

ECORails

**Designing a
Regional Transport System
in Regione Lombardia**

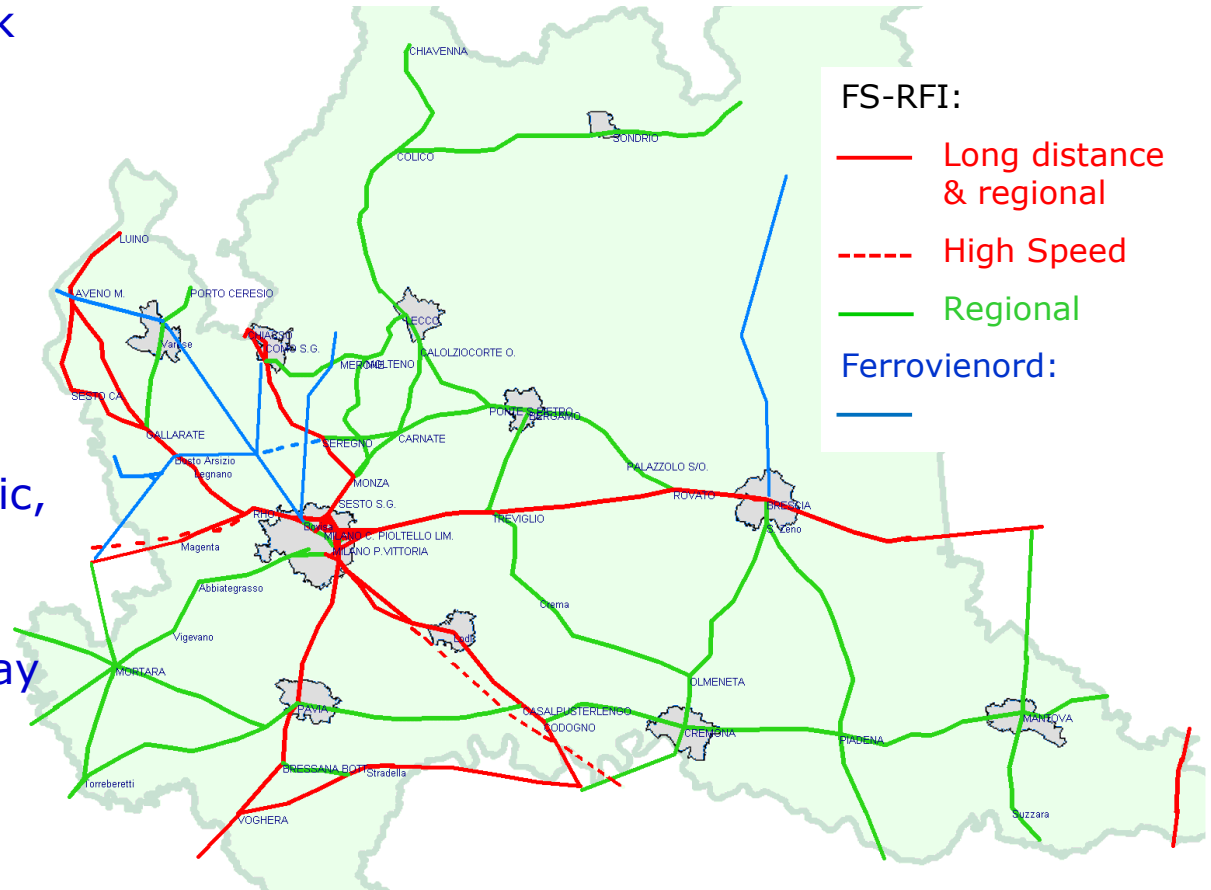
Elena Foresti, Giorgio Stagni



Brescia, 14.04.2011

Regional Railways System in Lombardy

- **1.920 km** of railway network
400+ railway stations
- **2200+ trains per day**
along 37 lines
- **36,7 million** trains*km per
year
(16% of Italian regional traffic,
+32% since 2001)
- **600.000 passengers** per day
- **3 service contracts:**
LeNORD, Trenitalia,
Line S5 (tendered in 2004)



New capacity is available on Lombardy network

Important works have been completed on **railway network** in 2007-09:

- 4 tracks towards Milan city centre on Ferroviennord network, between **Milano Bovisa** and **Milano Cadorna** (2007)
- 4 tracks between **Milano** and **Treviglio** (2007)
- The **Passante Ferroviario** is finally completed, after 26 years of work (2008)
- High Speed line **Milano - Bologna** (2008)
- 2 tracks between **Milano** and **Lecco** (2008)
- 2 tracks between **Milano S. Cristoforo** and **Albairate**, line towards Mortara (2009)
- High Speed line **Milano - Novara** - Torino (2009)
- 2 tracks in **Castellanza** (connection to Malpensa Airport, 2010)
- New **stations**:
Camnago (2006), Romolo (2006), Rho-Fiera (2008), Pregnana Milanese (2009), Pozzuolo Martesana (2009), Arcene (2009), Levate (2009), Stezzano (2009), Levata (2009), Albairate (2009), Cesano Boscone (2009), Ferno-Lonate (2009).



New Rolling Stock

<i>Trains</i>	<i>Used on</i>	<i>Cost</i>	<i>Years</i>
78 Double-decker EMUs AnsaldoBreda TSR	LeNORD, S5	646 M€	2007-2012 (70 delivered)
6 EMUs Alstom Meridian	Malpensa Express (airport connection)	35 M€	2010
16 E-locos Bombardier E.464	Trenitalia	45 M€	2004-2006
2 DMUs Pesa ATR.220	Brescia-Edolo	7 M€	2009
8 DMUs Stadler GTW 4/12	Brescia-Edolo	25 M€	2011 (1 delivered)
11 DMUs Stadler GTW 4/12	S7 Milano-Molteno- Lecco	65 M€	2011 (to be delivered)

TSR EMU
(3, 5 or 6 vehicles)



- Total cost: **823 M€**, fully paid by Region (funds from State and Region itself)
- Rolling stock bought by regional network manager (Ferrovienord), which is independent from Railway Operators (*frameset compatible with tendering of railway service*)



Designing the Service



Guidelines: Moving Always, Moving Everywhere

- “Moving” **everywhere**,
not only towards Milan
- “Moving” **always**,
not only in peak hours
- “Moving” **people**,
not train and buses
- Building a **system**,
not just a set of trains

- ❑ **Frequency**
for short distance trips
- ❑ **Speed**
for medium distance trips
- ❑ **Offering a system of services**
not only single trips:
 - ❑ coordinated timetables
 - ❑ coordinated information
 - ❑ unique fare system

