

MUNICH

Germany

population 2,929,000 (would be 21st in US)

weekday trips per 1000 700

- + Frequent commuter rail with downtown tunnel integrated with local transit
- + High ridership subway and tram system

Munich is a very centralized metropolitan area. The city itself has 1. million people in 120 square miles, a density similar to the city limits of Boston, Chicago, or Philadelphia. The city is surrounded by rural areas; many of the outer neighborhoods border forest and farm fields. Scattered through this area are series of small towns, all with populations under 50,000. The nearest large city is 50 miles away.

Munich is over 800 years old, but its transit system as it exists today was created after World War II. Unlike some other German cities (like Berlin and Hamburg), it had no prewar subways, only surface tram and bus networks. It had extensive commuter rail networks, but it ran into a dead-end station outside the Downtown core. The 1972 Olympics gave the city the impetus it need to transform its transit. The plan was based on three ideas: a new “U-Bahn” subway system, an “S-Bahn” commuter rail system, and unified fares across the metropolitan area through a regional transit coordination agency, the MVV.

The U-Bahn is a fully grade separated system (like the New York Subway or DC Metro), largely in tunnels. Planning and construction started in the 1930s, but didn’t restart until 1964. Munich, like most German cities, is relatively high density with very clear edges the U-Bahn is focused in this urban core. Only 3 stations are outside city limits. While some of the outer stations have park-and-ride lots, the majority are intended for passengers walking from the surrounding areas or transferring from bus.

The S-Bahn is an electric commuter rail system radiating out from the city. A new railroad tunnel through the center of the city allowed commuter trains that had terminated at Munich Hauptbahnhof to run through the center of the city instead, stopping multiple times in the heart of Munich. Along with the tunnel, suburban rail lines were electrified and equipped with off-board fare collection and level boarding platforms. Most of the metro is operated at 20 minute frequencies all day, 7 days a week. The S-Bahn connects the city to the surrounding small towns; its core route, which has a train at least every 3 minutes, also serves as an additional U-Bahn line through the city. The MVV, created in 1971, set S-Bahn fares to match bus, streetcar, and U-Bahn.

The 220 mile S-Bahn network and the first 12 miles of the U-Bahn opened in 1972, in time for the Olympics. Both have continued to expand since. The U-Bahn added another 30 miles in the 1980s, 18 miles in the 1990s, and 6 miles in the 2000s. The S-Bahn added another 50 miles, including the line to the new 1992 airport.

The intent in the 1970s was that the U-Bahn and the S-Bahn core route would replace the city’s trams. With each new line, the parallel streetcars lines were removed. Of the 84 miles of streetcar in operation in 1964, half were gone by 1996. But U-Bahn expansion came slower than expected, and planners concluded that streetcars were useful for lower ridership corridors. In 1991, the city council voted to retain and modernize the streetcars. Since then, the network has been converted to low-flood trams, stops have been upgraded, and tracks have been put in dedicated lanes. Expansion resumed in 2009, and the network is now up to 52 miles. It’s much more efficient than the original streetcar network, with traffic signal priority, 2/3 of the lines in dedicated lanes, level boarding at all doors, and stops integrated



