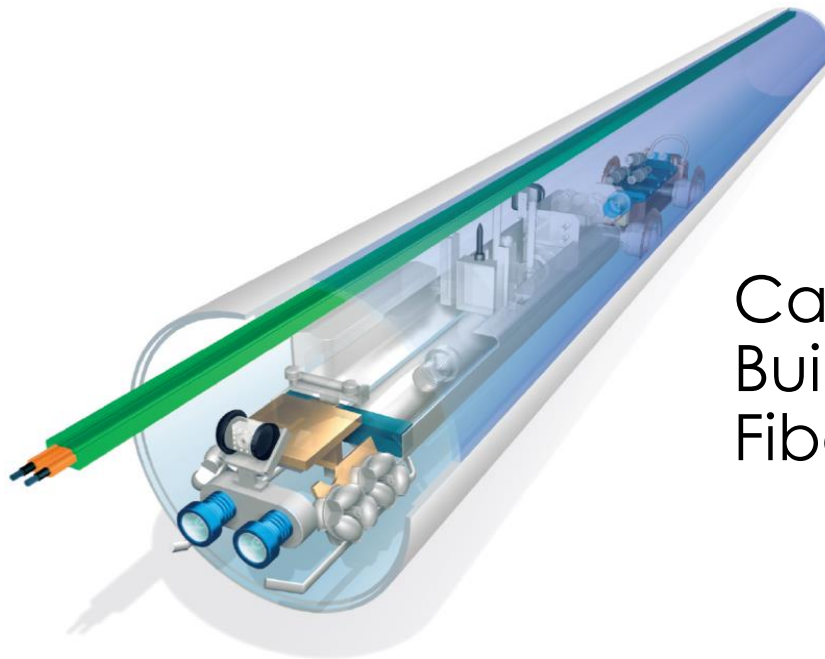


THE FIBER OPTIC INFRASTRUCTURE COMPANY



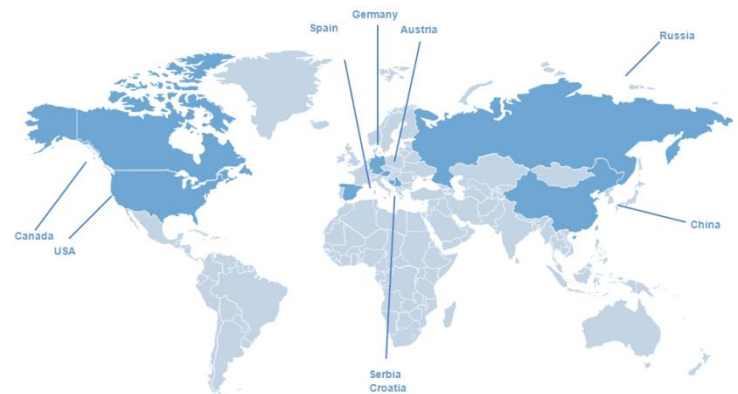
Case Study Vienna:  
Building a  
Fiber Optic Network

## THE STORY OF THE CABLERUNNER TECHNOLOGY

- The **CableRunner Technology** was invented by the **Sewer Department of the City of Vienna** in 1996 and was applied first in Vienna's own sewer and storm water systems.
- CableRunner commenced its **international business activities** by establishing subsidiaries in **USA, Spain, Germany, China and Russia**. Since then, the technology was continuously improved and more than **2.000 km of in-sewer fiber optic networks** in different countries worldwide have been **successfully deployed**.
- CableRunner has always been closely connected to Vienna. At first, **Vienna's Sewer Department connected its own facilities** with the CableRunner technology. With the foundation of CableRunner, an entity was created that served local businesses as a **constructor for P2P-networks**. Later, CableRunner was asked to **build Vienna's fiber optic backbone**. Finally, CableRunner is **upgrading to FTTH in Vienna** right now.
- This shows the **wide spectrum of applications** of the CableRunner technology – from **P2P networks to FTTH**. Moreover, thanks to the great flexibility, **networks can easily be expanded afterwards according to the demand**. The following pages show how Vienna's fiber optic network evolved by using the CableRunner technology.

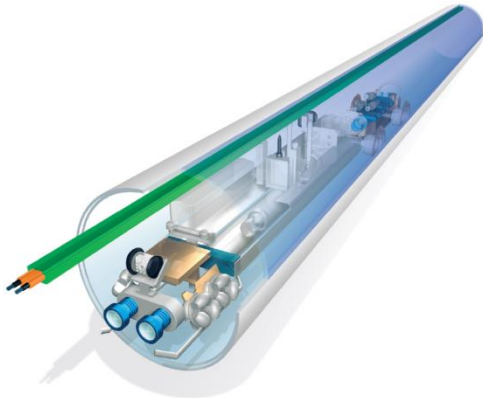


The CableRunner Installation Unit



CableRunner International's worldwide activities

## A GREEN TECHNOLOGY FOR FIBER OPTIC NETWORKS



The CableRunner robot as a draft...