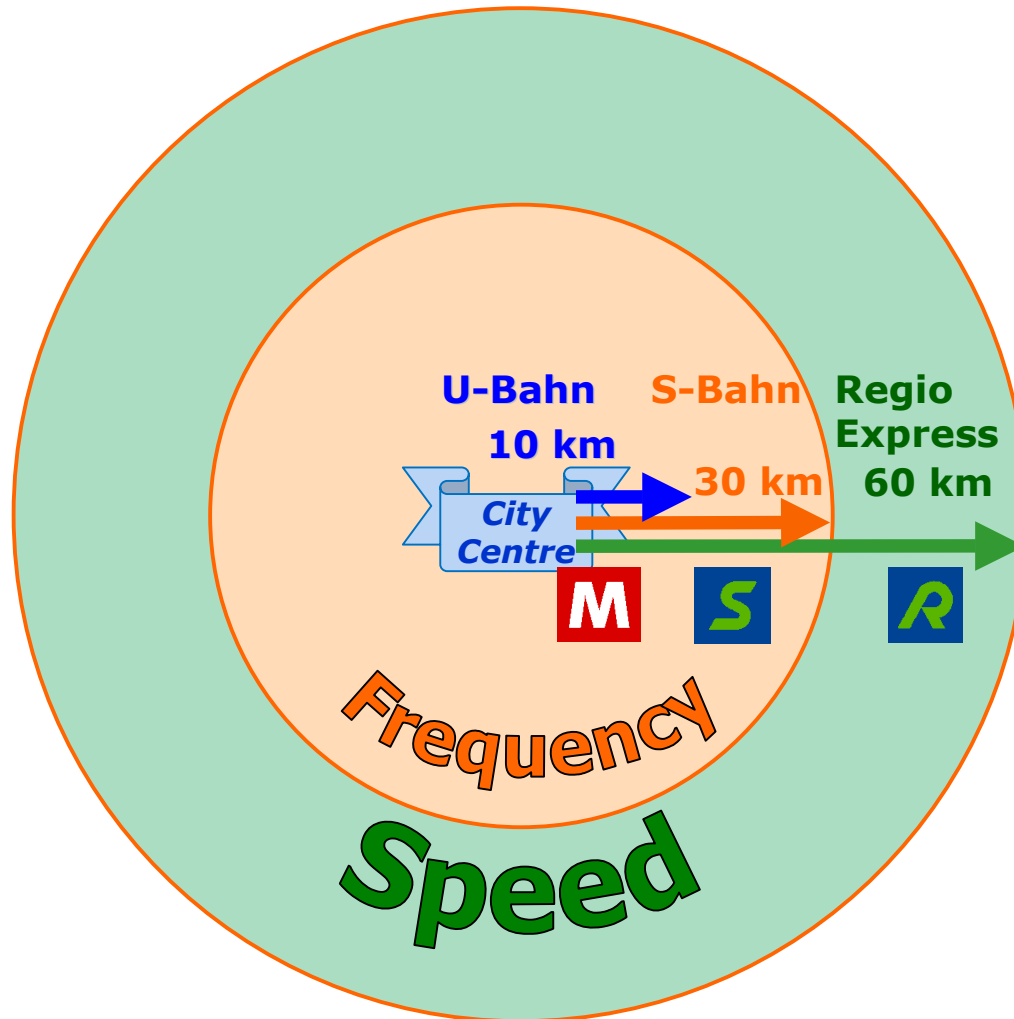


Public transport is truly effective **if:**

- it is available during the whole day
- it reaches every place
(with a sequence of connected services, when necessary)



A Structured and Ordered System...



A structured and ordered system...

...able to offer the best performances for each kind of trip

- More **frequency** when it is required (*closer to the city centre*)
- More **speed** when it is important (*running far away from the city centre*)

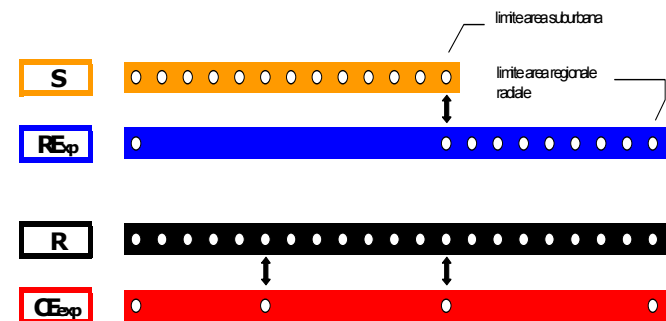


...Coming from Our Past

The structure of Regional Railway Service first appears in **Transport Masterplan of Lombardy Region** issued in **1982**. when building of **Passante Ferroviario** was started (finished in 2008!)

The Masterplan already defined a hierarchy of railway services for regional connections:

- **the suburban service** ("comprensoriale", presently the **S-lines**), for areas closer to Milan, stopping in each station, with a fixed frequency of at least 30 minutes;
- **the regional service** ("regionale", presently **RegioExpress**), to connect Milan with areas beyond the suburban border, travelling without stops in the suburban area and then stopping in the other stations;
- **the direct service** ("interpolo", presently **CityExpress**), to connect main regional stations, with few intermediate stops.



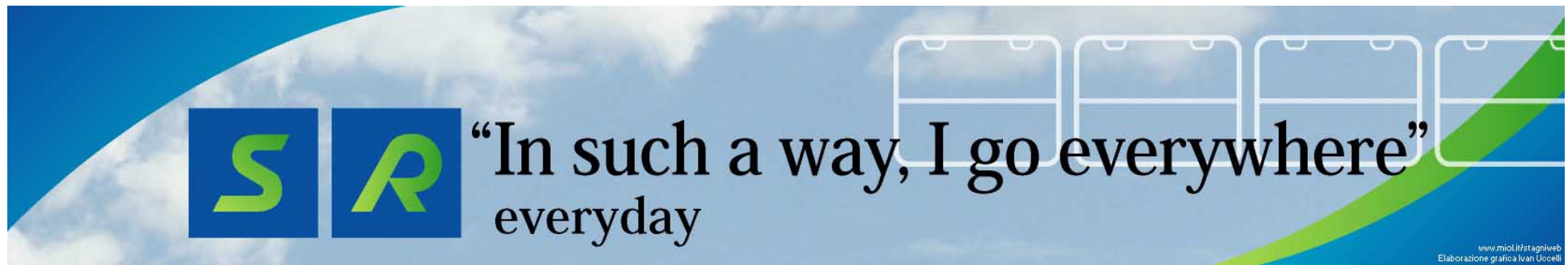
Railway Is for Everybody!

Railway cannot work fine "by itself".

We have to respect some rules of good design (and common sense!).