MVV
independent agency
Coordination



MVG
municipal
Heavy Rail
Streetcar
Frequent Bus



S-Bahn München
franchise operator
Commuter Rail



DB Regio
franchise operator
Commuter Rail



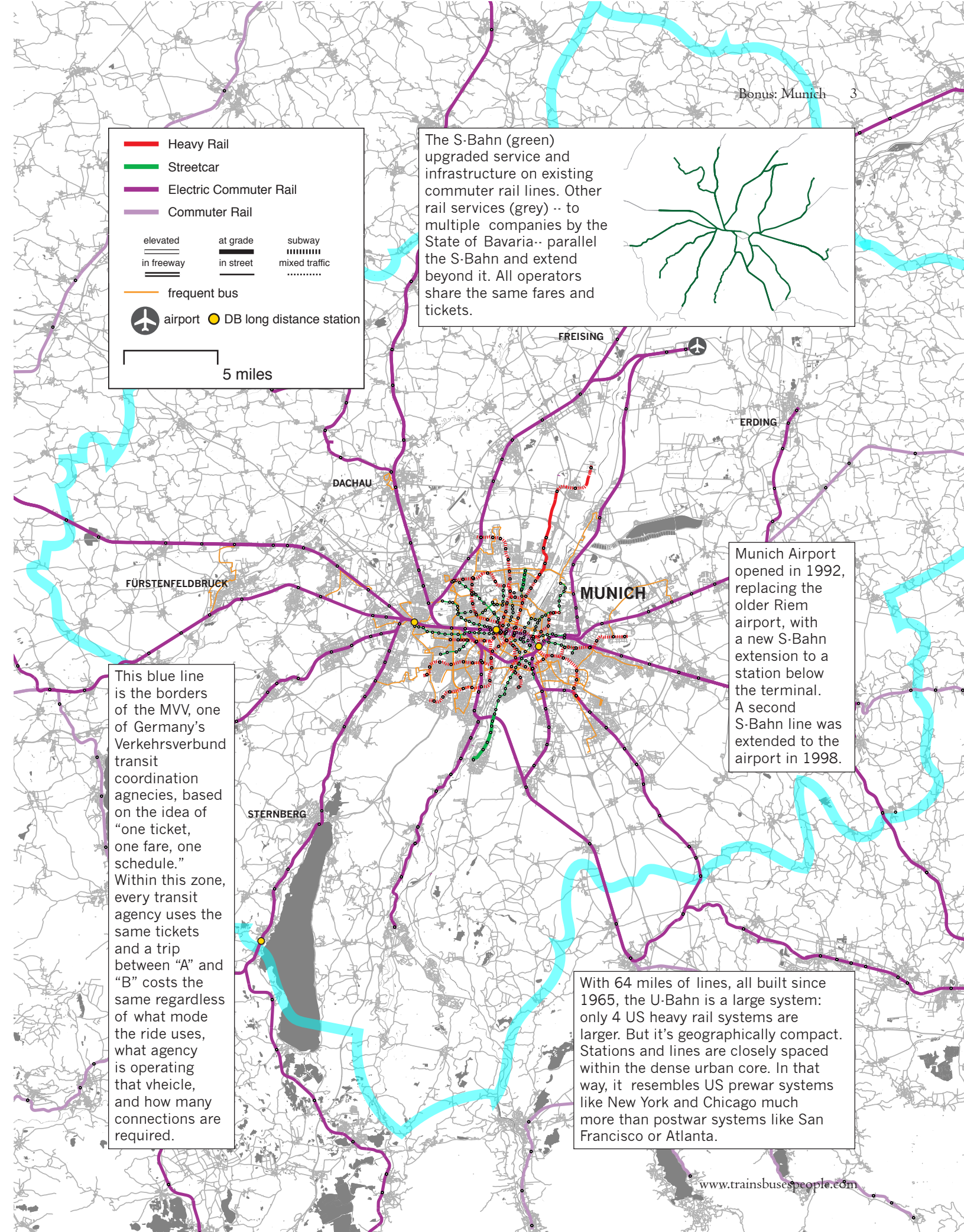
BOB Bayerische
Oberlandbahn
Wir sind transdev
BOB
franchise operator
Commuter Rail




Meridian
Wir sind transdev
franchise operator
Commuter Rail



Alex
franchise operator
Commuter Rail



Heavy Rail (U-Bahn)
HIGH PERFORMER



Opened: 1971
 Last Expanded: 2010
 Length: 64 miles
 Stations: 100
 Frequency: 2-10 min peak/midday/weekend, 20 min evening
 Avg weekday ridership: 1,123,300
 Ridership per mile: 17,550

