Vontas

WHITEPAPER

The Transit Plug & Play Revolution

ITxPT

Ask yourself this question - would your cellphone be as indispensable to you if you needed a separate device or system to make each interaction on it possible?

With apps enabling a plethora of specific tasks and connectivity to other wireless devices, the smartphone has become the essential tool for the modern consumer. But what makes these mobile devices so central to daily living has as much to do with their architecture as their seemingly limitless functionality. They all utilize a platform that enables each device to communicate with another, even if each were made by a different manufacturer or had another operating system.

For the past eight years, public transit has been quietly working on something akin to the smartphone 'plug and play' revolution. With the advent of the Internet of Things (IoT), increased automation (including automated vehicles) and smart cities, public transit has recognized the need for transit systems components to be able to "talk to each other" and work together seamlessly to ensure safety, efficiency, and increased adaptability to mobility innovation.

That means on-vehicle devices and systems need to connect and communicate with one another almost immediately – exchanging data and information without friction – even if they were manufactured by different vendors. This interoperability, the ability to exchange and share data between disparate systems, unlocks transit innovation while optimizing operations and lowering implementation costs.

ITxPT – Open Architecture for Interoperability and a Community for Innovation

ITxPT, or Information Technology for Public Transport, are specifications for a standardized IT architecture with open interfaces that facilitate the exchange of data between multiple on-vehicle and back-office systems so they can seamlessly integrate with one another for smooth transit operations. It is a giant step toward breaking down the silos and proprietary systems that compromise service delivery by creating a common framework for designing hardware and software. By simplifying the IT infrastructure, devices and systems share a communications backbone and can be readily connected to each other.

ITxPT also refers to the consortium of public transport stakeholders that develop the specifications, forming a "community of innovation" that continuously shapes the standards

that govern data exchange and interoperability. What started as a collaboration among eight founding stakeholders to enable interoperability between different systems in a bus (the European Bus System of the Future, or EBSF), has now grown to 142 members in 28 countries, comprising public transport authorities, operators and partner associations as well as vehicle and system suppliers. Members can participate in ITxPT working groups that develop and evolve the specifications.

The organization also performs technical support and compliance testing, which makes it possible for a supplier to become ITxPT labelled.

What is ITxPT?

There are two parts to the ITxPT architecture: 1) internal to the vehicle and 2) external to the back-office.

1) **The internal gateway** provides a standardized way to connect with on-board devices. Specifically, the legacy physical interfaces are replaced with a shared IP network, eliminating redundant wireless network solutions and reducing wiring requirements for connecting on-board devices with each other. With all the devices connected on a shared IP network, the communications between them can be standardized over TCP/IP. Vendor-proprietary communication interfaces are now replaced with standardized XML messages.

2) **The second part of the architecture** is the external vehicle gateway which allows for the vehicle and back-office to communicate with each other. The on-vehicle IP network communicates over the wireless network link to the Back-Office IP network. This live connectivity allows for your fleet operations team to monitor all kinds of information about their vehicles in real-time. For example, current geo-location, vehicle status and diagnostic data, and exchanging dynamic passenger information, amongst many other capabilities. The data integration is not limited to just CAD/AVL solutions, but could also integrate with for example, vehicle intelligence, asset management and other back-office systems.

While originating in Europe, ITxPT is gaining traction in North America, with Vontas already working with two of its partners in faring and dynamic passenger information systems to

develop ITxPT-compliant products that seamlessly integrate with our Vontas OnTransit ITS system.

Active vendor engagement with ITxPT in North America means that agencies can increasingly demand interoperable solutions during their procurement processes, leading to faster deployments and lower ownership costs.

Why ITxPT: The Benefit to Your Riders

To understand the impact ITxPT can make on your operations, you only have to look at how streamlined the physical infrastructure on your vehicle will be with ITxPT-compliant systems. Transit vehicles feature a variety of on-board modules such as passenger information systems, infotainment, fare collection and validation, head signs, passenger counters, video surveillance, GPS, and much more.

Before ITxPT, on-vehicle components used a variety of physical interfacing standards and communications protocols to connect with each other. This meant that each device required its own wiring to connect with other devices such as driver screens. Often, devices also would have their own wireless communications infrastructure, resulting in antenna farms on the vehicle roof.

