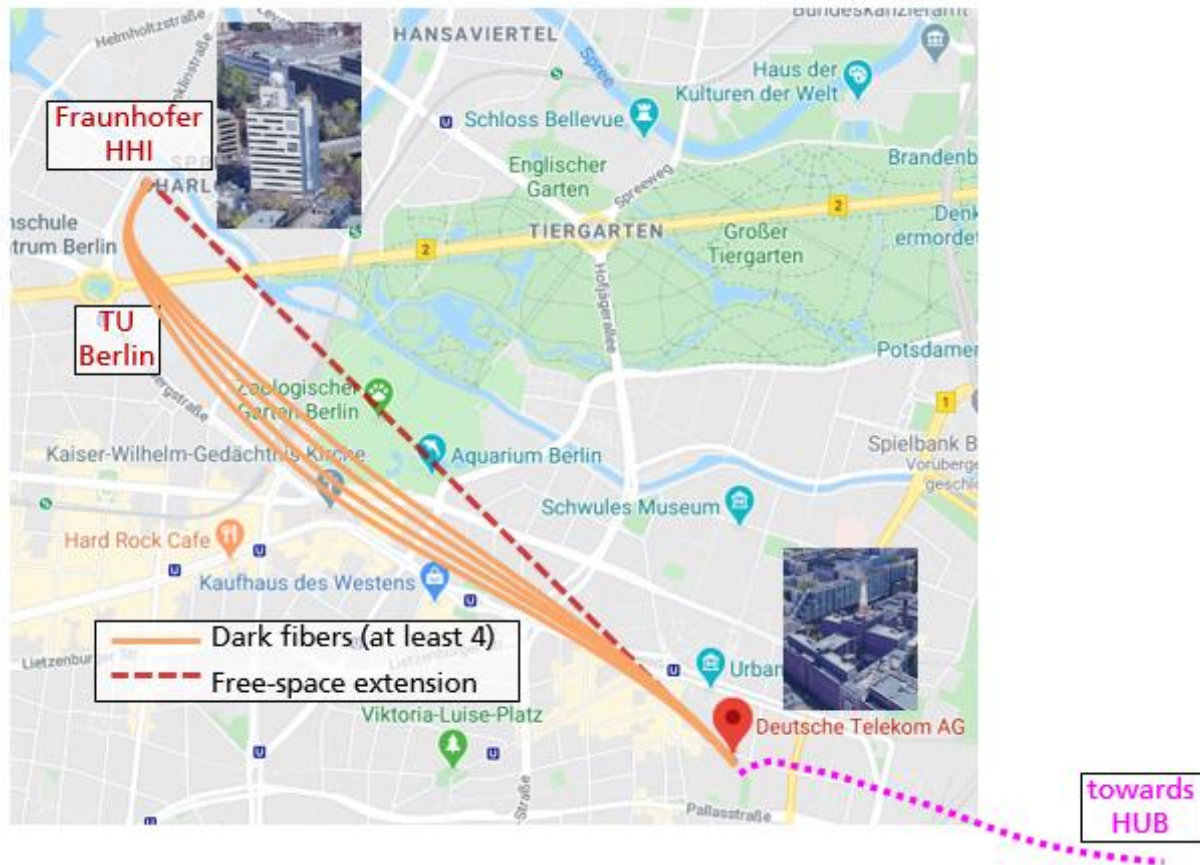


## Berlin Quantum Communication Testbed

The Berlin Quantum Communication testbed allows experimental quantum communication between different nodes/buildings over fiber and free space using telecom wavelengths (optical O and C bands).



