

Challenges of improving and expanding the Metro in Santiago, Chile

Roberto Bianchi
CEO
Metro Santiago



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Agenda

- a) Overview
- b) Operational and technical strategies to face dramatic growth in demand
- c) Upgrading the existing network: new service enhancements and capacity growth
- d) Expanding the Network: The new Lines 3 and 6
- e) Future concerns



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Today:

- 6,5 Million inhabitants
- US\$ 14.000 GDP per capita
- 867 km² surface
- 1,3 millions of private vehicles
- 0.2 vehicles/inhabitant

2022:

- 7,5 Million inhabitants
- 2,2 millions of private vehicles (+70%)
- 0.3 vehicles/inhabitant



Public Transport in Santiago

Integrated public transport (bus + metro)

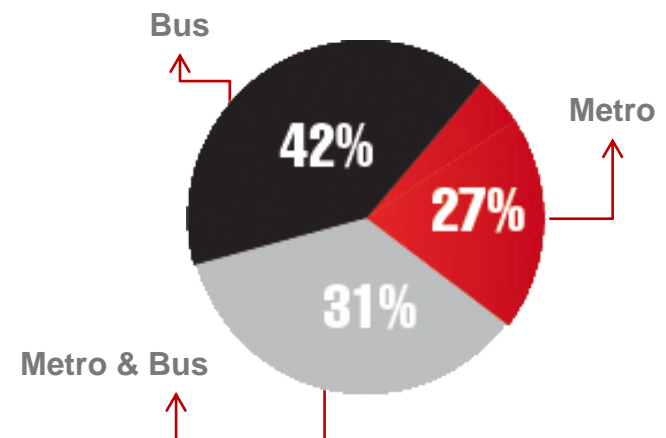
- Transantiago started February 2007
 - 4,0 million daily trips
 - 1,6 stages per trip
 - 6,2 million of stages (Bip's)