- timetable planning (clock-face scheduling, symmetry, ...)
- minimum level of frequency and trains per day (otherwise it can't be effective)
- minimum level of performance (e.g. speed)
- timetable - rails - infrastructure (in this order, not the opposite!)
- selling a unique system (and not presenting multiple public transport system in competition against each other)
- true competition towards private car (and not between railway and railway)

If these rules are respected, railway is truly useful for all citizens.



The S-Bahn: a Suburban Network for the Metropolitan Area

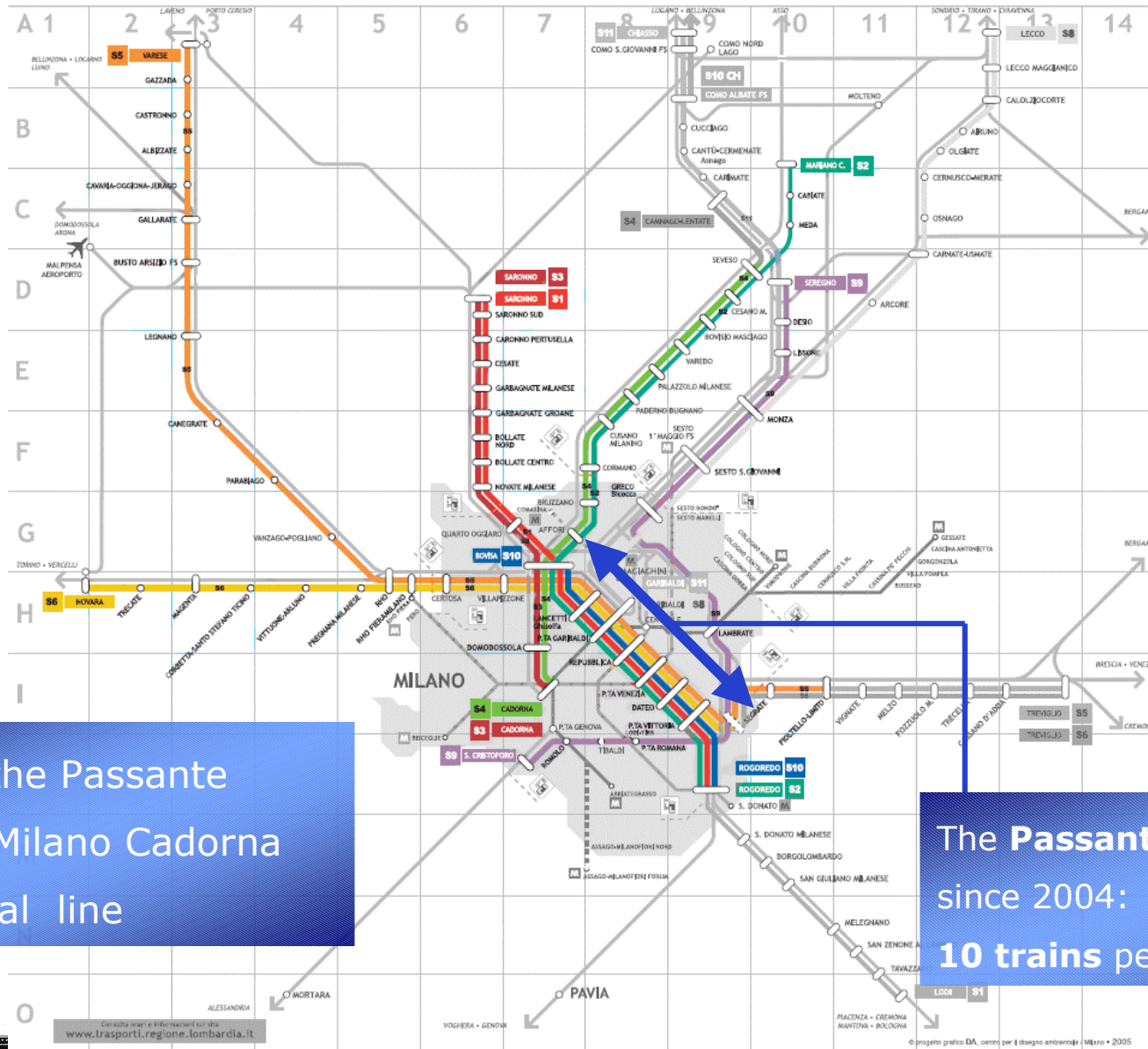


S-Bahn... a Train Similar to an Underground System

- **12 S-Lines** designed as a suburban system around Milan
 - ✓ direct access to city centre and connection to the underground network
 - ✓ frequency of **30 minutes**
 - ✓ running all the day, all days in year
 - ✓ easy connection with other trains and buses
- **new rolling stock**, suitable for suburban service
- specifically designed **information**
- a **simple and unique fare** for the whole regional system
 - **First S-Lines running since December 2004**
 - **The network is almost completed in 2010**



