

Paris New Light Rail System: Operation Strategy

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As existing large-scale bus and metro systems reinaugurate light rail transit (LRT) service, organizational opportunities may present themselves to simplify and increase the productivity of the new light rail service. Such a situation will exist in Paris with the opening of the new Saint-Denis/Bobigny LRT. The first phase of this new 21-stop, 9-km line opens June 29, 1992, and is projected to carry 15.5 million annual passengers. Seventeen low-floor articulated light rail cars will be operated on this new tram line. Paris has been without trams since the late 1930s. A decision had to be made whether to operate the new rail line as a separate entity or as part of the Paris Metro system, the bus system, or some combination of the two. It is now proposed that the LRT line will be operated by the bus department and that the vehicles be maintained in the existing Bobigny Metro workshop. A private company will provide daily cleaning services. The new LRT line will be operated through a central control room by bus division supervisors. Fifty-five bus drivers selected through a volunteer seniority process and especially trained for the LRT will operate the cars. During their careers, they will remain both bus and LRT drivers. Functions performed at a systemwide level, such as administration, marketing, and so forth, will further increase LRT productivity. The next step in creating a circumferential tramway around Paris is a second line, Tram Val de Seine, which is now in design and scheduled for completion in 1995.

As existing large-scale bus and metro systems reinaugurate light rail transit (LRT) service, organizational opportunities may present themselves to simplify and increase the productivity of the new light rail system. Such a situation will exist in Paris with the opening of the first section of the new Saint-Denis/Bobigny LRT on June 29, 1992.

The new line will be operated by the Paris Transit Authority (Régie Autonomes des Transports Parisiens, or RATP). Paris, which has been without trams for 54 years (and nearby Versailles for 34 years), presently operates 15 Metro lines, 2 RER-Regional rail lines, and 202 bus routes. Some 3,899 buses are now in service operated from 23 bus garages. More than 2.96 billion riders used the combined system in 1989.

SAINT-DENIS/BOBIGNY TRAMWAY PROJECT

The modal choice of the tramway between Saint-Denis and Bobigny in the Ile de France region was made to suit site conditions and to create a direct link between outlying communities. The creation of this circumferential route will link 3 Metro lines, 30 bus lines, the RER D line, and the Société Nationale des Chemins de Fer (SNCF) commuter rail system and strengthen the use of the existing infrastructure. The

tramway is entirely innovative in its design and impact on the environment and was selected for its reasonable cost and the economic and social advantages that it provides. The first Ile de France Tramway represents a new concept for travel between suburbs.

RATP based its decision to install the tramway on the success of new or modernized LRT systems in Grenoble, Lille, Marseilles, Nantes, and Saint-Etienne. The Saint-Denis tramway has many advantages:

- Its price is competitive. It is four times less expensive than an underground railway. The total cost less equipment is approximately 650 million francs (4.94 francs = \$1 1992 U.S.).
- It runs on its own tracks within a specific right-of-way. This results in more reliable service.
- With a maximum speed of 60 km/hr, it is a fast means of transport.
- It is silent.
- It is electric and therefore nonpolluting.
- The technical systems (track, wire, etc.) are fully integrated into the urban scene.
- It serves an ever-increasing demand for travel between suburbs without passing through the center of Paris itself. Today 70 percent of all trips in the region take place between suburbs, although public transport carries only a small proportion.

The line will serve 91,000 inhabitants in Saint-Denis and 43,000 in Bobigny as well as 34,000 in La Courneuve and 60,000 in Drancy enroute. There are an estimated 110,000 jobs in the LRT corridor. Daily ridership is estimated at 55,000 travelers.

Seventeen low-floor, standard French tramway, articulated light rail cars (based on the Grenoble car design) will be built by Alstom at a cost of 13 million francs per car. The first car was delivered in February 1992. Access to the car is convenient both for the disabled and all riders. Car floors and platforms are at the same level. No sliding "gap" filler is needed. Two wheelchair places are in each car without safety attachments. Fourteen cars operated in one-car trains will be required for peak hour service. Cars will carry up to 180 passengers with 52 seated.

There will be 21 stops on the 9-km line, which will be opened in two sections (Figure 1):

- Bobigny (Metro Line 5) to La Courneuve (Metro Line 7), June 29, 1992, and
- La Courneuve to Saint Denis (Metro Line 13), end of 1992 (construction took 2 years).