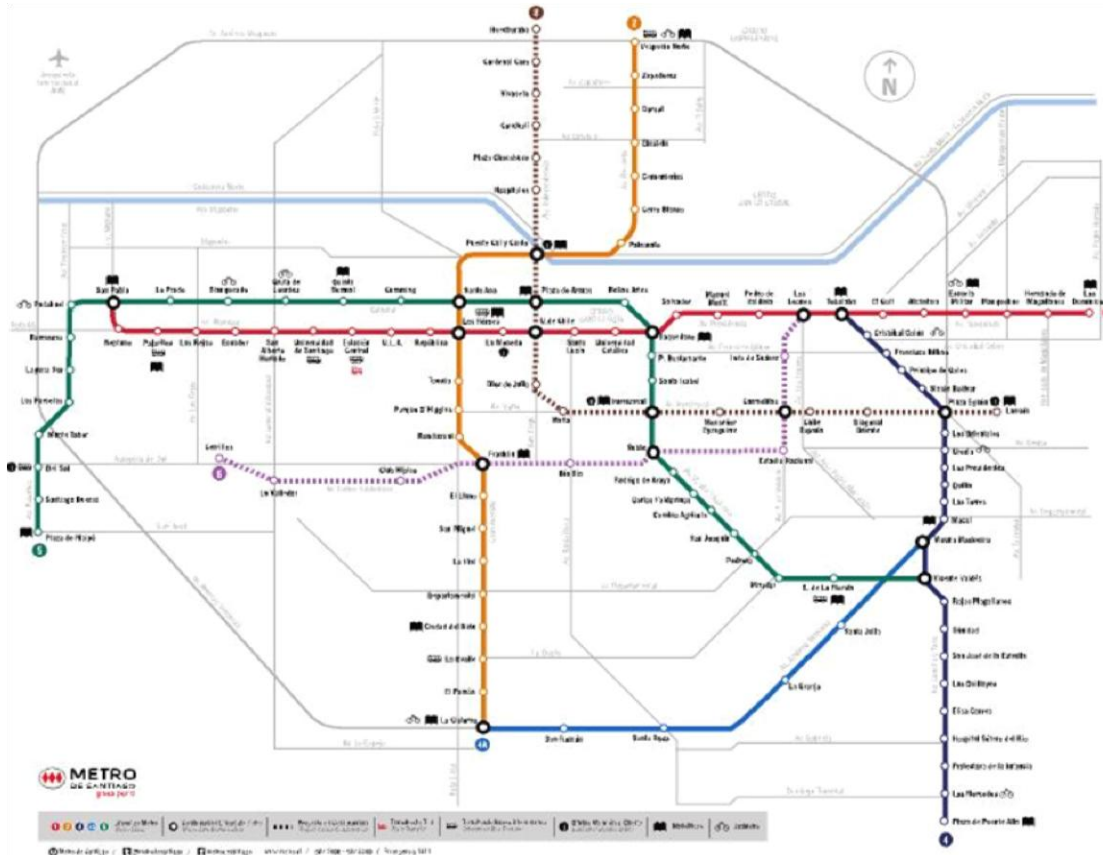
Metro, Main Actor

- 2,4 million journeys/day
- 650 million journeys/year
- 58% public transport users travel in Metro
- 27% of stages are pure Metro trips

Public Transport Travel Distribution



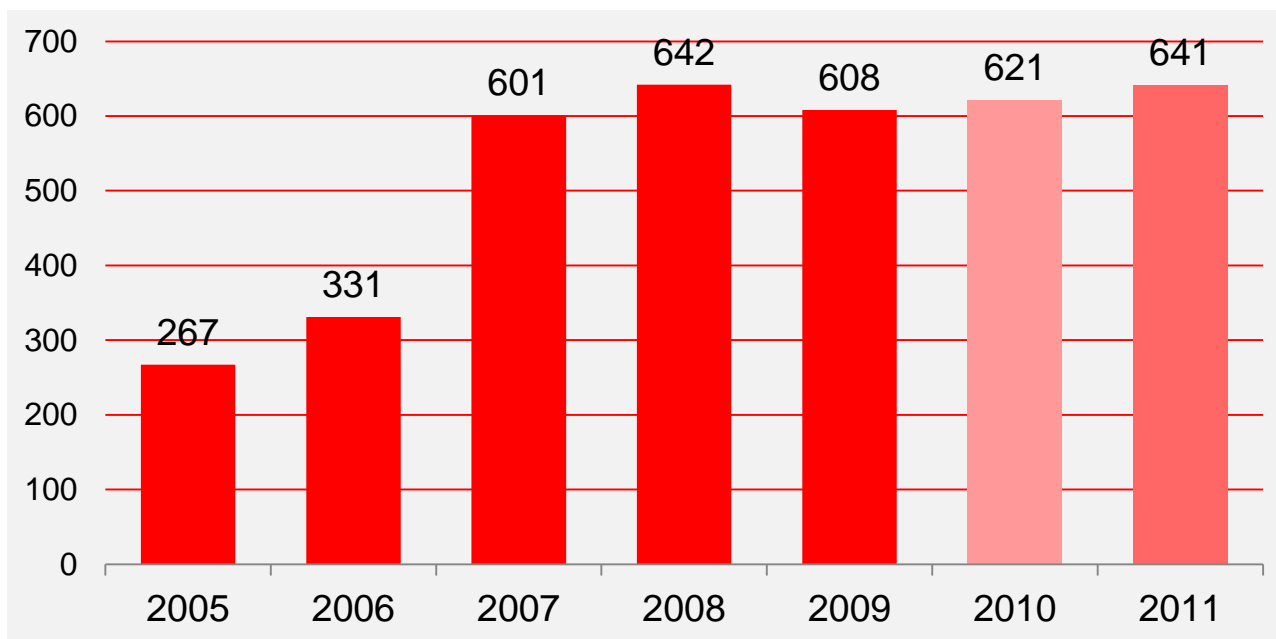
Description of current network



Network 2012:

