

The Metro System of Bucharest city



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Current network coverage

The city of Bucharest is currently (2011) served by four different underground metro lines: the M1, M2, M3, and M4. The M1 line connects the northeast part of the city and provides a circular service around the city centre. The M2 line provides services between the north and the south area. The M3 line provides the east-west linkage. The newly built M4 line provides a connection between the north-west area and the M1 line.

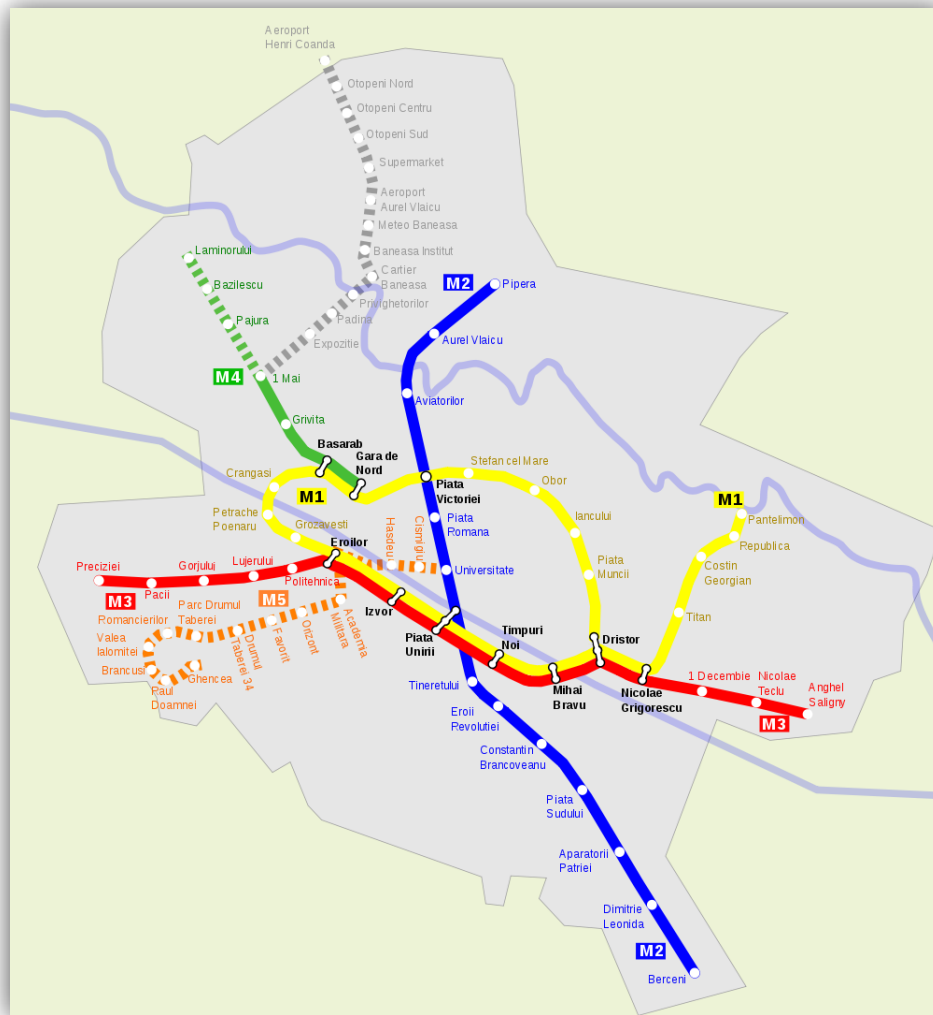


Figure 1: current Bucharest's Metro network with extension on M4, and future M5 and the Airport link

Source: Wikipedia

Train frequency and hour of operation

The underground system operates between 0500 and 2300hr, except on Fridays and Saturdays when the last trains leave the terminus stations at 2400hr. The frequency of the trains on each line are various

throughout the day; at rush hour, trains arrive every 6-7 minute on lines 1, 3 and 4, and every 3-5 minute on line 2. The rest of the day, the trains arrive every 8 minute on lines 1 and 3, every 9 minute on line 2 and every 10 minute intervals on line 4.

Line	No. Of Station	Total service km	Frequency	
			peak	off peak
M1 + M3	30	44.7	6 - 7	8
M2	14	18.7	3 - 5	9
M4	4 (+3 additional)	3.7 (+3.1 additional)	6 - 7	10

Table 1: Information and frequency of Bucharest's underground system

source: <http://www.urbanrail.net>

Ticket system

The Bucharest Metro network employs two ticket systems, the magnetic strip card that are only use for the metro system and the Radio-frequency Identification (RFID) contactless card. The latter can be used with other modes of transport (bus, tram, and trolleys bus) run by Regia Autonomă de Transport București (RATB). The ticket systems only check the permit at the entrance; the exit is an open system. The disadvantage of this is that the usage information can only be collected on the origin of the trip.

Types of ticket

- **Magnetic strip card**

The magnetic Strip Card can be purchased at any metro stations prior to the travel, except the discounted passes which have to be purchased at a specified number of stations. The older-style card, unlike the new RFID card, contains no personal information or usage data. The multi-trip card also allows for users travelling together to use the same card.