Streetcar (Tram)
HIGH PERFORMER
LARGE SYSTEM
PREWAR SYSTEM



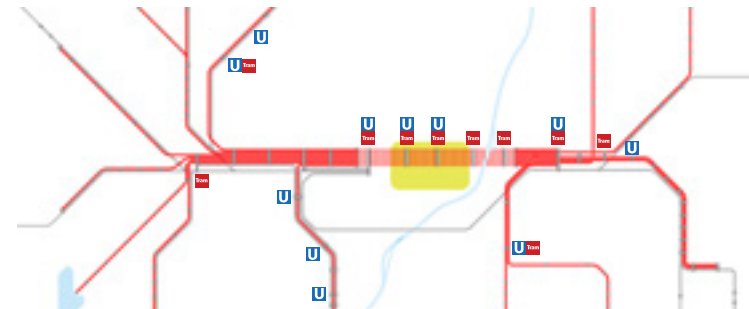
Opened: 1895
 Last Expanded: 2016
 Length: 52 miles
 Stations: 165
 Frequency: 5-10 min peak/midday/weekend, 20 min evening
 Avg weekday ridership: 284,900
 Ridership per mile: 5479



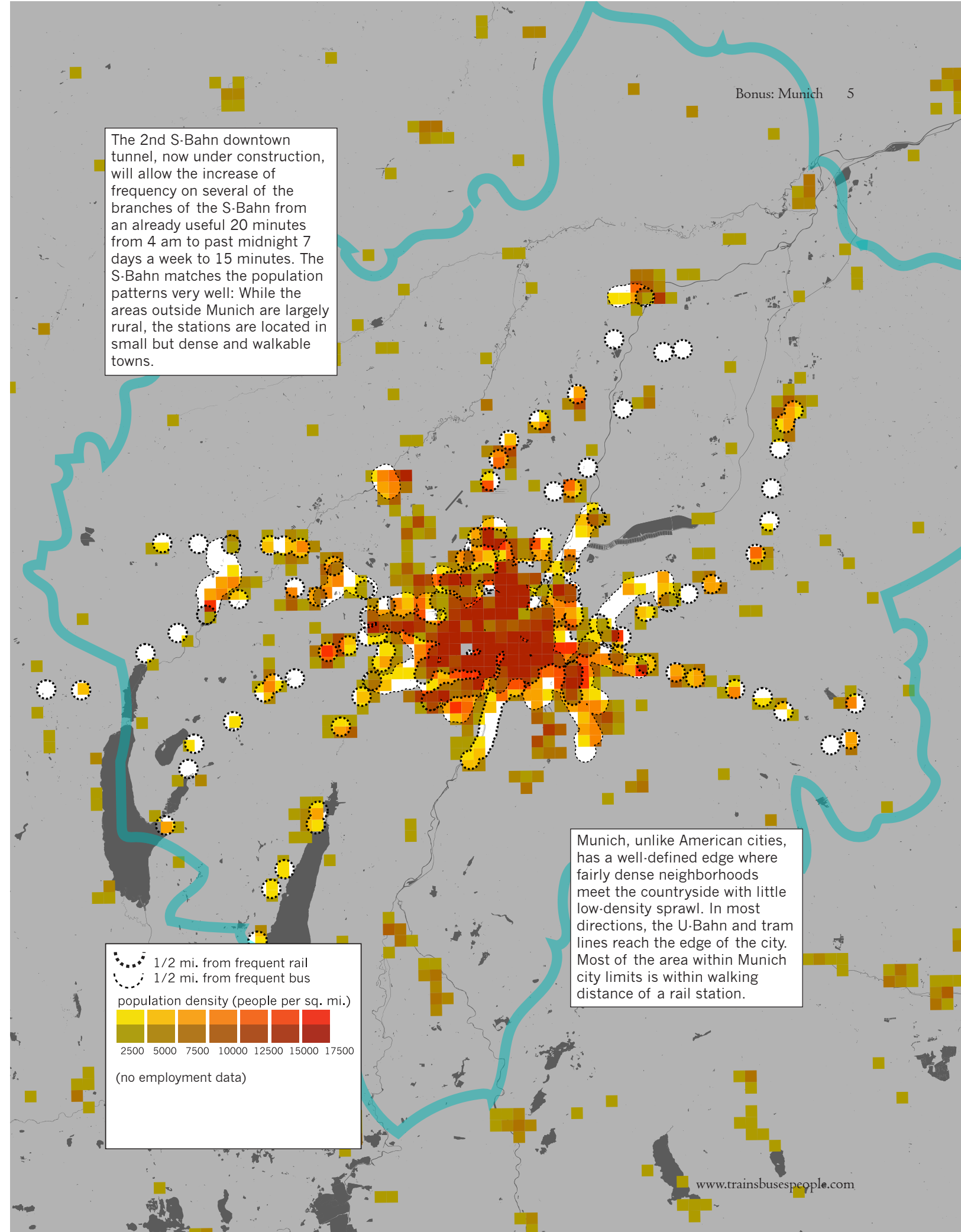
with U-Bahn and S-Bahn for easy transfers.