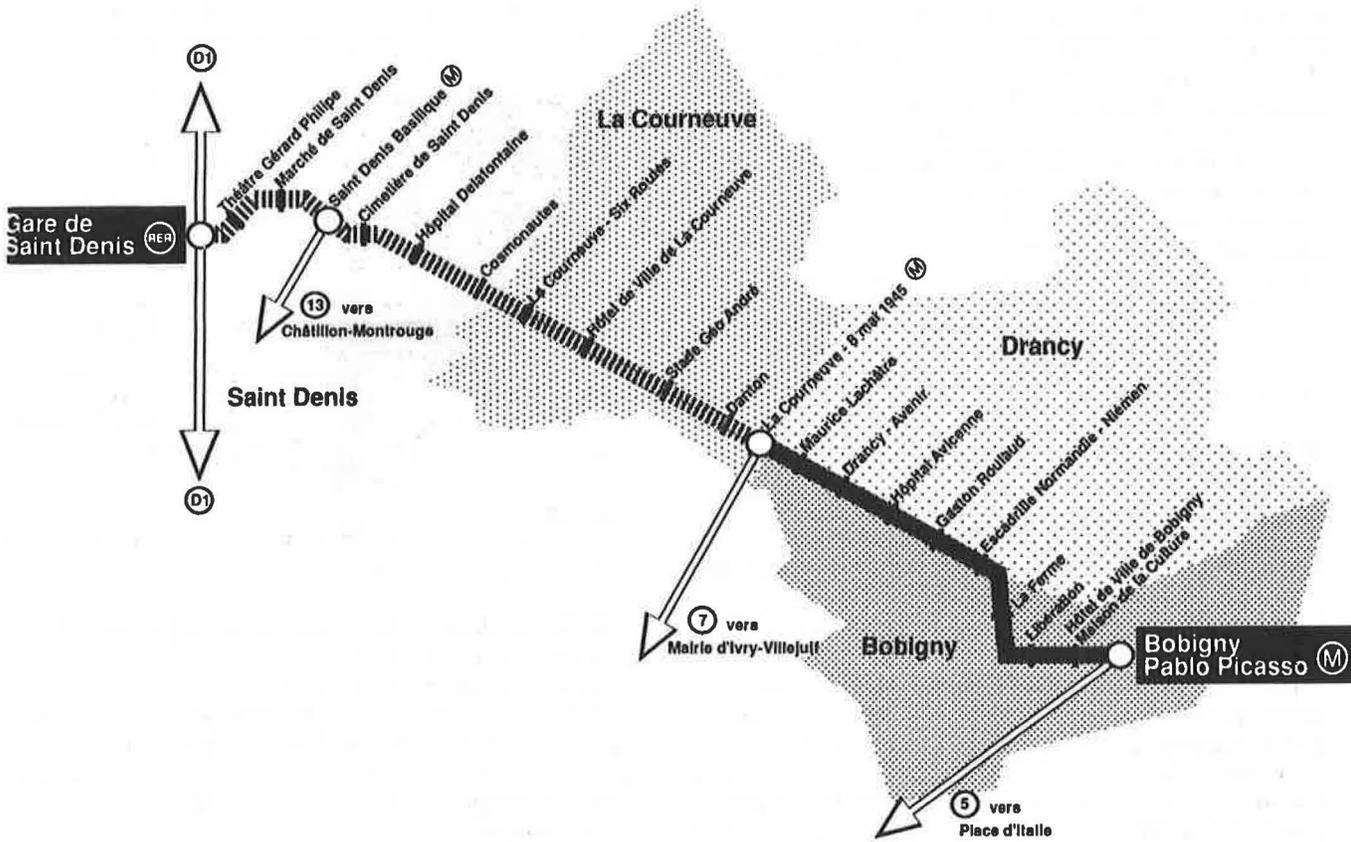


FIGURE 1 Map of Paris light rail system.

Service will be provided from 5:30 a.m. to 12:30 a.m. The tramway will operate every 4 min at the peak of the peak hour. Running time will be 30 min each way with a 75-min cycle time. The commercial speed is 19 km/hr.

The line is designed as part of an urban boulevard. It runs on dedicated track parallel to rebuilt National Road 186. Water and gas pipes, drains, electrical and telephone lines were adapted to the new construction. The Seine Saint-Denis local authority and the region took special care to ensure architectural consistency with the environment. The landscape was remodeled to provide absolute safety for users and pedestrians within pleasant surroundings. Pedestrian areas will stimulate the trade that the tramway traffic initiates. The track area is paved with paving blocks to improve appearance and reduce maintenance. Traffic signals at crossroads and along the line are integrated with the tramway. The LRT was considered to be part of a total urban improvement project.