- 103 Km; 108 stations; 5 lines
- Assets: US\$ 5,6 billion
- 1.075 cars (2012)
 - 216 Steel Wheel
 - 859 Pneumatic Wheel
- 3.266 workers (dec. 2011)

Total Annual Passenger Journeys (million of trips)



Main Differences 2006-2007

- Demand Increased: **+ 81,5%**
- Off Peak Demand increased: **83,8%**
- Peak Demand increased: **+78,3%**

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Operational and technical strategies to face dramatic growth in demand



Capacity increase



Passenger flow management



Safety Improvements






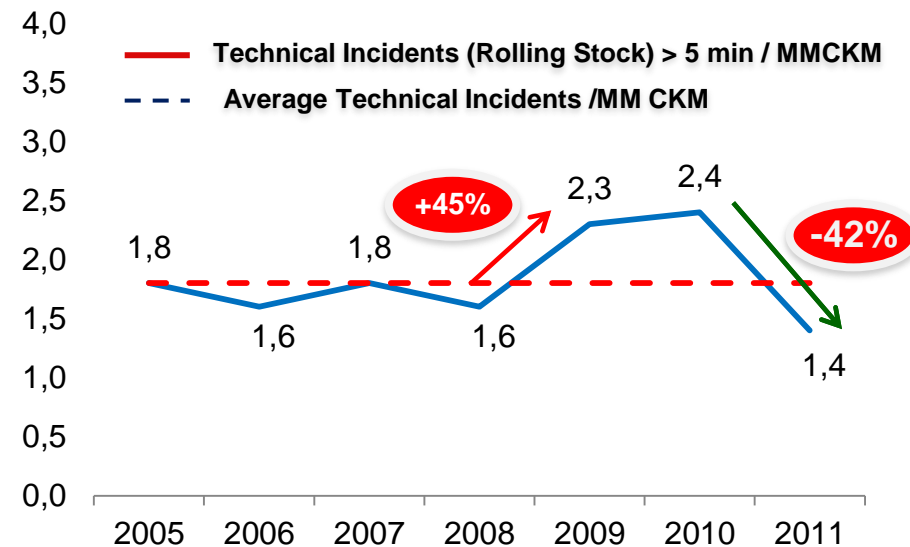
Passenger habits

Operational and technical strategies to face dramatic growth in demand



Capacity increase

- Purchase new Rolling Stock (20%, 180 new cars)
- Express Operation (Skip-Stop) 
- Operational Loops 
- Improve Fleet Availability (88% in 2007; 99% in 2011) and reduce occurrence and duration of technical incidents 





Passenger flow management

- **Improve station infrastructure to reduce flow bottle necks**
- **Flow Management**
 - Periodical Micro simulation of passenger flow (Legion Software)
 - Pre-defined pedestrian flow plans at stations
 - Passenger containment (before and after turnstiles)
 - Platform Assistants (12 in critical station)
 - Uniform Distribution of passengers at platform



Safety Improvements

- Increase Safety staff
- Better and more Cameras (average 10 per station)
- Introduce no uniform staff on trains
- Strengthen proactive security screening
- Encourage and facilitate complaints



Operational and technical strategies to face dramatic growth in demand



Passenger habits

- Good practices and collaboration standards
- Allow disembarking before boarding
- Do not sit on the floor
- Correct use of stairways
- Use of handrails
- Stimulator Passengers



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Upgrading the existing network