Like the streetcar lines, the Munich bus network has been modernized. Bus stops are all named (just like streetcar stops) and average 1/3 mile apart (just like the streetcar lines.) There are 15 miles of bus lanes as well as signal priority on some routes, and buses move as fast as the streetcars do. Munich entirely redesigned its bus network in 2004 with branded frequent routes. City bus routes operate every 10 or 20 minutes all day. Like the streetcars, all buses use all-door boarding with proof of payment fare collection, and every bus has a ticket machine on board. On some streets, buses and streetcars share the same stops.

By US standards, ridership is dramatic. The S-Bahn carries more people every day than all US commuter rail system outside New York combined, and the U-Bahn carries twice as many people as the Chicago 'L' on 2/3 as many tracks in a city half the size. From 1972 to 2017, ridership grew by 336% as population grew by 6%.



The key to Munich's transit system is intermodal connections. At Karlsplatz (below) escalators connect a surface streetcar platform directly to an underground subway and commuter rail station. All three systems use the same fares and tickets, and there are no turnstiles between them. This is only one of more than a dozen S-Bahn stations (above), both in downtown and in outlying neighborhoods, with connections to U-Bahn or tram.




Electric Commuter Rail (S-Bahn)
EXTREMELY HIGH PERFORMER
LARGE SYSTEM
PREWAR SYSTEM



Opened: 1972
 Last Expanded: 2014
 Length: 270 miles (6.2 miles under construction)
 Stations: 150
 Frequency: 10-40 min
 Avg weekday ridership: 840,000
 Ridership per mile: 3,110



Diesel / Electric Commuter Rail
HIGH PERFORMER
LARGE SYSTEM
PREWAR SYSTEM

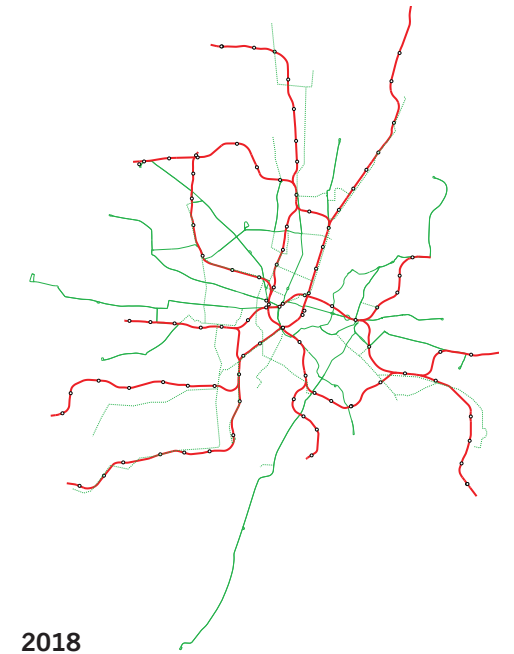


Opened: 1839
 Last Expanded: 2006
 Length: 3,700 miles (across all of Bavaria)
 Stations: 1,060
 Frequency: generally at least hourly
 Avg weekday ridership: 1,300,000 (across all of Bavaria)
 Ridership per mile: 351