S-Bahn, December 2004: Setting up the System



5 lines in the Passante
 2 lines to Milano Cadorna
 1 peripheral line

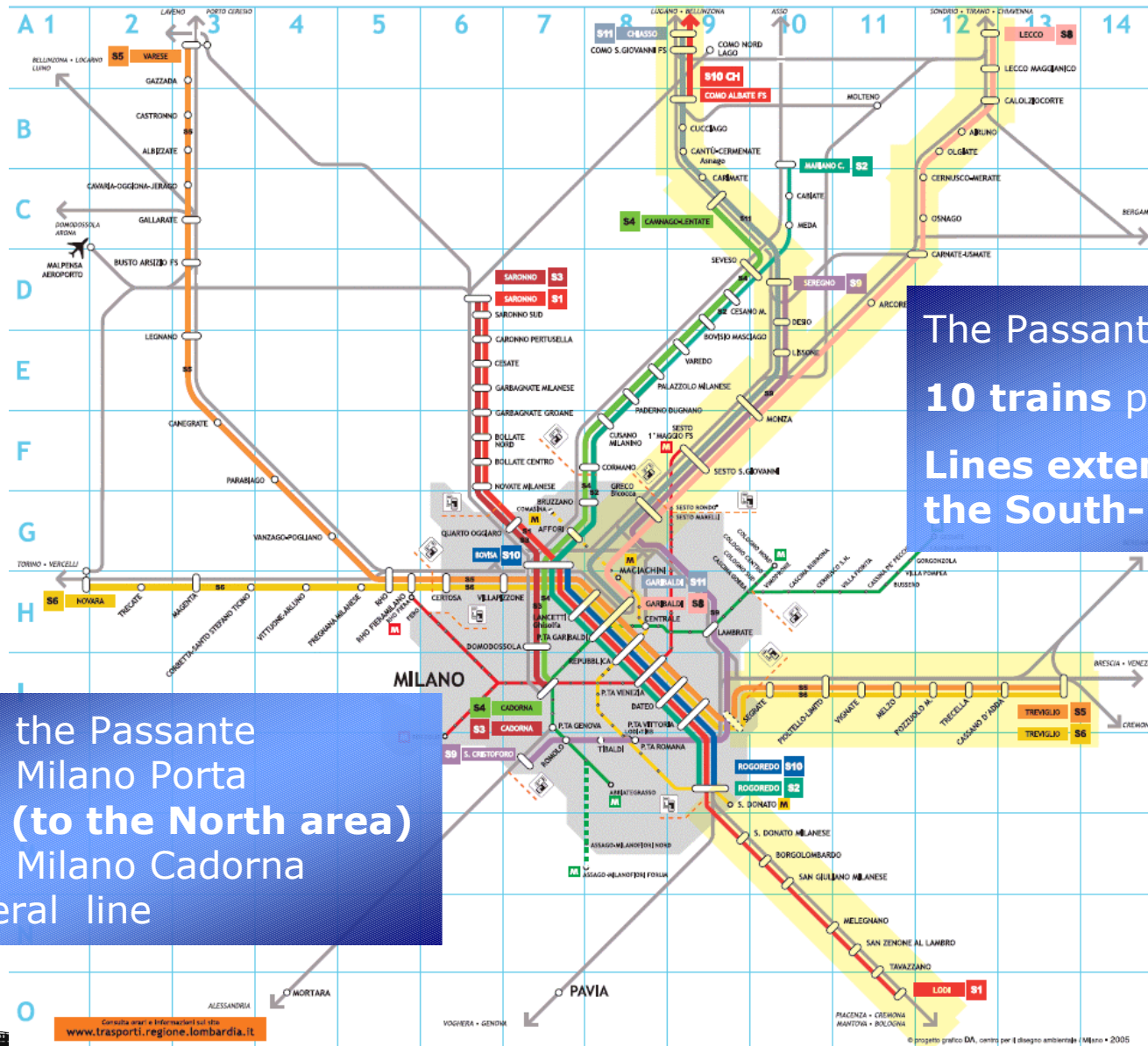
The Passante of Milan
 since 2004:
 10 trains per hour-direction



Consulta orari e informazioni su www.trasporti.regione.lombardia.it

© progetto grafico DA, centri per il design ambiente Milano • 2005

S-Bahn, December 2009: towards the Goal



The Passante of Milan:
10 trains per hour-direction
Lines extended towards the South-East areas

5 lines in the Passante
2 lines in Milano Porta Garibaldi (to the North area)
2 lines in Milano Cadorna
1 peripheral line



Consulta orari e informazioni sul sito www.trasporti.regione.lombardia.it

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The Final S-Bahn System

- S1** Saronno – Mi Passante – Lodi
- S2** Mariano C. – Mi Passante
- S3** Saronno – Mi Cadorna
- S4** Camnago – Mi Cadorna
- S5** Varese – Mi Passante – Treviglio
- S6** Novara – Mi Passante – Treviglio
- S7** Lecco – Besana – Monza – Mi Garibaldi (to be introduced)
- S8** Lecco – Carnate – Monza – Mi Garibaldi
- S9** Albairate – Milano – Monza – Seregno – Saronno
- S10** *Albate – Chiasso – Bellinzona – Biasca* 
- S11** Chiasso – Monza – Mi Garibaldi
- S12** Varedo – Mi Passante - Melegnano (to be introduced)
- S13** Mi Passante – Pavia (to be introduced)



The R-Lines: An Added Value for the Whole Region



R-Lines... for the Whole Region

- ❑ **improved network** around Milan (2 & 4 tracks instead of 1 or 2)
- ❑ **the S-Bahn system** now travelling along the the suburban stations

No need to stop in intermediate “S” stations for regional services.

This permits a new design also for regional trains, in order to obtain **faster connections for the whole Region**

→ **City Express**: for fast connections among main cities

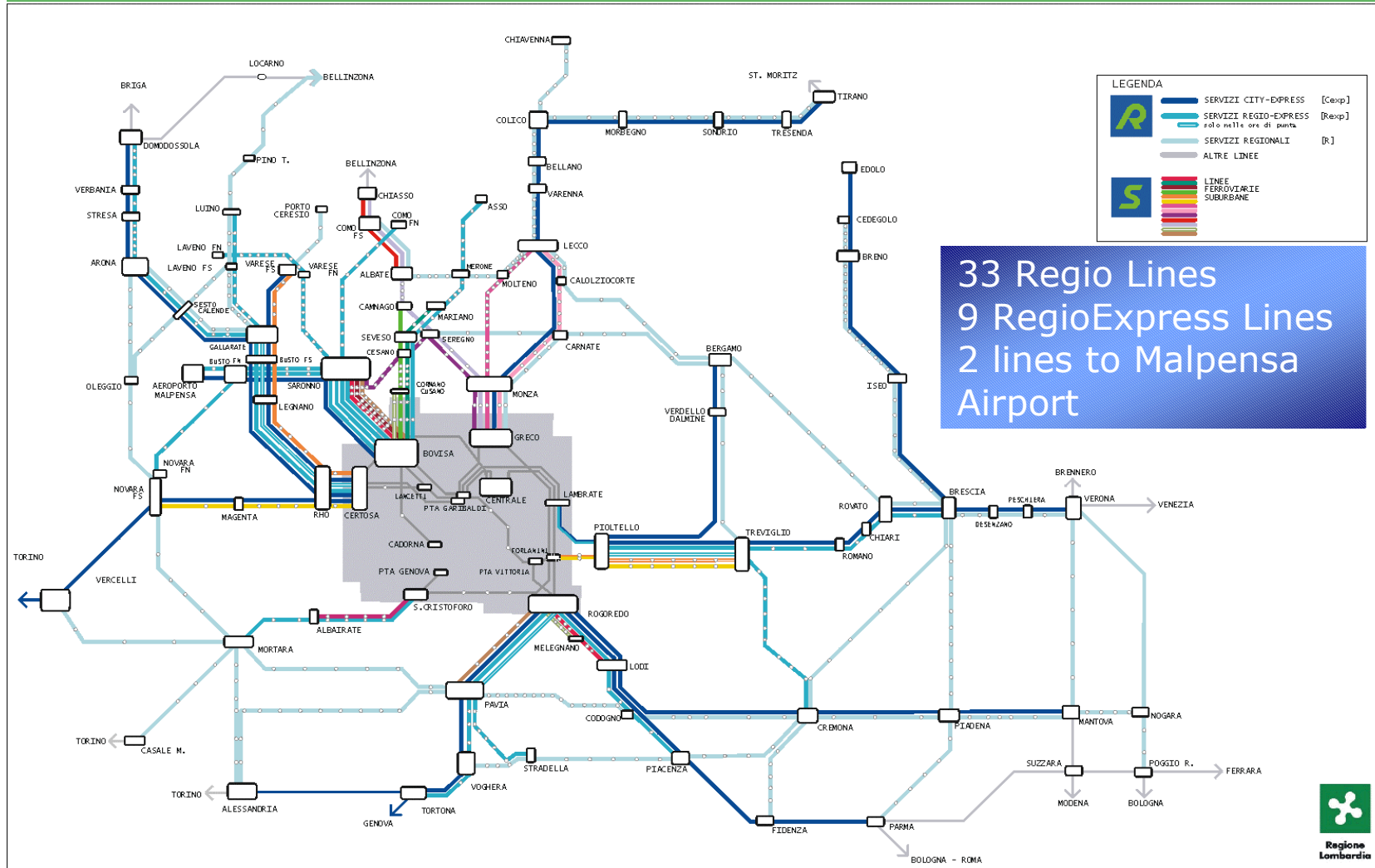
→ **Regio Express**: for faster connections of peripheral areas towards Milan