New service enhancements



**Air conditioning in trains
for line 1 and 60% of Line 2
and 5 (2012-2017)**



**Mega fans to improve
station ventilation
(2009-2014)**



**Strong improvement in operational
communication with passengers
(2012)**



**Elevators at all stations
(2009-2014)**

Upgrading the existing network

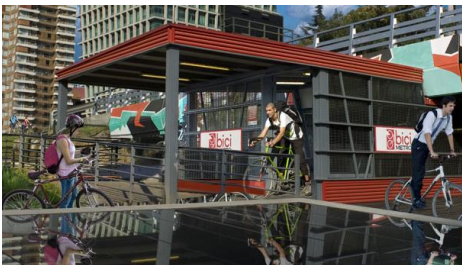
New service enhancements



**Free WIFI at stations in 20% of network
(2012)**



**More and better retail at stations
(2008 – 2012)**



**Safe bike parkings at stations
(2008- 2012)**



Adding culture to the travel experience.

20% of stations with relevant art pieces.
19 metro station public libraries
Biggest national poetry contest
Free open music concerts at stations (15 min)

Upgrading the existing network

Capacity growth



**14 New trains for L1,L2 and
L5 (20%)
(2012-2013)**



**Reconfiguration of trains L2,L5
From 5 to 6 & 7 coaches per train
(2013)**



**Platform extensions in 6
stations L5
(2012-2013)**

Upgrading the existing network

Capacity growth



14 New trains for L1, L2 and



Implementation of CBTC in Line 1
From 107 to 95 seconds interval (13%)
(2009-2013)



**Reduction of parking time by
controlling platform access (peak)**
(2012)

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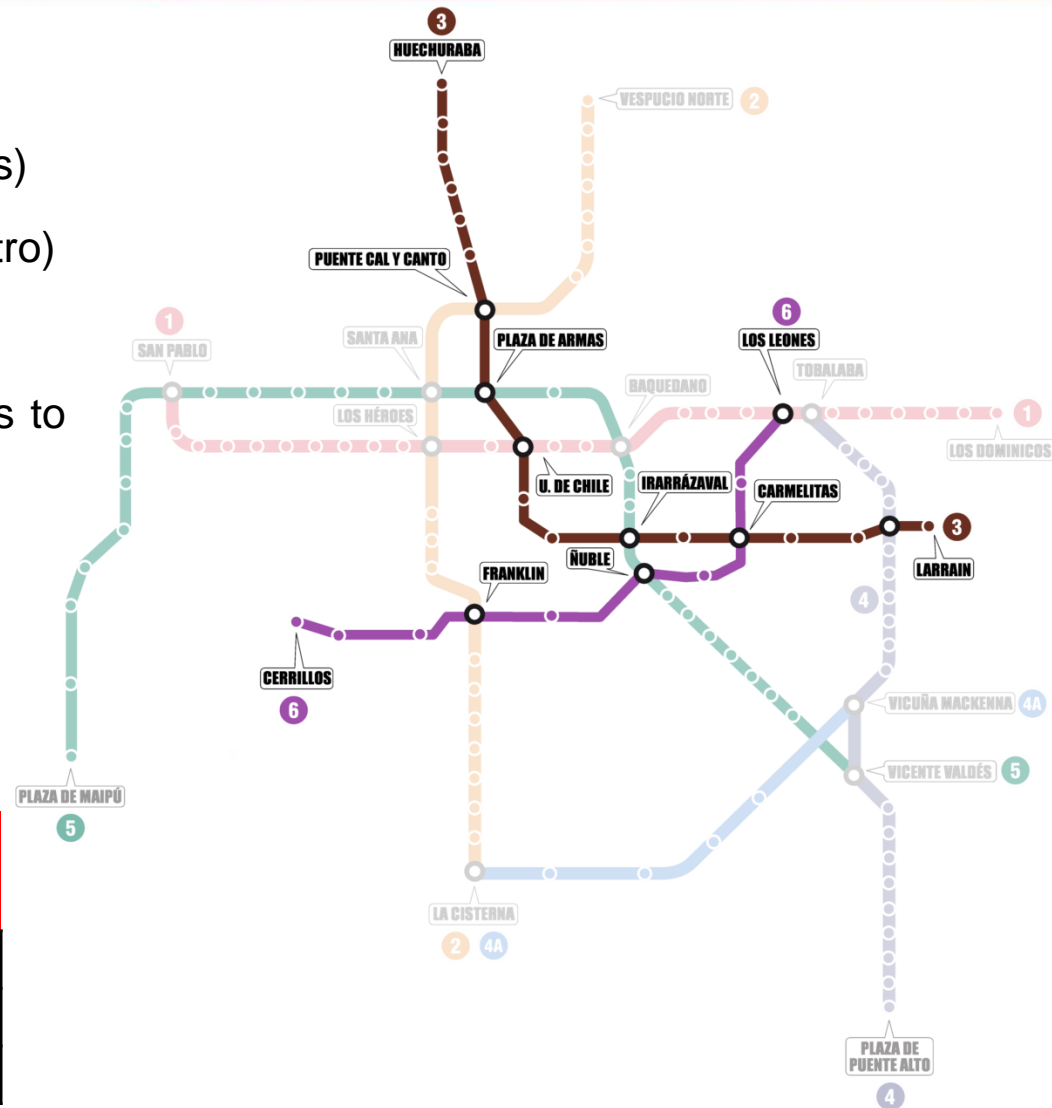


