GEANT QUANTUM SOLUTIONS

Q*bird
quantum
connectivity

QKD as a Stepping Stone to the Quantum Internet

Ingrid Romijn – co-founder Q*Bird

We are Q*Bird

- Originally a group inside QuTech / TUDelft, researching and developing Quantum Key Distribution devices
- Spun out of QuTech in 2022
- Team growth from 3 → 11 in 2023
- EU and NL subsidies to develop strategic quantum communication technology
- Our goal: **To provide hardware and software for the future quantum networks**

The Need for Quantum Networks

Connecting Quantum Devices:

- To scale quantum computing power, links based on entanglement are needed → distributed quantum computing
- To connect quantum sensors, the same quantum links are necessary

Democratize Quantum Technology:

- Quantum link to communicate quantum data
- Enable users to connect to powerful (and expensive!) quantum computers in an easy and cheap way

Provide Secure Connectivity:

- In the current geopolitical climate, secure communications is becoming ever more important
- Protecting governmental communications, critical infrastructures, financial and military data is crucial

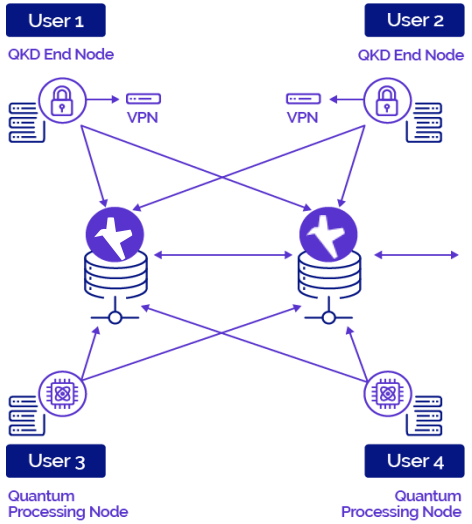
Secure Quantum Connectivity with Q*Bird

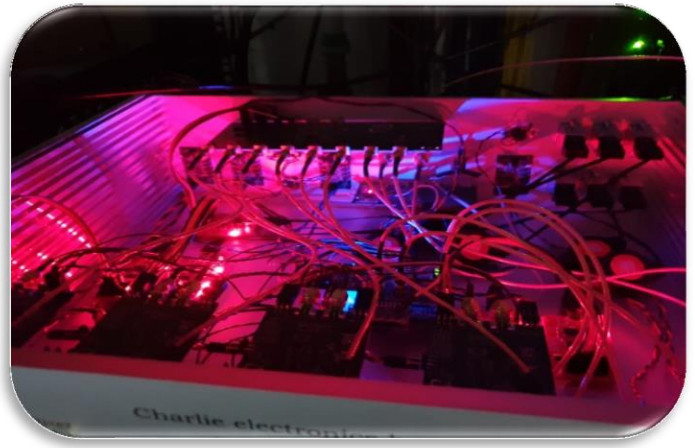
Today, we build devices for quantum secured data communications:

- Key distribution systems for secure data transfer, safe against even the most powerful computers
- Qubit Transmitting End Nodes
- Entanglement generating Center Hubs
- Scalable **multipoint-to-multipoint** connectivity
- Higher **intrinsic security** compared to other QKD sytems

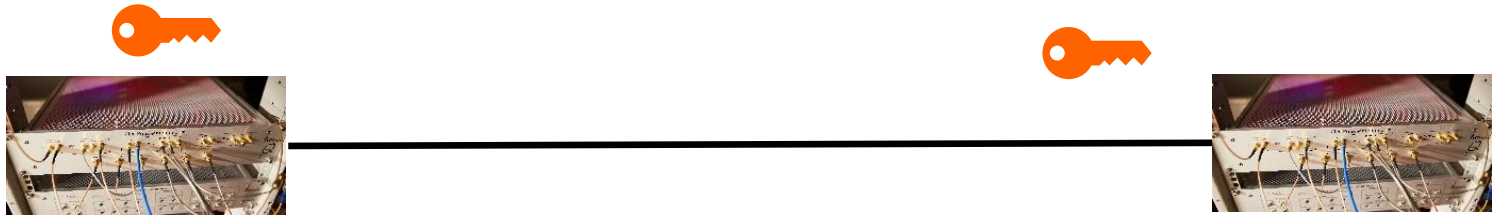
Tomorrow we will enable general purpose quantum connectivity