→ **Regio**: for “traditional” services in non-suburban areas



R-Lines

SERVIZIO FERROVIARIO REGIONALE Schema dei servizi - scenario 2009



Designing the Timetable



An Ordered Timetable

When train meet in some stations, further connections are available, if the timetable is well-structured.

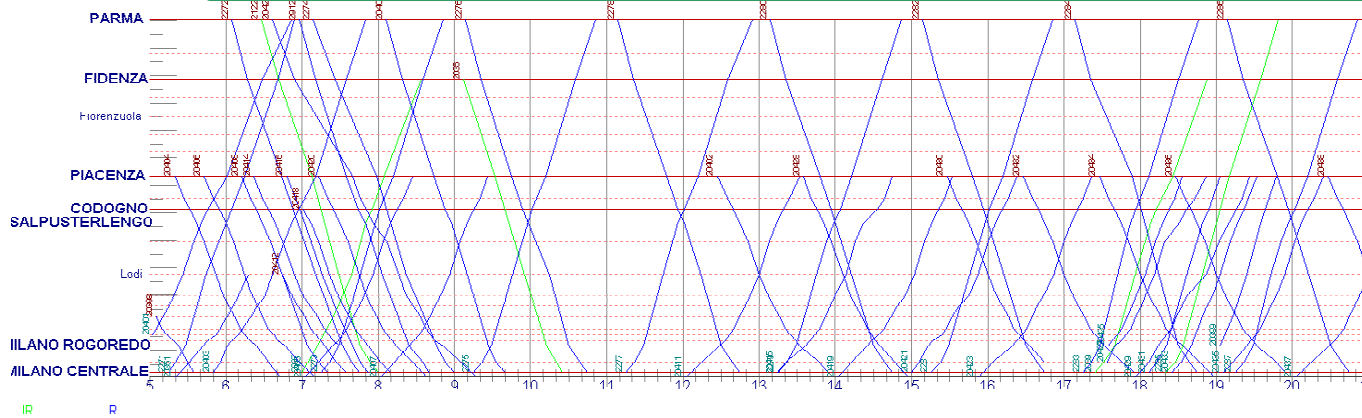
Timetables in Lombardy have been designed "**in an ordered way**":

- trains arrive and leave *hub stations* in such a way to **maximise the number of connections**;
- as the frequency is constant, the same connections are available along the whole day, **every hour or every 30 minutes**.
- as the timetable is **symmetric**, the connection works in both directions and with the same changing time



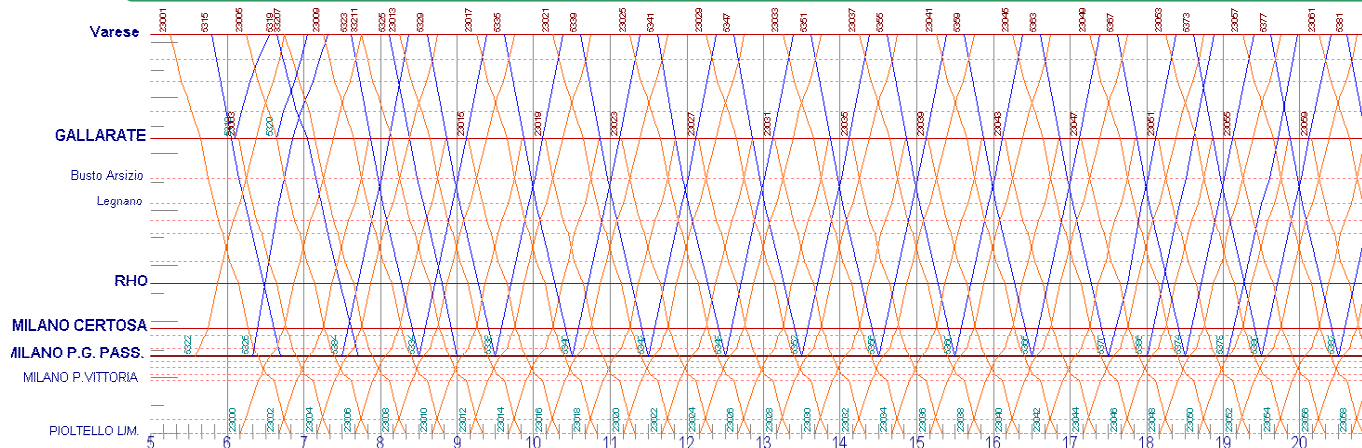
An Example of Ordered Timetable

Milano - Piacenza (before 2010): traditional timetable



R		Stazione di MELEGNANO				
		Direzione Milano				
5	.05					
6		.07				
7	.02	.12	.29	.37	.57	
8				.33		
9						
10						
11						
12						
13		.15				
14				.36		
15						
16		.14				
17		.14				
18			.16			
19			.16			
20						
21		.15				
22			.17			
23				.22		

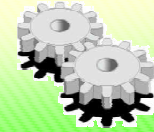
Milano - Varese: ordered timetable with constant frequency (Taktfahrplan)