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New Lines 3 and 6, an opportunity

- 37 kms (36% expansion)
- 28 stations (9 new combination stations)
- 11 municipalities (5 of them new to Metro)
- 120 million passengers
- The lines construction will take 7 years to be completed.
 - Line 6 in operation at the end of 2016.
 - Line 3 will be operational at the end of 2018.

	Length (kms)	Number Stations	Inter stations Distance	Final Budget (MMUS\$)
Line 6	15,3	10	1.53	1,036
Line 3	22,0	18	1.22	1,722
Total	37.3	28	1.38	2,758



Much better lines at the same investment cost



Internal Diagnosis + World Best Practices

More Efficiency

- Increment in interstation distance (1.38 km)
- Steel wheel trains
- Automatic sale of tickets
- Turnstiles at entrances and exits
- Lines 3 and 6 will be complementary (technology)
- Centralized train driving (UTO)

More Safety

- Cameras on trains
- Energy feeding by rigid catenary
- Platform Screen Doors

Better Customer Service

- Customer Information systems onboard and at stations
- Design density reduction (5,5 pax./mt²).
- Spares trains (5% of fleet)
- More commercial services
- Better ventilation at stations and A/C in trains
- Nine combination stations
- Connection with Suburban trains

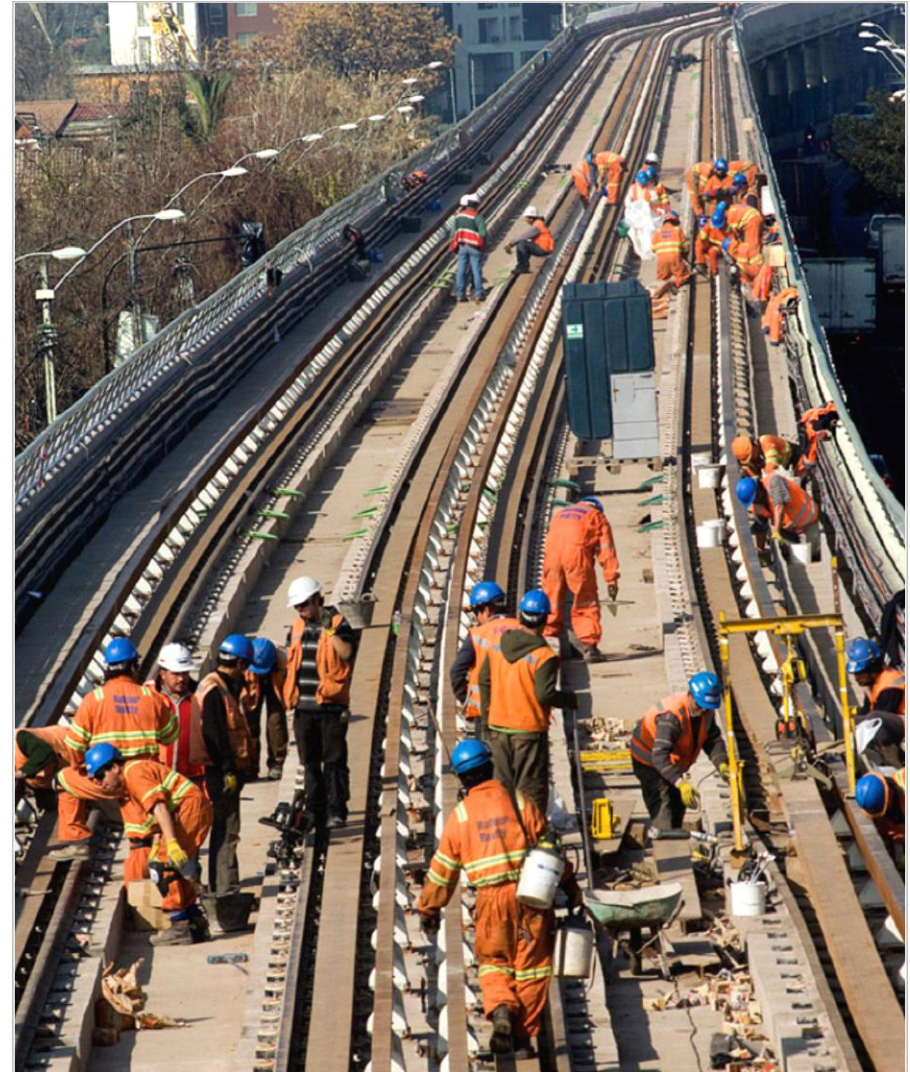
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- **Public Transport Long Term Planning**
- **Future Economic Sustainability**
- **Internal challenges**
- **New Environment and Stakeholder requests**



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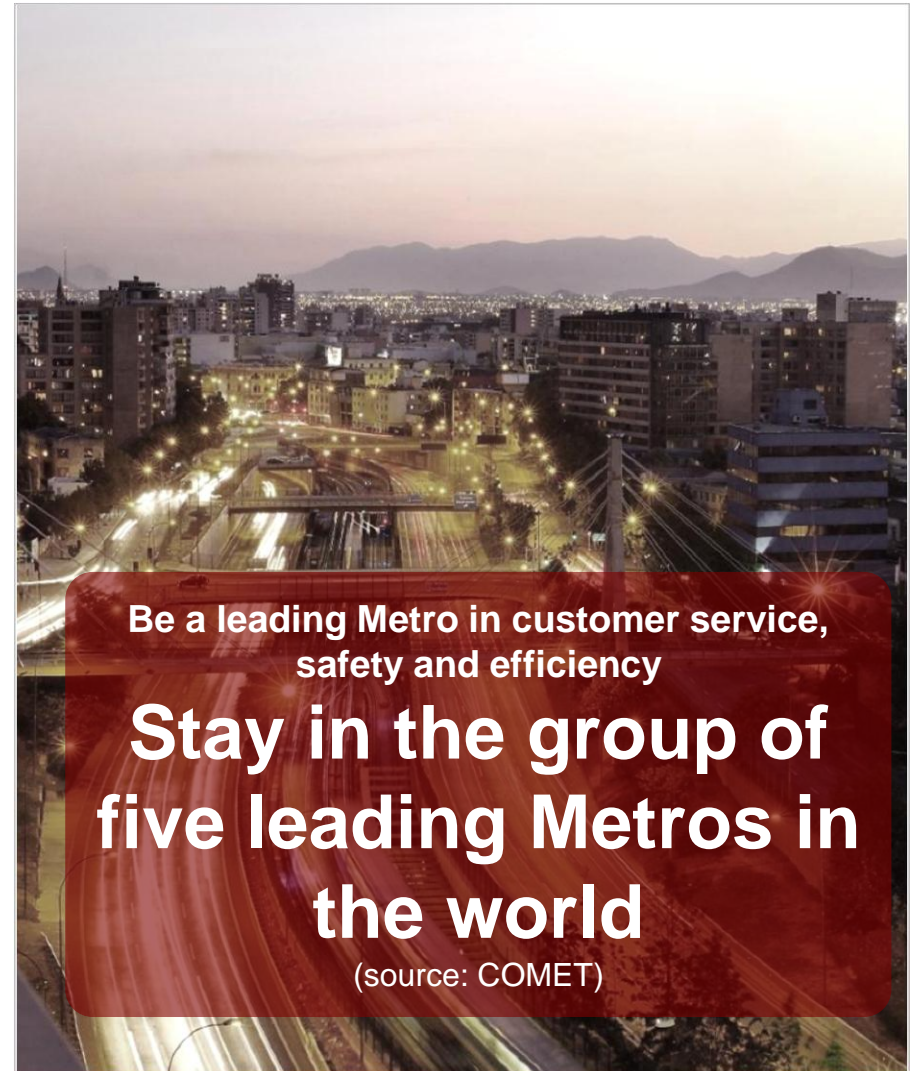
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¿Who are we?
¿Who we want to be?

