

case study



DWDM solution enables efficient connection of 5G antennas to the M-net quantum network in Munich

Introduction

The increasing popularity of bandwidth-hungry, latency-critical services such as connected cars, online games, virtual reality, Industry 4.0 connectivity and smart cities has led to a growth in demand for standalone 5G networks. To meet this demand, regional German telecommunications provider M-net conducted a review of fiber optic network topologies and the associated infrastructure requirements that encompassed a range of different options related to 5G RAN technologies.

Through this approach, M-net sought to fulfil two objectives: to provide the underlying fiber optic infrastructure for supplying 5G services to industrial, public and private customers in the Munich metropolitan area and also minimise the total cost of

Application

5G Open RAN

WDM xHaul

Technology

Optical fiber

Solutions

Bandwidth expansion
(WDM fronthaul)

Region

Munich, Germany
(Stadtwerke)

Customer:

M-net (regional
municipal fiber optic
network operator)

ownership for mobile operators while keeping the impact of civil engineering work on urban traffic as low as possible. The latter not only involves minimising construction work and the associated need to excavate roads, but also aesthetic considerations, such as ensuring that the mobile radio antenna infrastructure integrates with the surrounding cityscape. As Germany's first CO₂-neutral operator, M-net also had to consider an even more important factor – namely how to minimise energy consumption and CO₂ emissions during network operation.

Challenge

With a long history as an FTTx operator for business and private customers in the region of Bavaria, M-net has already played a key role in achieving Germany's ambitious broadband targets over a number of years. Since 2009, M-net has established a comprehensive fiber optic network for around 650,000 private households, companies and public institutions in the city of Munich alone. M-net therefore benefits from wide network coverage and a dense fiber optic infrastructure within this metropolitan area. In the future, the company plans to use this fiber infrastructure as a neutral host to provide mobile network operators with fiber access for use in a dense site architecture of 5G small cells. Under this microcell approach, the 5G Open RAN antenna sites have minimal space requirements, consume little energy and do not require any antenna site approvals other than the operating permit issued by the German Federal Network Agency.

Although the fiber infrastructure operated by M-net is massive, it does not support the ability to provide multiple optical fibers to each mobile operator at each site. In addition, the data traffic managed by each operator must be collected and aggregated at different locations. From there, the data must be transferred to a central M-net site for disaggregation, before being routed and aggregated to the specific cell sites.

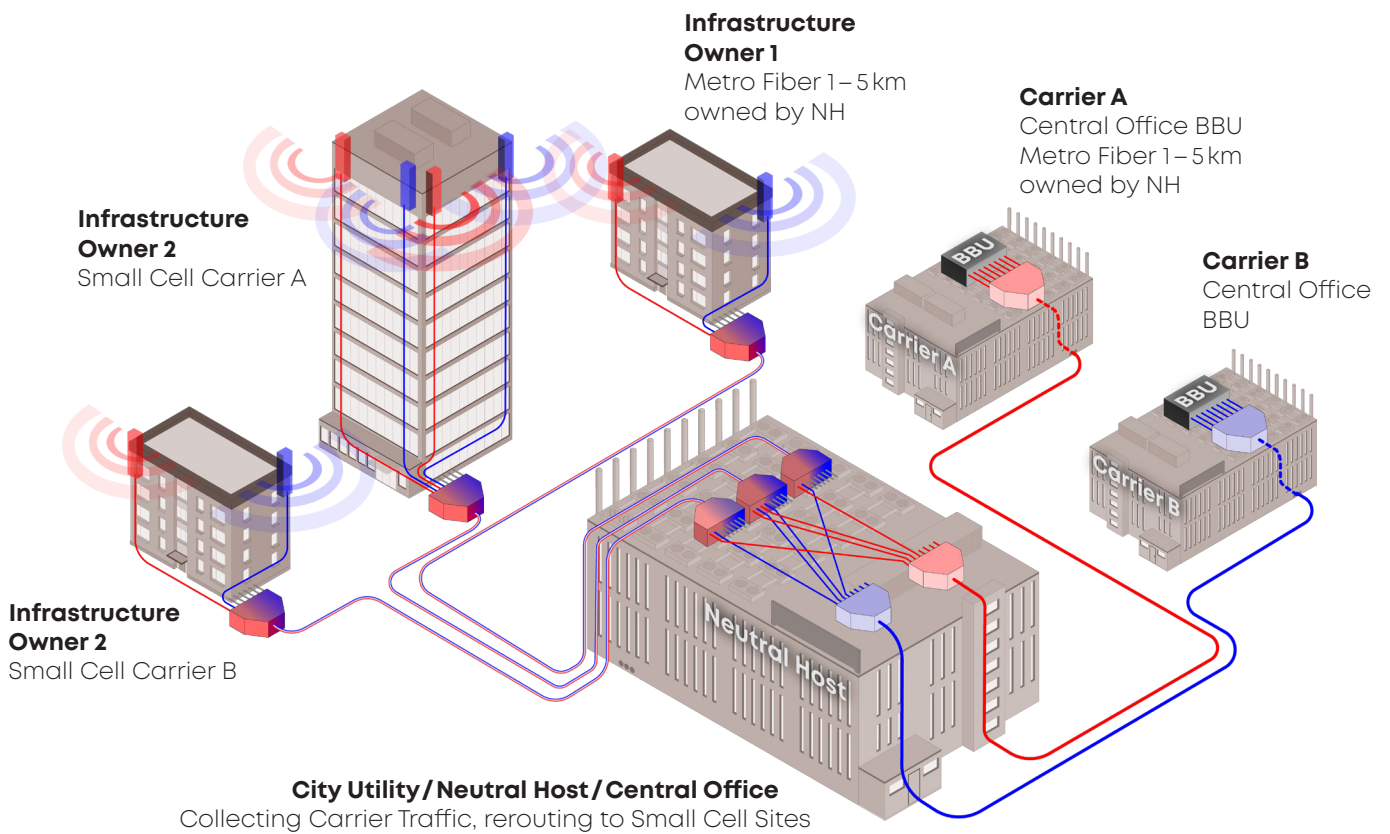
In addition to the challenge of insufficient dedicated dark fiber, M-net also had to consider latency. Already an increasingly decisive factor for mobile fronthaul, total latency is even more important for the 5G upstream. The delay latency in both directions is critical and requires identical upstream and downstream times.