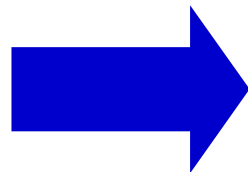
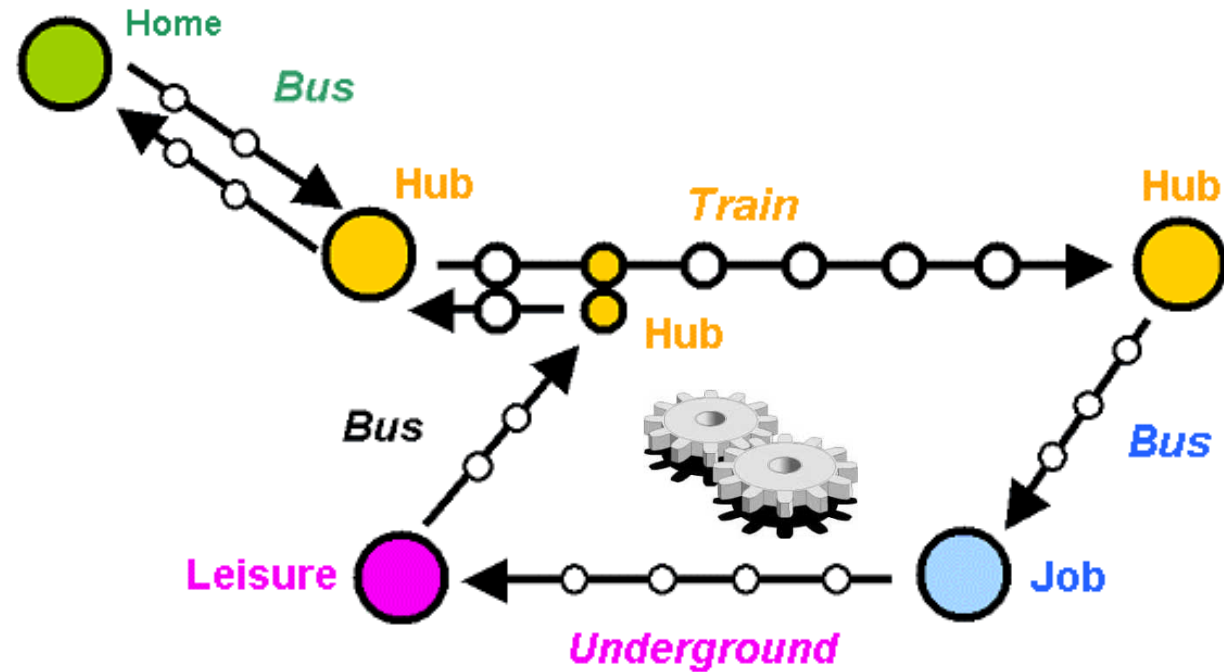
S5		stazione di PARABIAGO		
		direzione Milano		
6				.57
7		.27		.57
8		.27		.57
9		.27		.57
10		.27		.57
11		.27		.57
12		.27		.57
13		.27		.57
14		.27		.57
15		.27		.57
16		.27		.57
17		.27		.57
18		.27		.57
19		.27		.57
20		.27		.57
21		.27		.57
22		.27		.57
23		.27		.57
24		.27		.57



The Hubs, Gears of the System



- 
- +
- Intercity**
- +
- 
- +
- 
- +
- 
- +
- 
- +
- 



Symmetrical Clock-Face Scheduling

(Integraler Taktfahrplan)

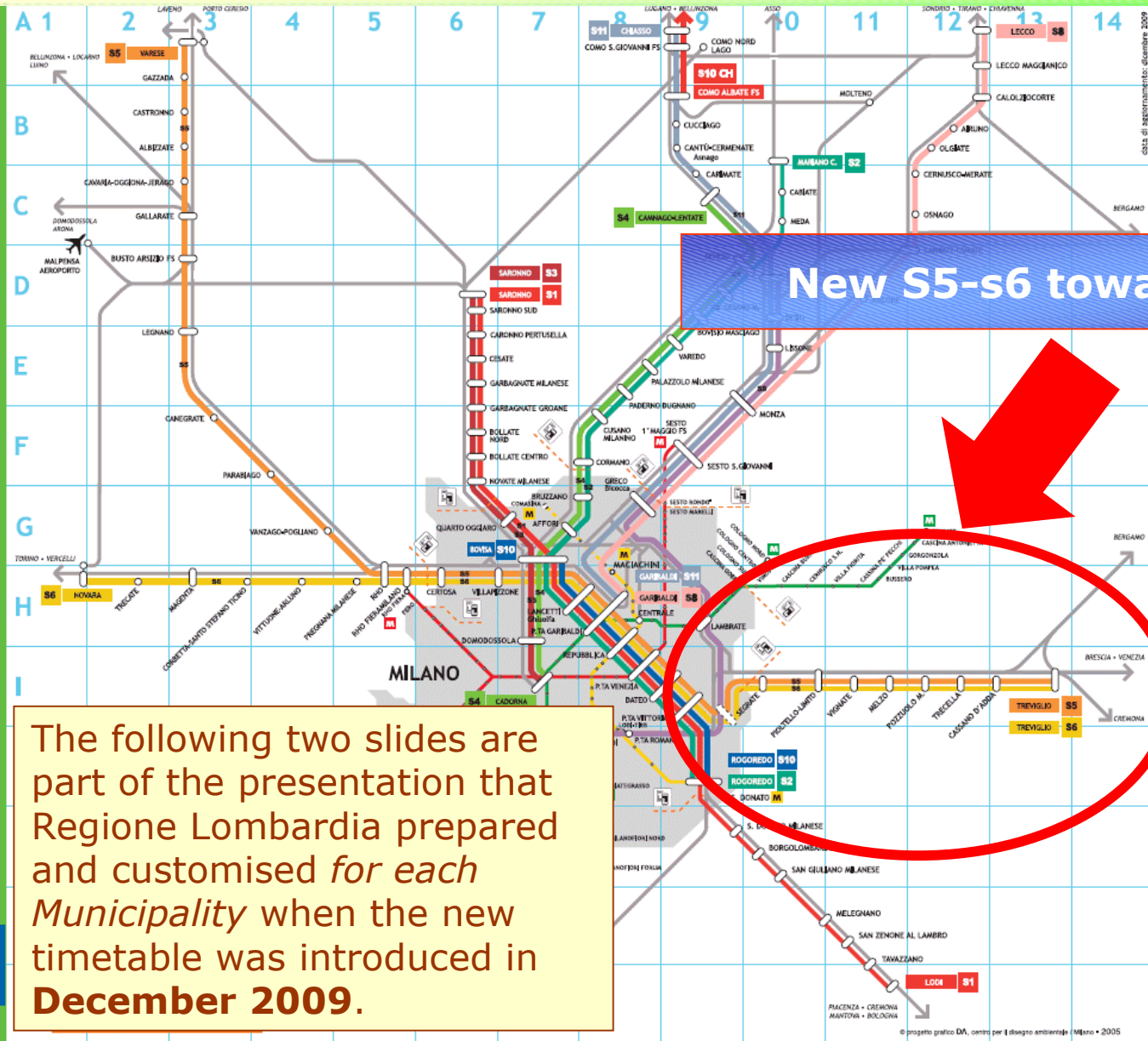
"a common language"



Describing the Service: Easy and Understandable



How Is the Service Changing in...