Figure 2: 10-trip magnetic strip card

- **Radio-frequency Identification (RFID) card**

The implementation of the RFID card was part of the measure to integrate the public transport in Bucharest. The city's public transport was going to be coordinated by the Metropolitan Transportation Authority from July 2006. Since then the plan to establish this governmental body has been postponed indefinitely. On the other hand, the unification of the public transport ticket system has begun. The RFID card system can be used in all modes of the city's public transport. The card can be obtained freely at Regia Autonomă de Transport București (RATB) kiosks in exchange with the personal data such as name and personal identification number which imprints onto the card, hence it can only be used by the owner

of the card. The RFID system allows the collection of personal usage into the centralised database which could be used to improve the transportation system. The advantage of the RFID card is that if the user lost his/her card, the old card can be electronically cancelled and a replacement card can be obtained with a small fee. An Anonymous RFID card can be also obtained in exchange of a small payment. This anonymous card can be used by multiple travellers similar to the Magnetic strip card. User must purchase either a monthly pass or a credit to be able to use the RFID card.

A full fare metro trip costs 1.25 Ron (0.31 Euro), the charge is based on time interval regardless of the number of time user enters the system. Under the current fee system, the 10 trip magnetic card still remains the most efficient payment fee for casual traveller (see Table 2 for fare comparison).

Type of ticket	Cost		Cost per trip	
	Ron	Euro	Ron	Euro
2 trips card	3	0.8	1.5	0.38
1 day card	5.5	1.4	n/a	n/a
10 trips card	9	2.3	0.9	0.23
Monthly 62 trip pass	27	6.8	0.4	0.11
Student monthly pass with 62 trip	13.5	3.4	0.2	0.05
Student unlimited monthly pass	25	6.3	n/a	n/a
Unlimited monthly pass	50	12.5	n/a	n/a
RFID card fare per trip	1.25	0.3	1.25	0.31
<i>Exchange rate: 4 Ron = 1 Euro Note: Senior citizens over 70 years of age travel free of charge</i>				

Table 2: Type of tickets and fares offer by the Bucharest city's underground system

source: cost per ticket from <http://www.metrorex.ro>, cost per trip, self calculated

The public transport in Bucharest is heavily subsidized to discourage the use of private transport and to alleviate traffic congestion and other problems that stems from heavy use of private transportation, such as air pollution and environmental problems. The fare is one of the lowest among European cities (Figure 3).



Figure 3: a comparison between Metro fares for a single trip ticket in different European cities
source: self compilation from various internet source

Rolling stock

The Bucharest Metro system currently has two types of train sets. The newer Bombardier Movia 346 train sets, built in 2002-2008 and the older Astra IVA modular cars, built in Arad between 1976 and 1992. The M2 line only uses the Bombardier train sets, while other lines are still partly use the Astra. In each Bombardier train, there are two guards employ to look after the train and deter any potential vandalism activities. The Astra train sets are approaching the end of its service life. It is currently either taken out of service or undergoes a refurbish program. It was rumoured that the Metrorex has employed graffiti artists to paint the older train sets, instead of footing an official high fee repainting program.



Figure 4: Oil train set with graffiti <left>, inside the new train set <right>

Source: <http://www.skyscrapercity.com>

The Metro network in relation to Bucharest's land use

In order to understand the rational behind the planning of the city metro line, the Metro network and a brief description of the land use of each district are included below.

The information on Table 3, shows that the Metro system can be accessed from 14 out of 19 districts.

The five districts that do not have access to the metro system are residential area and the area occupied by less privileged social group. It can be seen that all of the more affluent area and the business districts are accessible by the metro system. Although, it is difficult to draw any further conclusion from this limited data, the information presents here suggests some correlation between accessibility to the metro system and the city land use pattern.