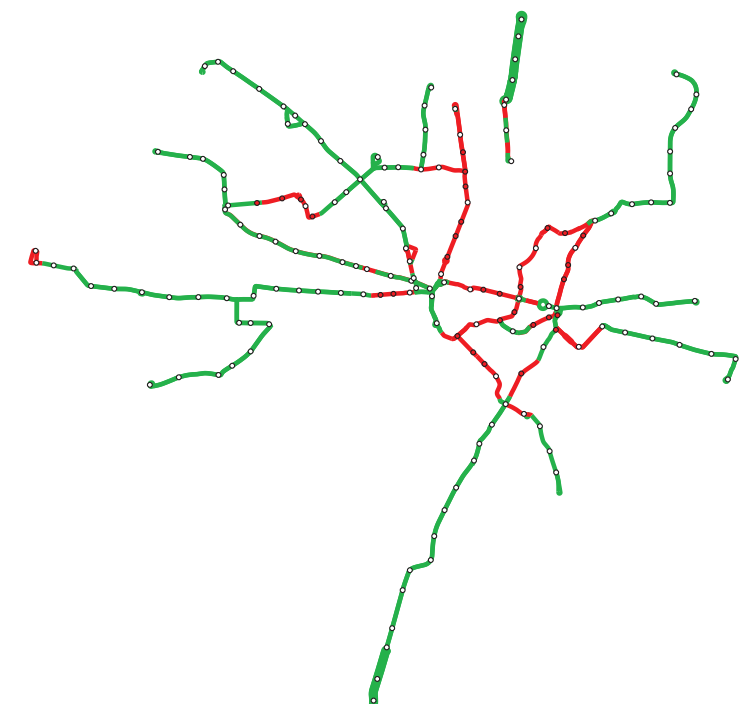


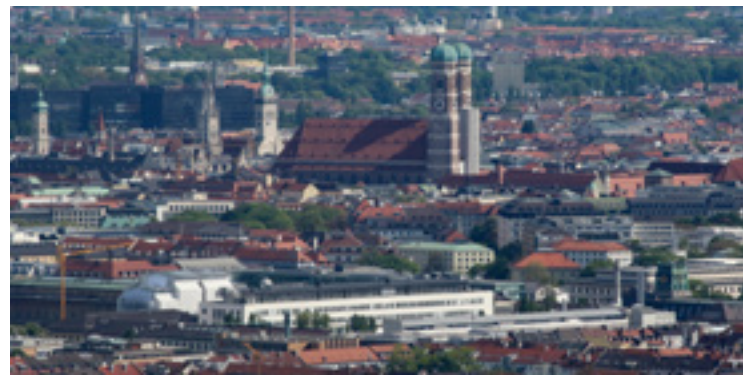
Before the S-Bahn, trains terminated at the stub end Hauptbahnhof (top). The S-Bahn tunnel transformed that network (above) by allowing trains to run through, stopping in the heart of Downtown and continuing to another suburban location. At left, an S-Bahn train enters the tunnel while a regional train departs the Hauptbahnhof.

Nearly all the U-Bahn lines (red, right) were direct replacements for tram routes (green), offering more capacity and faster trips. In some parts of the city -- the southwest, far north, and far southeast -- no trams remain. Elsewhere, trams are now tightly integrated into the U-Bahn, serving as feeder routes in corridors that don't have enough demand to justify a subway or as crosstown links.



While the Munich streetcar's vehicles resemble US streetcars, its ridership does not; it carries 4 times as many passengers per mile as the typical US streetcar system. That's because it's genuinely useful: it's frequent, relatively fast, extensive, and integrated with bus. Some of the system, mainly in narrow streets in the city center (above left) shares lanes with cars (shown in red below, with red dots showing stations where passengers board from the street.) . But 2/3 of the network is in dedicated lanes (sometimes shared with buses, center left.) The 23, opened in 2009, follows a former railroad line through a new development area (bottom left.)





Munich is dense, but it is not a skyscraper city. Five to ten story buildings (above) pack in lots of jobs and residents. Likewise, Marienplatz (below), which has been the center of city life since 1158, does not look like a major rail station, but more than 200,000 passengers pass through here daily on S-Bahn trains -- more than 5 times as many as use the entire Los Angeles commuter rail network. The downtown tunnel (in dark green at bottom), where all lines combine to provide a trains every 2-4 minutes, functions as an additional downtown line for the U-Bahn (in blue), serving short inner city trips as well as regional trips. When the S-Bahn was built, tram tracks through the square were replaced with a pedestrian mall, Kaufinger Strasse which attracts nearly 12,000 people an hour, making it one of the 10 most financially successful shopping streets in the world. The tram now circles the inner city.