...and in reality

- CableRunner has developed **installation techniques** to **utilize existing city underground infrastructures** – such as sewer and storm drainage systems, canals etc. – for fiber optic cable deployments. The CableRunner technology can be applied in **every type of sewer**: Where it is possible, workers enter the sewers to perform installations. For sewers that are too small for workers to enter, CableRunner has developed robot installation techniques.
  
- CableRunner's underground fiber optic deployment technology **benefits installers in a number of ways**:
  - Shorter construction periods,
  - reduced installation costs,
  - no traffic disruption,
  - no or minimal excavation,
  - no heavy equipment,
  - no inconvenience to businesses or to the public,
  - maximum protection by eliminating "hot cuts" or unintentional access to lit fiber,
  - and the utilization of an environmental friendly technology.
  
- CableRunner is **dedicated to product innovation** and offers **unique solutions** for deploying fiber optic cables in **man-accessible and non-accessible sewers** in congested metropolitan areas. The company has **partnerships with leading international telecom companies** to develop customized solutions. CableRunner products and services have been used safely and successfully worldwide.

## QUICK FACTS ABOUT VIENNA

- Cosmopolitan City with **international reputation**; superior position in the **center of Europe** and as **gateway to Eastern Europe**
- **Population:** 1.85 million, 980,000 households, 70,000 SMEs, density: 4,000/km<sup>2</sup>, area: 415 km<sup>2</sup>
- **Existing sewer infrastructure:** 2,400 km of sewer pipes
- Support from the political level: **FTTH** was announced as **one of Vienna's three major future projects**
- The City of Vienna is convinced that **ensuring universal access to information** – without any digital divide – is a **"service of general interest"** just as the provision of local traffic networks, water, electricity, gas and other municipal utility services. Therefore, a task to be performed with the involvement of the municipality.

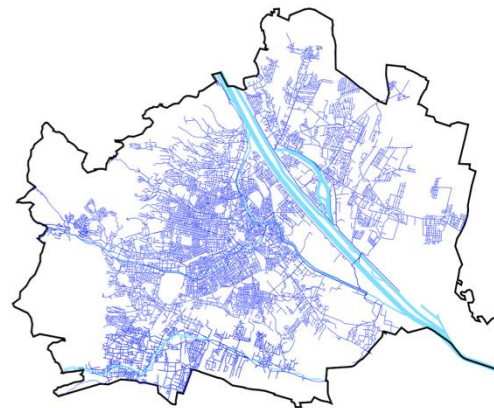


## 1996: A NEW TECHNOLOGY IN OLD SEWERS

- When the Viennese sewer department wanted to **upgrade its data network**, the goal was to find a cost-effective solution, especially **preventing cost-intense digging**. The idea was to **use the City's sewer network** as fiber optic cables would be secured under meters of solid ground in already existing infrastructure.
- To successfully implement the project, the **CableRunner technology** was developed which **warrants effectiveness and functionality** of both the sewer system and the fiber installation.
- The Sewer Department of Vienna uses the technology since 1996 to **connect its own facilities and monitor the sewer conditions**.



Modern network connections in old sewers



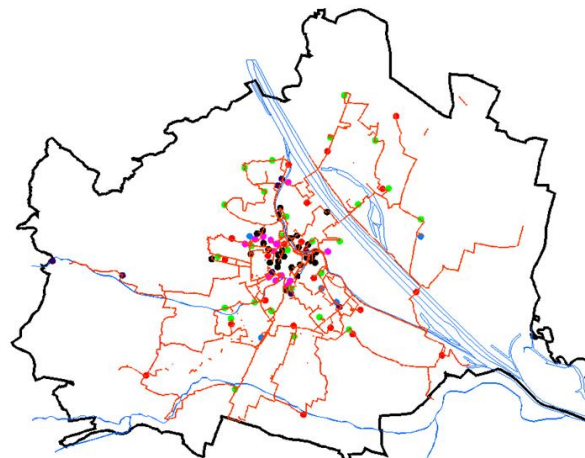
Network of the Viennese sewer department

## 1999: CONNECTING THE DOTS

- The heads of Vienna's Sewer Department soon realized the **huge commercial potential** of the CableRunner technology and **founded CableRunner Austria** in 1999 as a spin-off to **connect customers** via the in-sewer fiber optic point-to-point connections.
- CableRunner Austria immediately **built a large customer base of private and public companies** that were in need of fast, reliable and secure high-speed connections.
- With **increasing popularity of the technology**, companies from outside of Austria started to show interest in CableRunner, which provided a basis for the **expansion into international markets** like Spain, China and the USA.