### A: Brief Information

<b>Testbed Title</b>	Berlin Quantum Communication Testbed
<b>Institution/Organization</b>	Humboldt University (HU) of Berlin T-Labs (Deutsche Telekom AG) Fraunhofer Heinrich Hertz Institute (HHI)
<b>Contact</b>	Dr. Marc Geitz, <a href="mailto:marc.geitz@telekom.de">marc.geitz@telekom.de</a> Dr. Nicolas Perlot, <a href="mailto:nicolas.perlot@hhi.fraunhofer.de">nicolas.perlot@hhi.fraunhofer.de</a>
<b>Status</b>	active

## B: Technical Information

Start Point	End Point	Length [km]	Losses [dB]	Type of Transmission
Fraunhofer-Institut für Nachrichtentechnik, Heinrich-Hertz-Institut (HHI) Einsteinufer 37	Fraunhofer-Institut für Nachrichtentechnik, Heinrich-Hertz-Institut (HHI) Salzufer 15/16	0.3	20	free space link
Fraunhofer-Institut für Nachrichtentechnik, Heinrich-Hertz-Institut (HHI)	Telekom Innovation Laboratories	3.1	30	free space link
Fraunhofer-Institut für Nachrichtentechnik, Heinrich-Hertz-Institut (HHI)	Telekom Innovation Laboratories	7	7	fiber
Telekom Innovation Laboratories	Humboldt-Universität	25	8	fiber
Telekom Innovation Laboratorie	Strausberg	47.3	14.5	fiber
<b>Supported Wavelengths [nm]</b>	C-Band, O-Band			
<b>Type of Fiber</b>	single mode			
<b>Type of Deployment</b>	aerial for free space link and underground for fiber			
<b>Polarization Stabilization</b>	No			
<b>Free Aperture</b>	2 cm			
<b>Adaptive Optics</b>	No			
<b>Quantum Communication Infrastructure</b>	entangled photon pair source at 1550 nm; div. single photon detectors for C- and O-band (SNSPDs array, InGaAs SPADs); DWDM Mux/Demux C-Band DWDM Telecom laser rack; DV-QKD platform incl. Encryptors; RF-Communication link system			
<b>Available Infrastructure for external Parties</b>	access upon request and agreement; available infrastructure: access to entangled photon source, single photon detectors, internet			

## C: Additional Information

<b>Linked Projects</b>	<ul style="list-style-type: none"> <li>QR.X: <a href="https://www.forschung-it-sicherheit-kommunikationssysteme.de/projekte/qr.x">https://www.forschung-it-sicherheit-kommunikationssysteme.de/projekte/qr.x</a></li> <li>QR.N: <a href="https://quantenrepeater.net/">https://quantenrepeater.net/</a></li> </ul>
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<b>Press Release and Publications</b>	<ul style="list-style-type: none"><li>• <a href="#">High-Fidelity Quantum Entanglement Distribution in Metropolitan Fiber Networks with Co-propagating Classical Traffic</a>, 04.2025</li><li>• <a href="#">Secure fiber-based quantum communication</a>,</li><li>• <a href="#">A Flexible Real-Time Quantum Key Distribution System for Fiber and Free-Space Links</a>, 09.2024</li><li>• <a href="#">Linking QKD testbeds across Europe</a>, 01.2024</li><li>• <a href="#">Experimental validation of DV-QKD-based Qline architecture for metropolitan network on Berlin OpenQKD testbed</a>, 11.2023</li><li>• <a href="#">A quantum key distribution testbed using a plug&amp;play telecom-wavelength single-photon source</a>, 03.2022</li><li>• <a href="#">Projekt-Kick-off: QR.X treibt Forschung zum Quantenrepeater voran</a>, 10.2021</li></ul>
<b>Demonstrated Milestone</b>	<ul style="list-style-type: none"><li>• Massively parallelized DWDM-QKD with more than 1Mbit/s secret key rate over HHI-TLabs-Loop of deployed fiber;</li><li>• photonic entanglement distribution over HHI-TLabs-Loop of deployed fiber;</li><li>• continuous FSO QKD over 300m, classical FSO communication over 3km</li></ul>
<b>Outlook</b>	<ul style="list-style-type: none"><li>• demonstration of free-space QKD over 5km FSO link between HHI and TLabs;</li><li>• Entanglement transfer over the direct open-air optical link between HHI &amp; DT (LoS) and fiber optical network;</li><li>• demonstration of entanglement based QKD;</li><li>• demonstration of entanglement swapping and quantum teleportation between remote, fiber-coupled nodes</li></ul>
<b>Suggested Use Cases</b>	
<b>Other Comments/ Information</b>	