- The same central hub technology **connects quantum processing nodes and quantum sensors**
- **Upgradable** for future quantum internet

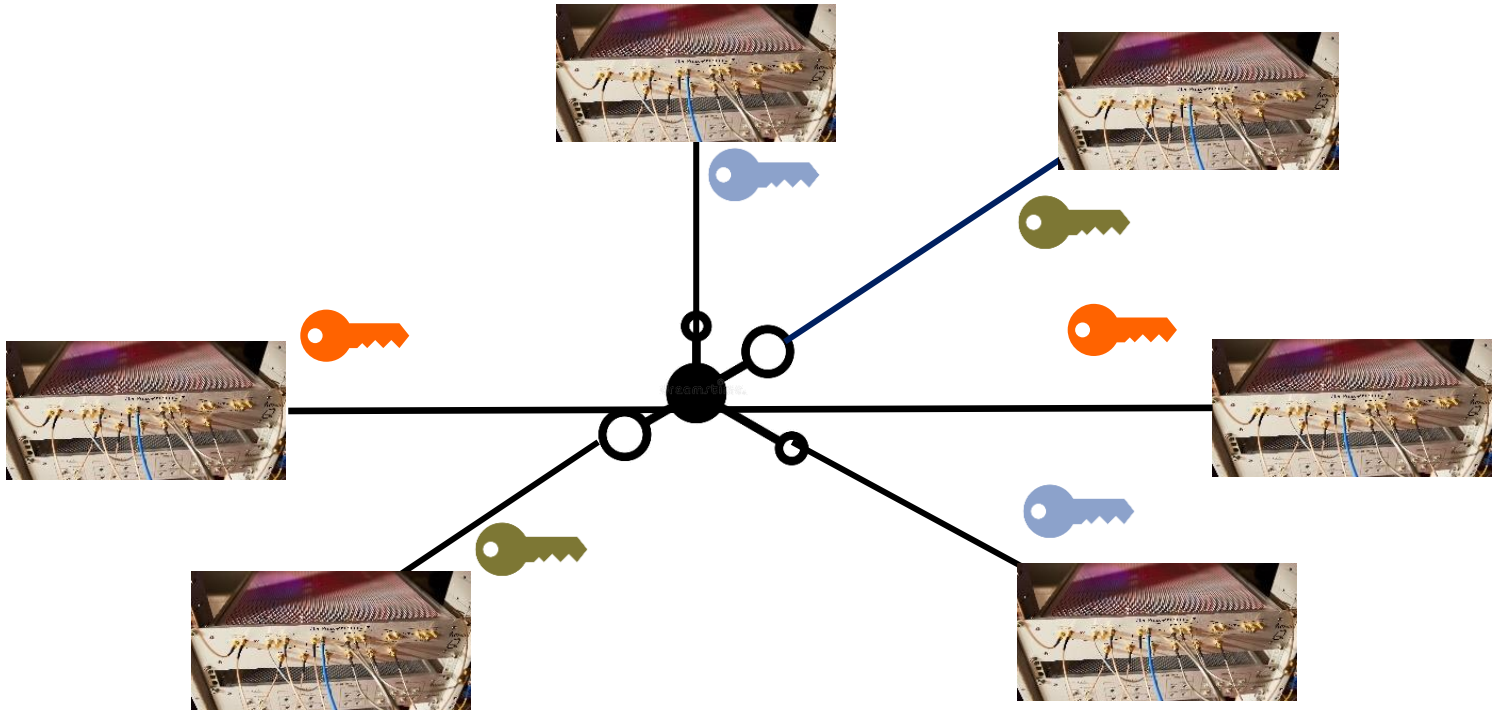




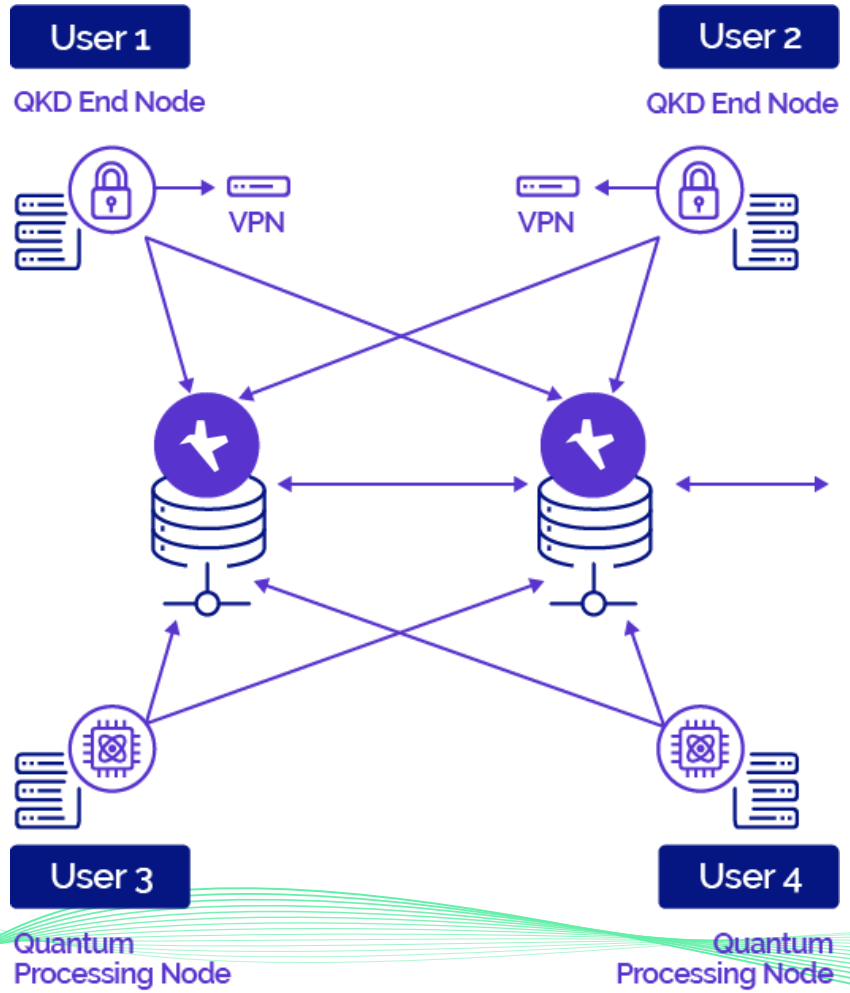
QKD until now:



Q*Bird's QKD solution



Key Features Q*Bird's QKD solution



1. **Multipoint-to-multipoint connectivity:** Any user can generate key with any other user. New users can connect to all the other users.
2. **Cost-effective scaling:** User devices are small, cost-effective, and don't require cooling. New locations only need an End Node.