One of the key benefits of ITxPT is the flexibility it provides for the selection of on-vehicle modules. With a standardized interface, there is no longer a need for vendor-specific integration work to the on-board computer. Public transit agencies and operators can specify ITxPT-certified functionality when purchasing new or upgrading their ITS systems. This reduces your integration costs and increases the speed at which solutions can be deployed. Essentially, your ITxPT devices can now provide you with a “plug and play” experience.

In addition to saving time installing and configuring devices, having ITxPT-compliant systems will generate substantial license cost savings. Multiple ITxPT-compatible devices will share licenses, reducing your licensing costs. Having standardized equipment and systems also means eliminating the need to develop custom interfaces for your mobile data terminals (MDT) and AVL solutions, as well as reducing the maintenance of the interface because it is now common to all vendors. Having common interfaces also enables you to easily mix and

match mobile hardware vendors, and lower your switching costs when replacing vendors with new suppliers – there would be no additional interface to develop.

One of the best reasons to adopt ITxPT is simply because it is a mature standard with a well thought-out interface. It is flexible, extensible, and very data-rich, which means it can support most hardware vendors off-the-shelf. In the rare cases where something is missing, the interface supports the means to carry additional custom information.

Lessons from Abroad: Global Experience with ITxPT

Europe and Asia have considerable experience piloting and implementing ITxPT projects, providing valuable lessons for integrating standardized ITS solutions. Here are a few:

Transport for London (TfL) Demonstration for EBSF2

Transport for London runs one of the largest bus systems in the world, with around 9,300 buses covering 675 routes throughout the UK's capital. Maintaining and upgrading such a large fleet – and ensuring that multiple systems interface easily – is a lengthy, labor-intensive process. The buses' ticketing, automatic vehicle location (AVL) and radio systems are proprietary, with separate communication equipment, wiring, and driver displays. To increase efficiency and cost savings, TfL should be able to change system components easily and multi-source them as well.

Participating in the European Bus System of the Future 2 project led by UITP, TfL in 2017 hosted a demonstration to test the interoperability, supported by ITxPT, of on-vehicle systems, including our sister company, Trapeze Group's. Four buses were fitted with systems from different vendors to prove that multi-sourced on-board transit technologies and back-office systems based on open standards integrated seamlessly in an operating environment. It was the first implementation of multiple on-board systems reporting to the same back-office suite in an existing fleet, and showed how large transit systems could benefit from a non-proprietary architecture based on open standards.

Ruter: Oslo's "Bus-as-a-Service

Oslo's transit authority, Ruter, has been testing an interoperable technology platform on 400 smart buses that constantly stream live transit data such as passenger counts, position

reporting, traffic speed, and light and noise pollution levels to a data center. The data can be used for both transit planning and the Norwegian capital's smart-city initiatives. It's part of a data-sharing project called "Bus-as-a-Service" that utilizes the huge amounts of data buses generate to build smart-city applications and services.
Previously, these live data functions were supported by seven, separate, proprietary systems. In 2018, Ruter announced plans to implement an open and standards-based IT platform, based on ITxPT specifications. Apart from enabling its smart-city goals, standardization will create a more efficient and flexible IT system for bus operations.

The project is one of the world's first large-scale tenders based on an interoperable platform.

Dubai RTA: Adopting Innovative Transit Technologies

Dubai's Roads and Transport Authority (RTA) is known as an early adopter of innovative public transportation technologies in its bid to develop an integrated and sustainable transportation system and make transit the first choice for mobility in the city.
From driverless technologies to smart transit amenities (such as air-conditioned bus stops equipped with Wi-Fi, cellphone charging stations and utility bill payment), the RTA has implemented many transit firsts in the gulf region.

In 2019, Dubai ordered 373 buses from Volvo, increasing the number of buses in the United Arab Emirates by 30%. The buses will be fitted with modern driver assist and monitoring systems (e.g., driver fatigue, driver RFID and will feature interactive screens, Wi-Fi, and USB charging). All will be ITxPT-compliant and will leverage the bus information database in the UAE Cloud.

What's Next? We're Working Toward a World of Plug and Play

These developments increase the likelihood of ITxPT's adoption as the global standard for interoperability. ITxPT already is a mature standard with considerable adoption in Europe and Asia, delivering a mobile hardware plug and play experience that reduces operational complexity, vendor lock-in, and licensing costs, and significantly saves you time deploying your on-board equipment and ITS systems.