- The most reliable, fastest, safest, cleanest and most efficient transport system in Santiago
- The second largest Metro in Latin America
- One of the few metros in the world with no operational subsidies
- One of the most reliable metros in the world
- The safest public place in the city



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Operational and technical strategies to face dramatic growth in demand

Express Operation (skip-stop)



Objectives:

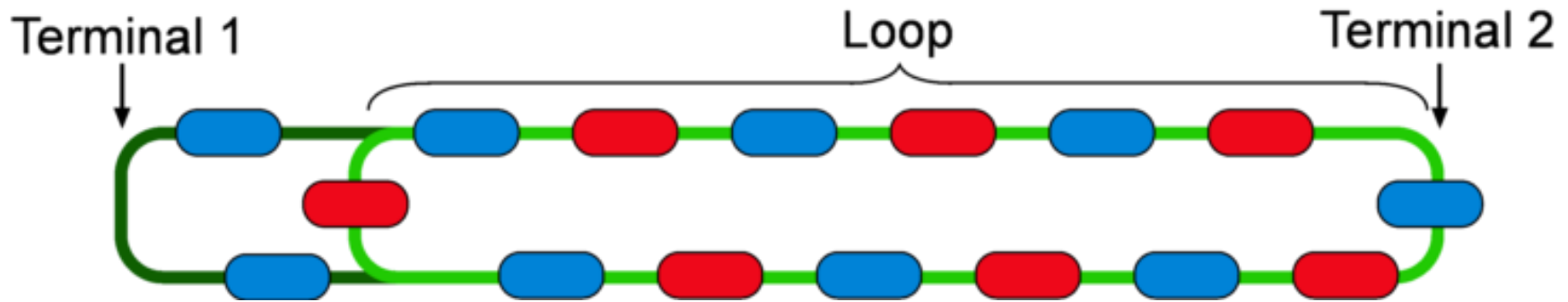
- Increase capacity
- Improve service quality (shorter trips)

Benefits:

- 18% capacity increase, equivalent to 5 new trains
- travel time reduction (*decreased 11%*)
- Reduction in technical failures due to reduce stops per trip.



Operational and technical strategies to face dramatic growth in demand



- Reduced loops in peak hour allows to increase capacity where it is needed (5% to 10%)



Operational and technical strategies to face dramatic growth in demand

99% Availability of trains & better response time



- Increased night servicing
- Maintenance Plan Adjusted (from reactive to predictive)
- Technical support deployed in stations during peak hours
- Equipped 5 new small repair centers on the network

