

TRANSIT PATHWAYS

Reuben M. Juster, University of Maryland | College Park, Center for Advanced Transportation Technology

Automated transit could evolve in a number of ways. To ensure that everyone designs around the same vision, please use this document as the reference for how transit will become autonomous for today's design workshops. The graphic at the end shows how the degree of automation and segregation for each type of transit will evolve. The narrative will refer to the numbered icons that appear on the graph using {1}, {2}, ... symbols.

2014 - CURRENT

Most transit today operate under manual operation. Bus transit {1} usually operates on roads with mixed traffic, though the growth of bus rapid transit has led to some lines operating in separated right of ways (Institute of Transportation Policy and Development, 2014). Rail based transit {4} can utilize automated safety features (adaptive train control) or can be completely automated. If they are completely automated, then the rail transit has to be completely segregated from other transportation. Automated rail transit can be considered automated guideway transit (AGT) which operates in two forms: automated people movers (APM) and automated transit networks (ATN) (US Office of Technology Assessment, 1975). Automated people movers, systems which move people along predefined paths, like the Vancouver Skytrain, have been the AGT of choice with many new systems under construction or in the planning phase. APMs system layouts can be similar to their non-automated counterparts (light rail, heavy rail). In addition, APM systems can also feature small loops with branches like AirTrain JFK (ACRP, 2010). Manually operated rail transit lines that have been converted to automated operation like the Paris Métro Line 1 can be considered APMs (Janand, 2014). ATN, systems whose layout is flexible, with the ability of having multiple branches and loops based on rider needs, like those located at London Heathrow Airport's Terminal 5 have been less popular for implementation {7}. Click here for more information about ATN (Advanced Transit Association, 2014). Para-transit, which is low capacity flexible transit, transport those who are mobility challenged, but is often inefficient and a significant drain on transit agencies {10} (Hilkevitch, 2012). Driverless para-transit like Navia does exist, but is still in the experimental/pilot study stage (Induct Technology, n.d.).

2020

With rising labor costs, more and more transit systems are converting existing rail lines into APMs, similar to how the Paris Métro converted Line 1 to automated operations in 2012 {5}. Autonomous Bus Rapid Transit (BRT, BRT Basics) lines that operate on their own right-of-way, but also contain at grade intersections with regular streets have successfully begun operations {2}. More ATN systems, larger than the systems operating in 2014, have begun to pop up over the globe, but they still fulfill only first-mile and last-mile service {8}. These ATN systems are also used to transport freight across short distances. Manual para-transit has become a greater financial burden on transit agency with an increase demand from an aging population. Driverless para-transit been implemented more widely, but only in areas with limited high speed vehicles such as pedestrian malls and campuses {11}.

2035

New implementations of ATNs have gone beyond their role as just a supplementary transit mode {9}. In areas of large scale development such as large brownfield or mixed-use greenfield projects have been designed around ATN, as opposed to ATN being designed around existing development. These large developments also feature automated buses, but in brownfield areas, buses are still manual {3}. In addition, public transit agencies have begun building their own or contracting out ATN systems. Freight companies are allowed to use these ATN networks for a fee paid to the public transit agency. The majority of fixed rail transit has become automated {6}. Para-transit has been partially taken over by autonomous vehicle service providers and in some cases, pod cars fill the role of para-transit {9, 12 respectively}.

2050



Source: Wikipedia.org, 2009
System: Vancouver Skytrain



Source: Time Magazine, 2011
System: Masdar City PRT



Source: Wikipedia.org, 2009
System: Vancouver Skytrain



Source: UltraPRT, 2009
System: Proposed San Jose Airport System

Automated transit has been fully integrated in society [13] and all sizes of transit operate together on the surface and grade-separated infrastructure unsegregated by vehicle type. People who live in urban areas use ATN for the majority of their short and medium haul journeys. Very few transit systems are manual. Paratransit has been fully taken over by autonomous vehicle service providers.

GLOSSARY

Automated Guideway Transit (AGT): Automated fixed-guideway transit includes any type of transit that is completely driverless and motion is constrained by a guideway/ rail (US Office of Technology Assessment, 1975).

Automated People Mover: Systems [that] are fully automated and driverless transit systems that operate on fixed guideways in exclusive rights of way (ACRP, 2010). This can include systems as small as a simple two station layout or as large as ones that resembles automated tradition urban rail transit such as light rail or heavy rail.

Automated Transit Networks (ATN): A transit system that has ability to take passengers direct from their origin to their destination without making any intermediate stops. Think of it as system consisting of multiple driverless taxi that do not have to deal with surface traffic. Recently built ATN systems located at London Heathrow Airport and Masdar City feature ATN vehicles that are typically smaller than typical other vehicles including cars with a capacity of around 4-6 passengers per vehicle. The Morgantown Personal Rapid Transit system, opened in 1975, features vehicles that can carry 20 passengers. Typical ATNs travel at speeds up to around 30 mph. ATN currently operated on their own grade separated right-of-way and are considered a form of AGT. With improved automation technology and or automation penetration rates, it is conceivable that ATN could include segments with mixed traffic (ATRA IG, 2014).

Personal Rapid Transit (PRT): A type of ATN that utilizes small vehicles (4-6 passenger capacity) and does not facilitate ride sharing (US Office of Technology Assessment, 1975).

REFERENCES

ACRP. (2010). *Guidebook for Planning and Implementing Automated People Movers Systems at Airports*. Transportation Research Board, Airport Cooperative Research Program. Washington D.C.: National Academy of Sciences.

Advanced Transit Association. (2014). *Home Page*. Retrieved from <http://www.advancedtransit.org/>: <http://www.advancedtransit.org/>

ATRA IG. (2014, June 4). Public Transit Complemented. Retrieved from https://www.youtube.com/watch?v=GgEhg4_ONk4

Hilkevitch, J. (2012, November 14). Transit agencies struggling to meet needs of disabled ridership. *Chicago Tribune*.

Induct Technology. (n.d.). *Navia*. Retrieved from Induct Technology: <http://induct-technology.com/en/products/navia>

Institute of Transportation Policy and Development. (2014). *About the BRT Standards*. Retrieved June 22, 2014, from Institute of Transportation Policy and Development: <https://go.itdp.org/display/live/About+the+BRT+Standard>

Janand, E. (2014, March). Paris Metro: How to successfully implement automation on existing line. *Track Talk*, 7-9.

US Office of Technology Assessment. (1975, May). *Index of /~ota/disk3/1975/7503 (Automated Guideway Transit)*. Retrieved from Princeton The OTA Legacy: <http://www.princeton.edu/~ota/disk3/1975/7503/>

PICTURE REFERENCES:

Wikipedia.org, 2009
Time Magazine, 2011
Wikipedia.org, 2009
UltraPRT, 2009