New S5-s6 towards Treviglio

The following two slides are part of the presentation that Regione Lombardia prepared and customised for each Municipality when the new timetable was introduced in **December 2009**.

Regione Lombardia

Linee S

Suburbano

Pianta chiave

Area Suburbana Milanese

Legenda

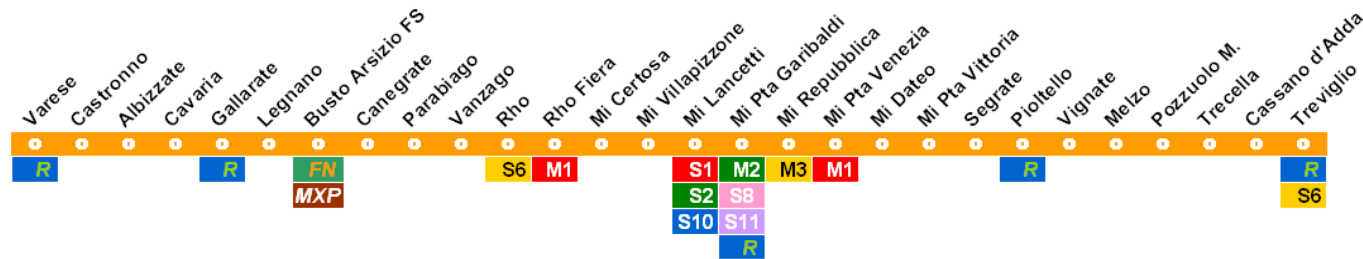
- Servizio Ferroviario Suburbano
- Servizio Ferroviario Regionale
- Stazione Ferroviaria
- Stazione Ferroviaria in costruzione
- Collegamento personale fra stazioni
- Capolinea S
- Capolinea M
- Capolinea T
- Stazione della Metropolitana
- Linea di prossima attivazione
- Limite Tariffa Urbana

Lombardia in movimento

How Is the Service Changing in...

- **New lines** **S5** **Treviglio-Milano Passante-Varese**, **S6** **Treviglio - Milano Passante - Novara**
 - all trains stop in **all** stations between Treviglio and Segrate (*suburban area*)
 - then they travel through the Passante and stop in **8 stations inside the city of Milan**
 - they cross **all 3 underground lines** (M1 M2 M3)
 - finally they go on towards **Rho Fiera, Rho** and **Gallarate/Varese** or **Novara**
- ⇒ **96 trips per day** Treviglio → Milano Passante → Rho → Novara/Varese

S5
Varese
Gallarate
Milano
Treviglio



- **Stations of Milano Lambrate, Centrale, Greco Bicocca** can be reached by **changing train in Pioltello or Milano Garibaldi**



How Is the Service Changing in...

As the suburban service is introduced (December 2009), in **Melzo** there are:

an S5 train every 30 minutes,

- from early morning to midnight,
- everydays during the week

and in peak hours **a train every 15 minutes** (as the sum of S5 and S6 lines)

along all stations between Treviglio – Mi Passante – Rho, towards Varese/Novara

☺ **Easy to remember timetable**

From **Melzo** to Milan, train leave at minutes: **.57 - .12⁺ - .27 - .42⁺**

Example: 7.57 - 8.12 - 8.27 - 8.42



(+ peak hours only)

☺ All trains stop **in all stations**

☺ Trains run at same frequency towards Treviglio and Milano



Identifying the Service at First Sight

- Identifying the service by means of a coordinated image is fundamental for a successful service.
- The  symbol, the **name** and the **colour** of the line are present in all labels and inscriptions referring to suburban lines: stations, trains, timetables and brochures
- A similar task has to be accomplished for regional services, which cover the whole regional network
- An  symbol, a **name** and a **map of regional services** are planned to be used in the future.



Identifying the Service in the Station



numero train	destinazione destination	orario time
R 10805	BERGAMO	07:21
R 23080	CARNATE USM.	07:25
R 5384	VARESE	07:30
R 20407	PIACENZA	07:30
S11	CHIASSO	07:38
S8	LECCO	07:49
R 10757	CARNI.-BERG.	08:02
R 5129	MOLT.-LECCO	08:13



M1 Milano Cadorna

Milano P. Garibaldi, 1/2010 - E. Foresti

Identifying the Service on Board



Examples and Applications



An Easy System

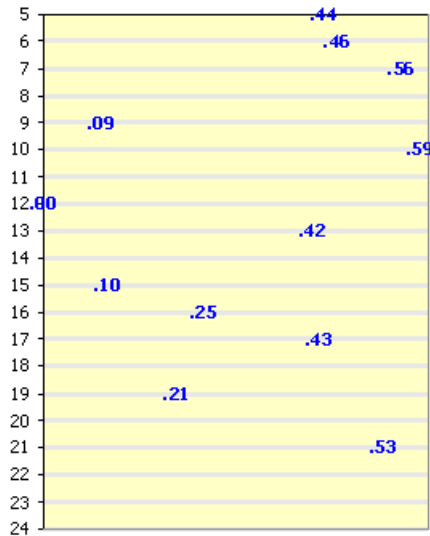
New Clock-Face Scheduling (*Taktfahrplan*)

**Before and after
December 2008**

Verolanuova station
(diesel branch line)

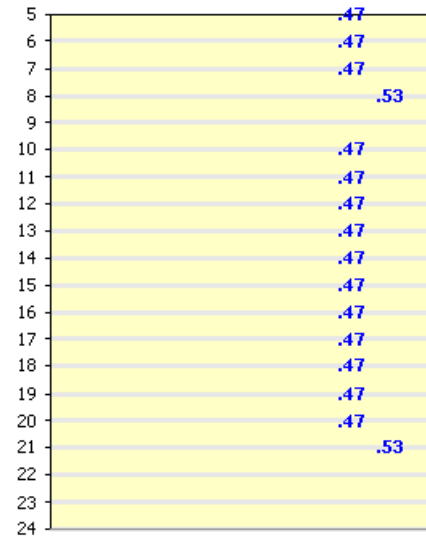
Before

Verolanuova - 9/12/2008
(verso Manerbio)