3. **Improved security:** Confidential key information is only present at the End Nodes / User Devices. Keys cannot be tapped by Hubs.
4. **Long distance:** up to **45 dB possible** between end nodes
5. **Future proof:** Technology and networks are designed to be upgradable to the most advanced quantum network technology.
6. **Field Tested:** Our technology has been deployed in multiple field environments with industry partners.

Field Setups and Integrations

Multiple Field Setups in Between Various Cities around the Netherlands

CISCO Integration and Setups (SKIP)

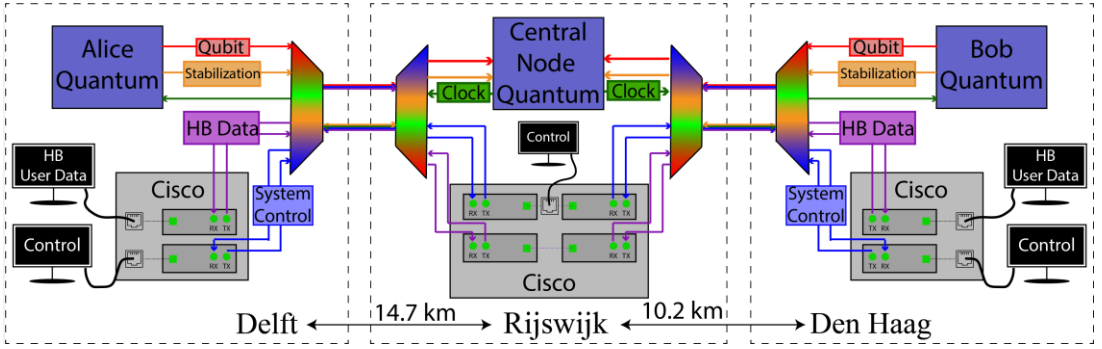
- MACSec line encryption
- IPsec encryption
- Key Rollover (AES256) every 30 seconds