LIGHT RAIL ORGANIZATION

In February 1990, the RATP's president-director general, Christian Blanc, announced a new organization plan favoring decentralization and simplification of lines of responsibility. The new organization realigns the RATP under five deputy general managers. Two of these deputy general managers (operations and maintenance/construction) share major responsibilities for the new light rail line.

President-Direct or General

- Security
- Public Communications
- Director General Services

Deputy General Manager: Operations and Commercial

- Metro Department
- RER Department
- Bus Department
- Commercial Department

Deputy General Manager: Maintenance, Construction, and Manufacturing

- Equipment and Electrical Systems Department
- Infrastructure Department
- Rolling Stock—Rail
- Rolling Stock—Bus

Deputy General Manager: Development, Finances, and Logistics

Deputy General Manager: Human Resources and Social Policy

Deputy General Manager: International

Within the new organization plan, a choice was open to operate the light rail as a separate entity, as part of the Metro

or RER, as part of the bus system, or some combination. The final operating plan eliminates all possible duplication within the overall RATP system and results in improved system productivity. The new line will be operated by the RATP bus department, the vehicles will be maintained by the rail rolling stock department, the line will be maintained by the infrastructure department, and electrical by the equipment and electrical systems department. Other functions such as finance, administration, marketing, and so forth will be performed at the systemwide level by the appropriate deputy general manager and department involved.

TRANSPORTATION AND OPERATIONS

The RATP bus department will be the responsible unit for operations under the direction of Ph. Ventejol, project manager, assisted by P. Lenormand and Ph. Isenbeck. Following the concept of decentralization, the light rail line will be administered from the bus garage at Pavillon Sous-Bois. This garage has 220 buses and more than 500 drivers assigned. The manager of the garage, M. A. Thoule, will be responsible for the LRT start-up and operations.

Fifty-five RATP bus drivers selected through a volunteer seniority process will receive training as light rail operators. In full operation the line will require 32 operator runs. During their careers, the selected operators will remain both bus and LRT drivers. They may return to bus operator duties but their selection for LRT is regarded as a moral contract. Driver pay is the same as for articulated buses with a 150-franc monthly bonus.

The main training staff of seven from the bus department received operating experience and training in Grenoble. They will be assisted by 12 regular bus trainers. The training program for drivers will last 3 weeks and consist of equal classroom and road instruction. The rule book and operating procedures are in accordance with French Ministry of Transport regulations and procedures and are now being reviewed and refined.

The new line will be controlled by bus department supervisors through an expansion of the central control room shared with local bus operations control located at the Bobigny/Pablo Picasso Terminus (Metro Line 5). This terminus will serve 13 bus routes (more than 120 buses per hour) and the LRT. The control room is at the bus platform level, glass enclosed, and visible to passengers. The LRT control position will monitor line operations, 10 closed-circuit television cameras, and traction power. Radio communication with all cars and a public address system at each stop is provided. Line supervision will be provided by bus supervisors.

The line is to be operated "on sight" without a train stop signal system. However, traffic signals are integrated with the LRT operation.

FARE COLLECTION

The fare collection system will be a proof-of-payment self-service system now in use on Paris bus lines served by a 283 articulated bus fleet. A magnetic ticket reader will be at each door of the light rail car and 41 ticket vending machines, one

at each platform, will dispense single ride, reduced fare, and 10-ride tickets. These machines will be serviced by outside contract. The entire line is in Fare Zone 3.

No dedicated security staff will be used. Operationally this is another bus line. Fare checkers in the bus department will check approximately 5 percent of the passengers based on the experience on bus lines operated with articulated buses. Police in the four municipalities are on call through the control center when required.

VEHICLE MAINTENANCE

The fleet of 17 light rail cars will be maintained by the RATP rail rolling stock department at the Bobigny Metro Line 5 maintenance base. This facility is connected to the Bobigny/Pablo Picasso Terminus by a 2,400-ft partial single-track connection.

At this location, the following facilities are provided for the light rail system:

- New single-track inspection and running repair building,
- New single-track wash building,
- Outdoor storage tracks, and
- Within the 10-track main Metro maintenance building, 2 tracks are set aside for LRT heavy maintenance and 1 track is shared with Metro. A unique three-truck hoist has been installed for the articulated cars along with a shared wheel-truing machine.

M. Barrandon is in charge of maintenance with C. Le Brun managing the Bobigny facility. A final maintenance staffing has not been determined pending discussions with the union.

The general maintenance plan is for a *petit noyau* (small core group) of ex-Metro mechanics to specialize in tram maintenance. Working with this group would be a larger group of mechanics who would split their time between tram and Metro cars. This group would receive less tram maintenance training. It is planned to have both a morning and afternoon work shift.