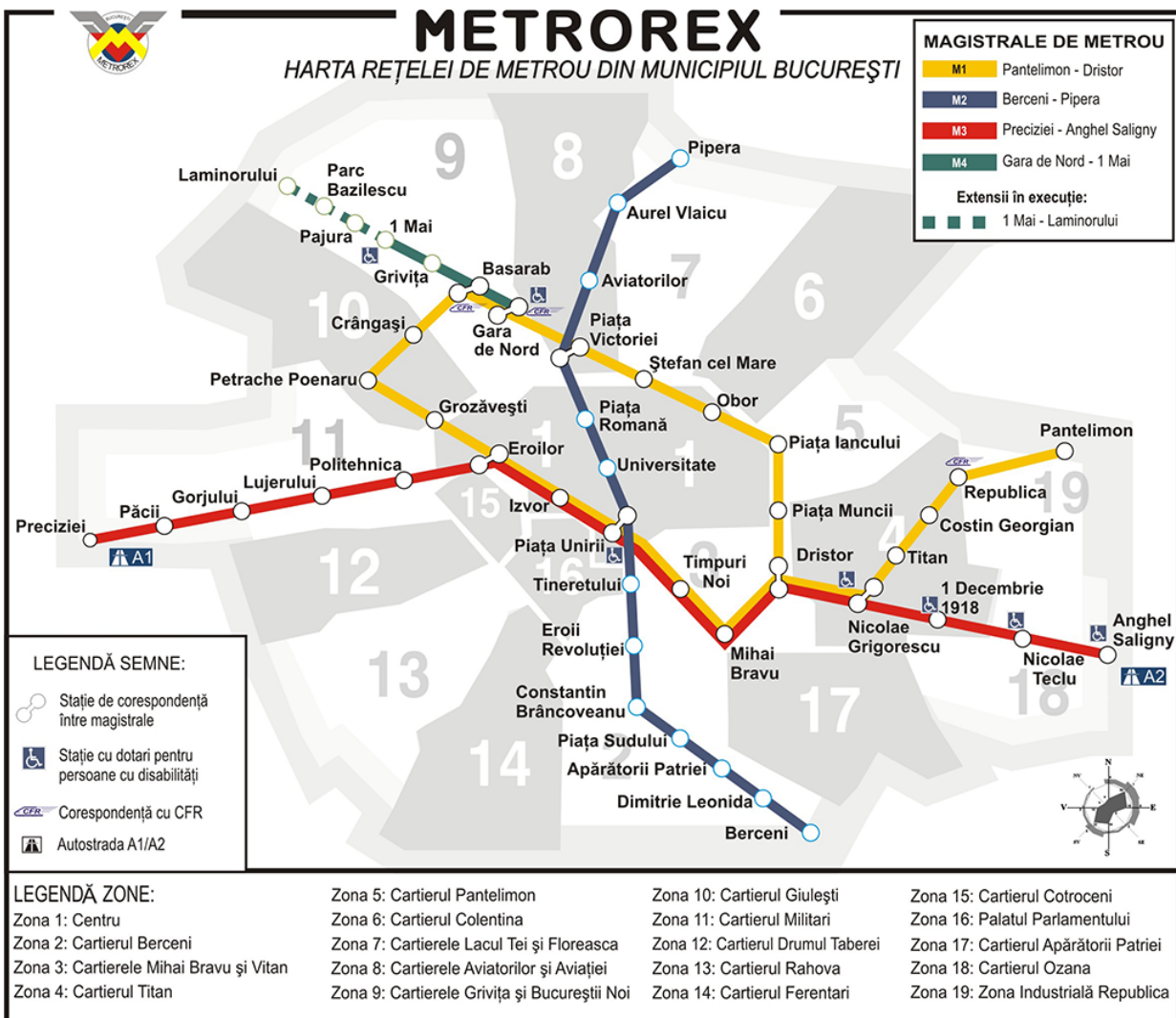


Figure 5: current Bucharest's Metro network with extension on M4 line

Source: <http://www.metrorex.ro>

District	Main Characteristic	Access to Metro
1	Historic city area, hub of the city's night life	Yes
2	Residential area with biggest green space in Bucharest	Yes
3	Residential area. High density blocks with facilities	Yes
4	Residential area. High density blocks with facilities	Yes
5	Residential area. Poor district with high crime rate	Yes
6	Residential area. High density blocks with facilities	No
7	Affluent districts, university campus, student dorms, and business centers	Yes
8	Affluent districts, close to the airports, business parks	Yes
9	Ex-suburb, fast development	Yes
10	Unattractive, football stadium	Yes
11	High density Residential area with many shopping area	Yes
12	Elderly residential area	No (planned for 2016)
13	Unattractive, high crime rate, Gypsies' quarter	No
14	Unattractive, high crime rate, Gypsies' quarter	No
15	affluent district close to the palace and parliament	Yes
16	affluent district close to the palace and parliament	Yes
17	Residential area	No
18	Residential area	Yes
19	Industrial area	Yes

Table 3: Summary of 19 districts of Bucharest's characteristics and their accessibility to the Metro line

Future development plan

Long term improvement plan of the current metro system is the construction of the M5 line which will run from the south-west to the north-east region of Bucharest. Metrorex has already commissioned the prefeasibility and feasibility studies for works on the new subway mainline that will links the south-western Bucharest's neighbourhood of Rahova to the north eastern area of Colentina. The new M5 line will be approximately 21 kilometres long with 31 stations. The commencement of the construction is due sometime in 2011 after the economic and technical feasibility studies are finished. It is estimated that the construction work for the line will last around 8 years.

Other improvement plan is the construction of the Airport Link, the M6 and the M7 lines. The Airport Link will be a branch of the current M4 line. The link will be part of the M4 line and branches from the M4 at station 1 Mai. It will provide a direct link between the city and Henri Coandă International Airport. The project was approved by the General Council of Bucharest. The construction for M6 (violet line) between Rahova (southwest) and Colentina (northeast) and M7 (brown line) between Gara de Nord train station and Henri Coandă International Airport have also been planned but not yet approved. A total of 9 Metro lines are planned for 2020.

Source: metrorex.ro; railway-technology.com; urbanrail.net; wikipedia.org