Easy installation process: Clips that are mounted on the wall carry the cables, a flexible cover offers additional protection

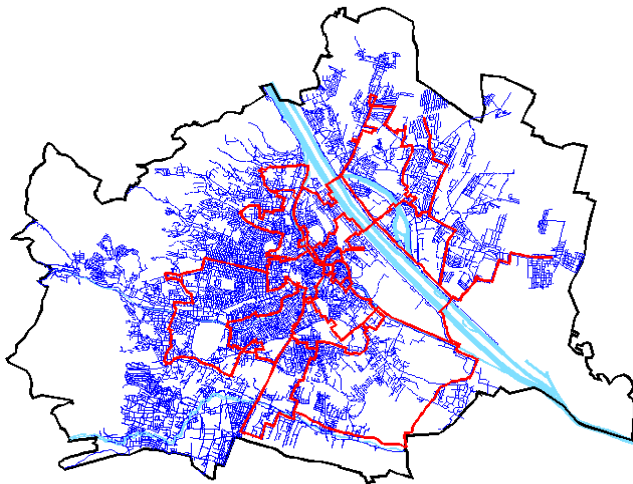


**Hospitals**  
**Municipal Departments**  
**Public Broadcast & Entertainment**  
**Universities & Education**  
**Governmental Entities**  
**Telephone Switches**

P2P connections in Vienna

## 2004: THE CITY'S NEW BACKBONE

- In 2004, Telekom Austria decided to **upgrade Vienna's fiber optic backbone** with CableRunner's technology.
- During this project, **more than 250 km of fiber optic cables** were installed inside Vienna's sewer system.



Blue: Existing sewer network, red: fiber optic backbone



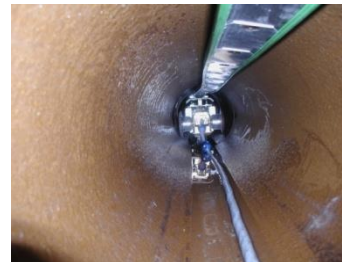
Vienna's backbone, installed with CableRunner technology

## 2009: FIBER TO THE HOME IN VIENNA

- In 2009, the City of Vienna and Telecom Austria initiated an **FTTH project** covering one low to mid and one mid to high income area (both districts comprise approx. **70,000 apartments**). CableRunner was assigned to carry out the construction.
- Construction commenced on September 1, 2009.
- The **first step** of the project included the connection of 170 buildings with approximately **3,500 households in each of the pilot areas** and was finished in March 2010. Construction was finished at the end of 2011.
- The long-term goal is to connect **140,000 buildings** (approx. 90%) in the city with a potential **subscriber base of 980,000 households and 70,000 businesses**, and expected penetration of 50% within 5 years.
- Offered symmetric bandwidth: **50 – 100 Mbps for residential, 1Gbps for business connections**
- Triple play** services: TV/HDTV/Video, Phone, High-speed internet access



Inserting cable trays into sewers



Robotic installation of cable trays in non-accessible sewers



Establishing connections between sewers and buildings



## WHERE IS THE TECHNOLOGY IN USE?

- The CableRunner technology is proven and internationally certified. With the CableRunner technology, more than 2,000 km of fiber optic networks have been built in urban areas worldwide up to now.
- CableRunner is dedicated to product innovation and offers unique solutions for deploying fiber optic cable in accessible and non-accessible sewers in congested metropolitan areas. The company has partnerships with leading international telecom companies to develop customized solutions. CableRunner products and services have been used safely and successfully worldwide.



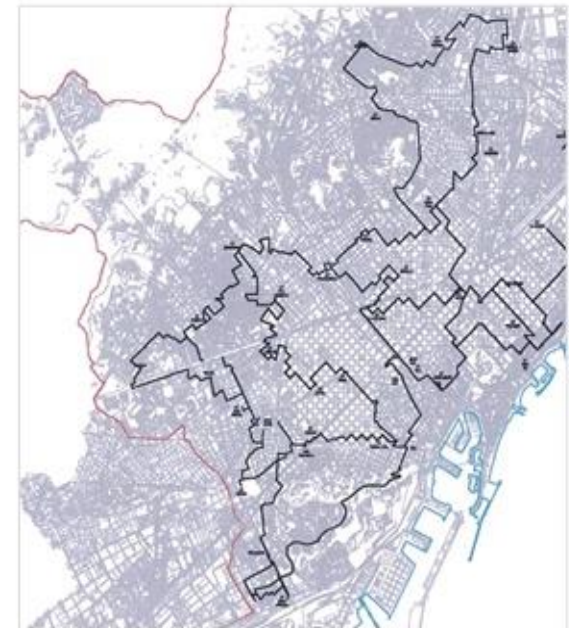
Vienna



Sevilla



Valladolid



Barcelona

## CONTACT

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### Offices



**CableRunner also contributes to setting industry standards through ASTM International, one of the largest voluntary standards development organizations in the world.**

#### **ASTM Standards for In-Sewer Fiber Development**

ASTM Committee F36 on Technology and Underground Utilities developed Standards on Installation and Operation of Fiber Optic Cables in Existing Sewers.

**F 2233:** Standard Guide for Safety, Access Rights, Construction, Liability, and Risk Management for Optical Fiber Networks in Existing Sewers.

**F 2303:** Standard Practise for Selection of Gravity Sewers Suitable for Installation of Optical Fiber Cable and Conduits.

**F 2462:** Standard Practise for Operation and Maintenance of Sewers with Optical Fiber Systems