The vehicle driver will operate the car to the parking location in the yard, including driving it through the wash building.

Light rail vehicle painting and body work will be performed off site at a Metro paint shop. Vehicles would be transported by highway truck.

Vehicle cleaning will be privately subcontracted, as at Metro.

TRACK, WAY AND STRUCTURES, TRACTION POWER

Track, way, and structures would be maintained by the RATP infrastructure department. No rail maintenance vehicles will be used as the line is accessible by road vehicle.

Traction power and overhead catenary maintenance will be provided by the RATP electrical systems department. They will use the same personnel as they now use on the RER. A staff of 70 cover 26 km of RER Line A. The overhead catenary for the 750-volt direct current traction power system is much simpler than the 1500-V RER line, so technical training will be minimal. But they have received extensive safety training

because working on the public street is new to them. The planned work load is 1 week every 2 months (4 hr per night, 5 nights per week) for three to four workers (two technical, one or two traffic control).

Passenger shelter maintenance and cleaning will be similar to that for bus stop shelters and paid for by advertisers.

Systems maintenance, including radio and telecommunications, will be provided by the RATP systèmes d'information et de télécommunications department under the RATP development and finance assistant general manager.

THE NEXT STEP

The Saint-Denis/Bobigny light rail line will serve as a model for the second new tram line to be constructed in Paris using the same type of low-floor car. This will be the Tram Val de Seine located to the west of Paris and now in design. Important details are as follows:

- Length of line: 11.3 km
- Number of stations: 12
- Average distance between stations: 1,020 m
- Number of LRVs: 13 plus 3 spares
- Cost per LRV: 14 million francs
- Total construction cost (excluding rolling stock): 572 million francs
- Start of construction: mid-1993
- Start of service: End of 1995

This line will use the right-of-way and trackage of SNCF's last remaining third-rail electrified line in Paris between Puteaux and Issy-Plaine with an extension from Puteaux to La Défense and a possible future extension from Issy-Plaine to near Boulevard Victor.

It will connect the major business development at La Défense (RER Line A, Metro Line 1 extended, and SNCF Commuter Lines) with Issy-Plaine Station (Interchange with RER Line C) in the southwest of Paris.

This new tram will modernize an old rail line serving a busy corridor, extend it to a major employment and transportation center at La Défense, and provide another section of a series of orbital links in the near Paris suburbs. The rail infrastructure will remain SNCF property but the RATP will provide the equipment, operate the line, and build the storage yard and workshop, which will be located in the SNCF Moulineaux-Billancourt freight yard near Issy-Plaine.

The Saint-Denis tram was the first of these orbital links designed to connect radial rail lines in the suburbs and eliminate the need to transfer in the center of Paris. Longer-term circumferential projects for the Tram Val de Seine include an extension eastward from Boulevard Victor along the route of the Petite Ceinture to either Porte d'Orleans or Cité Universitaire, where it will connect with the new Meteor automated rapid transit line. At the other end, from La Défense, there are two possible routes: northeast via Colombes or Le Stade to Gennevilliers and continuing to the Saint-Denis tram. This will form a linked circumferential tram for three-quarters of a loop around Paris. Another link in the southeast will consist of a dedicated Trans Val de Marne guided busway between RER Saint-Maur-Creteil and Chevilly-La Rue to open in 1993. This will later be upgraded to light rail. Two other noncircumferential busways are also under construction. Last, there is a possibility of LRT on an underutilized SNCF branch line between Dolnay-Sous-Bois and Bondy.

SUMMARY

The operating strategy developed for the new Paris light rail line is appropriate for an integrated medium-sized light rail start-up by a large bus and Metro system. It maximizes the use of existing staff, prevents unnecessary duplication, and builds on the concept of decentralization.

A number of cities, such as Chicago, New York, London, and Hamburg, could be faced with similar decisions as new light rail systems are opened. In some ways, it is similar to the operation of the Newark City Subway by NJ Transit bus operations. It is also similar in terms of driver staffing to several North American bus systems that opened new light rail lines. Older U.S. light rail systems developed from an even older trolley car network may also have integrated bus-LRT management and operations.

This strategy cannot be adapted by cities establishing separate light rail systems outside the existing transit organization or cities such as Manchester that are following a privatized design-build-operate concept.

Thus the Saint-Denis/Bobigny light rail line is not only a model state-of-the-art rail system fully blended into its urban environment, it is also a new and innovative management operating strategy to increase operating efficiency, prevent duplication, and contain costs. The Paris transit authority has been long known for its transit leadership. The proposed management strategy certainly reflects this long-standing tradition of cost-effectiveness and excellence.