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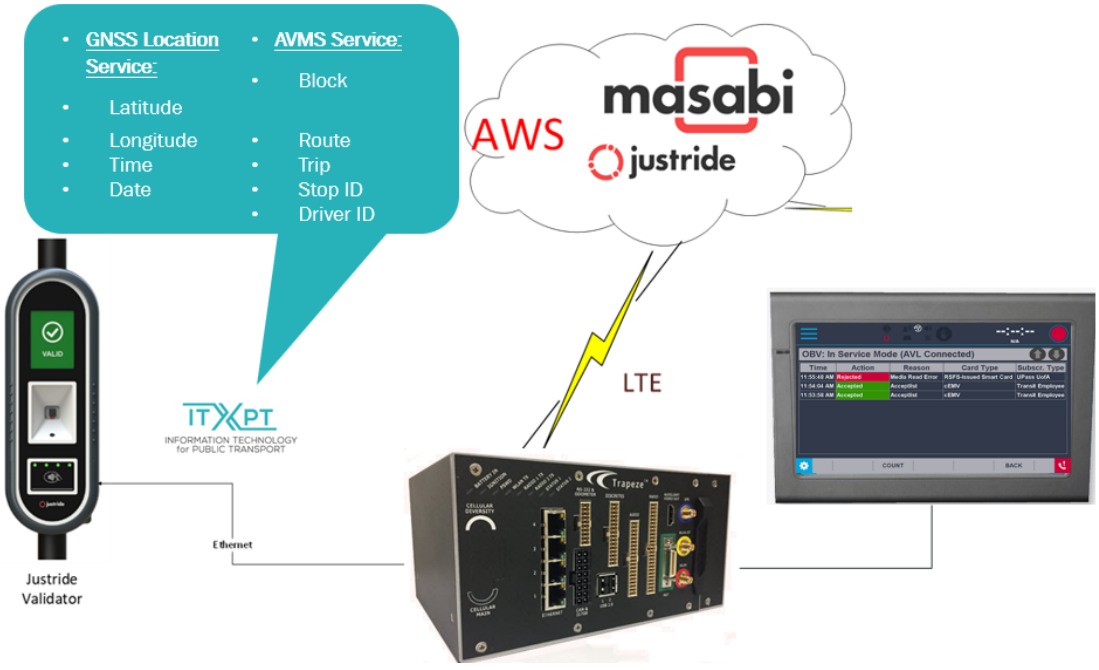
What's more, it paves the way for future mobility innovations by eliminating the proprietary approach and opening up the transport market to new, forward-looking suppliers and start-ups.

The ITxPT organization is also working toward identifying new and relevant use cases for the specifications. Establishing electrification standards are an emerging focus to enable systems to exchange data on real-time monitoring of battery health and current state of charge (to ensure that electric vehicles complete their journey) and locating available charging infrastructure. ITxPT is also developing standards for heavy rail, including multi-door passenger counting, and video capture and live streaming during incidents.

Mass public transit is integral to economic sustainability in a world emerging from economic disruption brought about by COVID-19. Connecting communities more closely through easy transit access will play a huge part post-pandemic recovery. Making this possible means better inter-modal integration, to facilitate faster, more reliable, and safer journeys that get people where they need to go. Having common mechanisms, standards, and protocols that will allow the exchange of data on buses, trains, tramways, and other modes of transportation.



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Vontas reimagines intelligent transit technology to help you grow your community of riders. To help get us there, we are embracing ITxPT and leading the charge for the adoption of the specification in North America. Apart from actively participating in ITxPT working groups, we worked with our partners for faring and infotainment solutions to develop industry-standard ITxPT interfaces to seamlessly integrate
with Vontas's Vontas OnRoute CAD/AVL solution. We're taking every opportunity available in pilots and partnerships to create ITxPT-compliant hardware and software, and engaging with transit agencies to explore use cases for ITxPT.

The best way to bring about full interoperability in transit is for agencies and operators to increasingly specify ITxPT-compliant hardware and software in their RFPs. This further incentivizes transit suppliers to participate in the ITxPT initiative, pooling together our collective knowledge and expertise to develop an open IT architecture to help create more efficient, safer, greener and cost-effective transit systems that also provide riders with a better travel experience.

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About Vontas

Vontas helps agencies make public transit the desired mode of transportation in their communities. Through real-time technology, we help create smart, safe, reliable, accessible, and more connected public transit experiences. Learn more at www.vontas.com

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Connect with our Experts

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