Solution

HUBER+SUHNER is M-net's single-source supplier partner for building entry point (BEP) applications, which use the connectivity company's LISA high-density fiber management system. When M-net decided to make better use of its fiber optic network and generate additional revenues, it once again turned to HUBER+SUHNER.

M-net and HUBER+SUHNER jointly designed a network architecture based on dense wavelength division multiplexing (DWDM) systems to connect the central offices of the mobile network operators to the cell sites via a large number of new M-net operations premises (vDU locations) distributed throughout the city. Latency requirements were met using a single-fiber bidirectional (BiDi) DWDM design with latency-optimised passive dense WDM Mux systems. These were supplied using the HUBER+SUHNER Network Cube X (NCX) and Optibox12, which are ideal for high-density 19-inch rack stacks and the various environmental requirements faced at the cell sites, which include cellars, residential buildings, etc.

For network monitoring and customer SLA reporting, M-net uses a quantum network solution specially developed for this purpose.



Small Cell Sites: Optibox12 based DWDM System

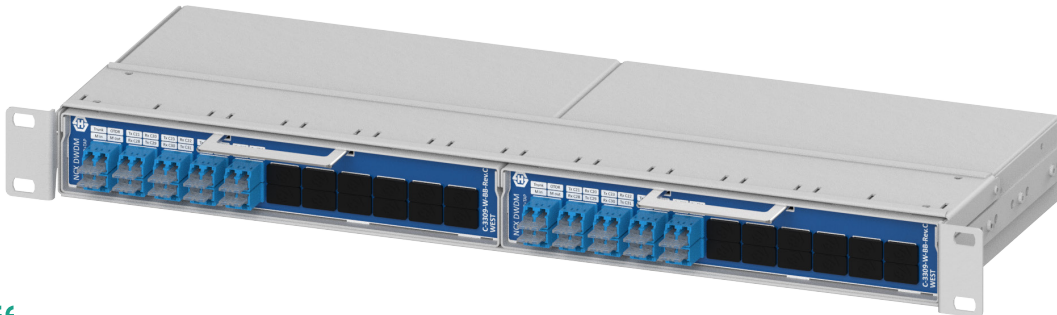


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The DWDM technology from HUBER+SUHNER allowed us to act as a neutral host. We were able to use the fiber network in a transformative way and provide a highly cost-effective approach to connecting mobile sites for 5G Open RAN.”

Dr. Hermann Rodler, CTO, M-net

M-Net Central and Carriers' Central Offices: Network CubeX based DWDM System



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The NCX series enables a DWDM setup and offers operators like M-net various growth options while simultaneously maximising the system's optical performance.”

Cornelius Oster, Product Manager at HUBER+SUHNER

More to explore

To better understand how HUBER+SUHNER can support your specific 5G xHaul and Open RAN transport needs and offer the most optimal solutions, please visit:

hubersuhner.com/contacts