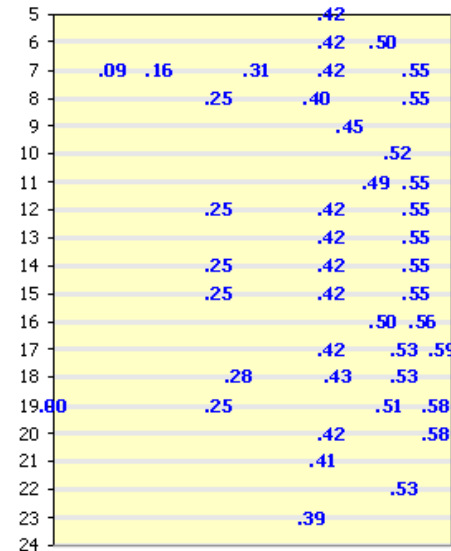


After

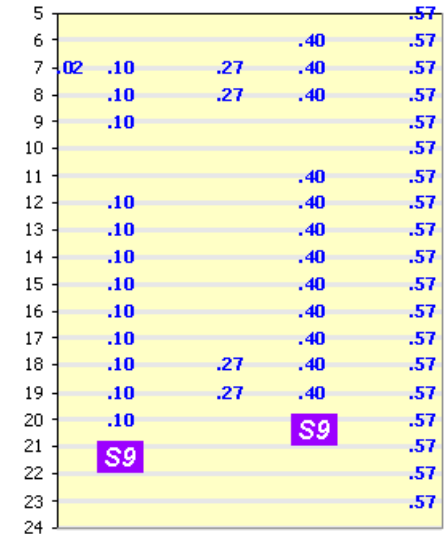
Verolanuova - 18/12/2008
(verso Manerbio)



Desio - 9/12/2008
(verso Lissone-Muggio)



Desio - 18/12/2008
(verso Lissone-Muggio)



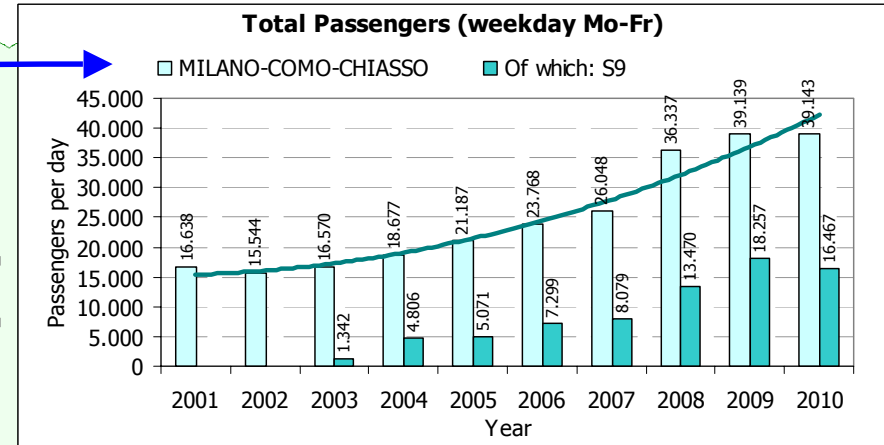
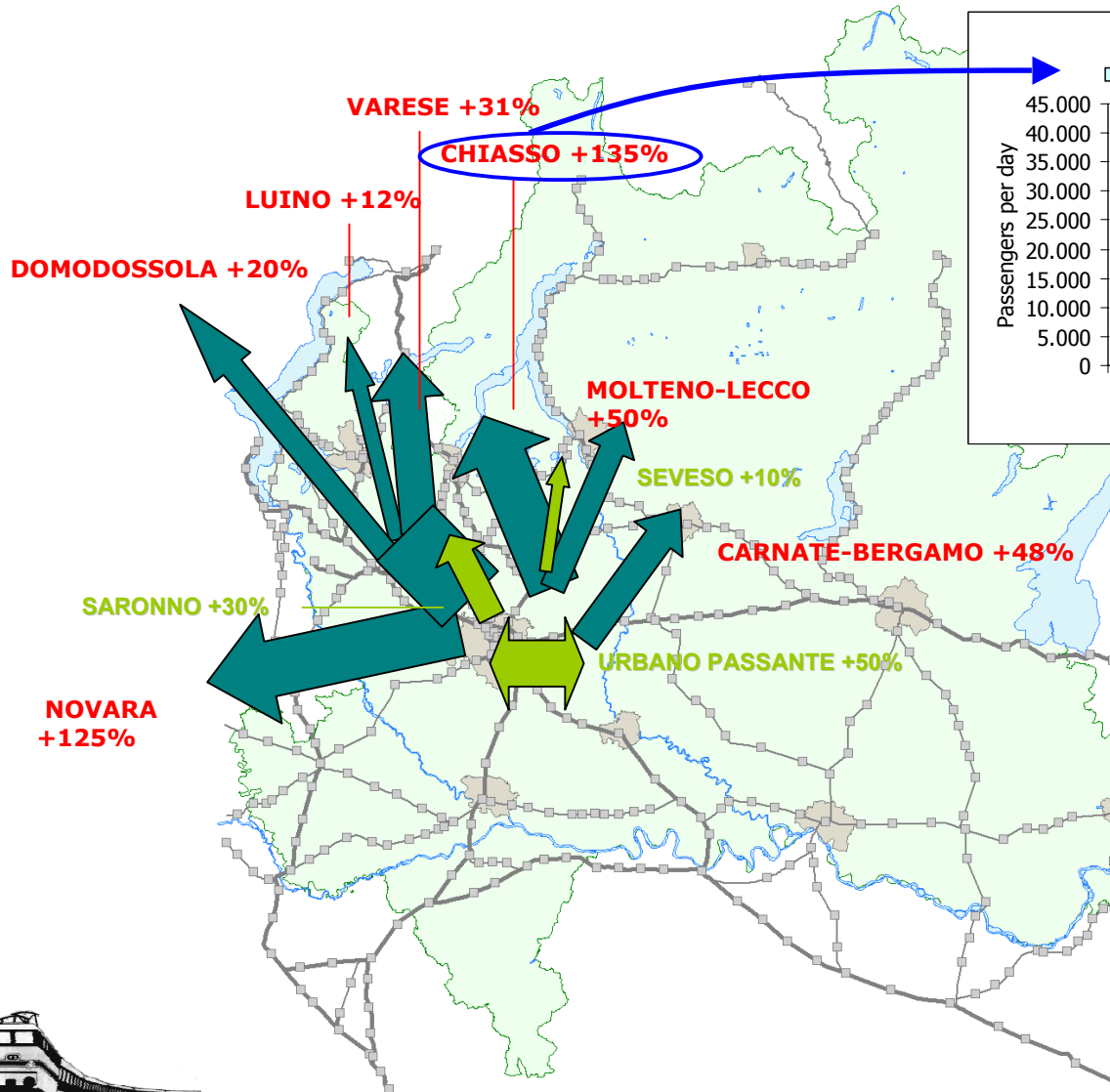
Before

After

Desio station
(S-Bahn)



Some Results: Milano – Chiasso +135% Passengers



**Total passengers per day
+135% along Milano-Chiasso
(presently S11+S9)**

**Similar behaviour along other S Lines
(S2, S6, ...)**

(reference year 2001, when Regions received the task of planning regional railways)



Learning more:



www.miol.it/stagniweb

Thank you for your kind attention and... **have a nice trip!**