thousands of concurrent users served by multiple mobile operators .

Through its relationship with CenturyLink, we have delivered services for 8,000 stores for a major coffee shop chain in the USA, ScotRail (including data offload), Coast to Coast Rail (Including a single sign-on solution, train to the platform). With other providers we have also delivered Wi-Fi services for Virgin West Coast, on buses and taxi services, as well as inflight Wi-Fi and maritime services with Inmarsat.

We have also developed frictionless onboarding for secure connections with large-scale Passpoint deployments in the US and Europe, which includes the LinkNYC deployment of 1,800 outdoor kiosks in Manhattan, enabling some 20m Wi-Fi sessions per week.

As the rail sector looks to improve its customer experience, we are ready to help support the UK rail industry deliver a world class connected passenger journey to enhance the overall customer experience, whilst enabling commercial models to support the investment required.

GLOSSARY

ACRONYM	MEANING
AAA	Authentication, Authorisation and Accounting
CoA	Change of Authorisation
CPE	Customer-premises equipment
DHCP	Dynamic Host Configuration Protocol
HTTP	Hypertext Transfer Protocol
PAS	Portal Aggregation Service
UE	User Equipment
URL	Uniform Resource Locator
VSA	Vendor Specific Attribute
WAG	Wireless Application Gateway
WLC	Wireless LAN Controller

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