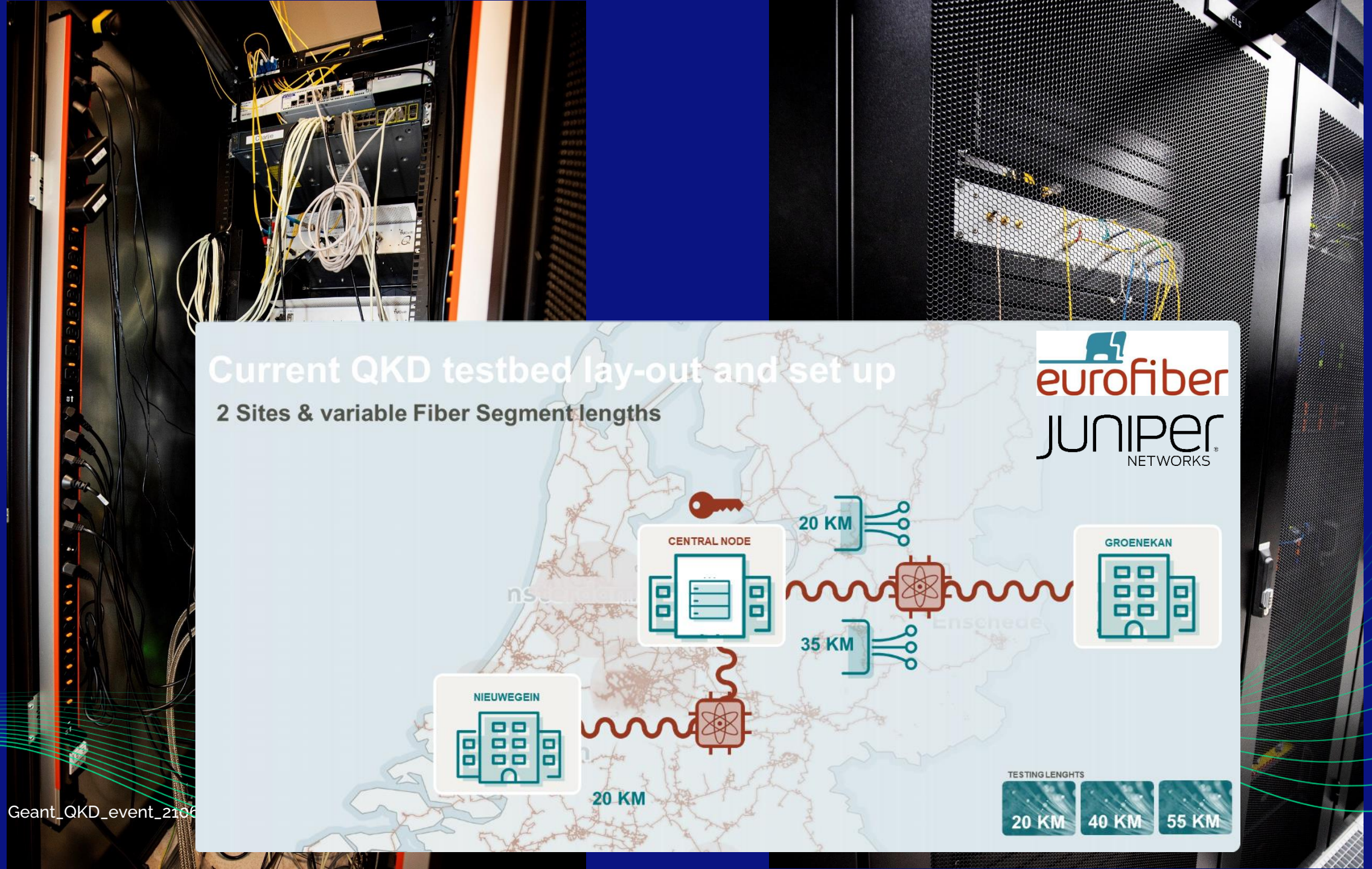
Juniper Integration and Setups (ETSI 014)

- MACSec line encryption
- Key Rollover (AES256) every 30 seconds

DWDM Integration with 10 gpbs channels
Functional with CISCO ROADMs & Amplifers
(White paper available)

Free-Space PoC with Optical SatComm Company
Banking PoC with ABN-AMRO Servers




Current QKD testbed lay-out and set up
2 Sites & variable Fiber Segment lengths
eurofiber
JUNIPER NETWORKS
CENTRAL NODE
20 KM
35 KM
GROENEKAN
NIEUWEGEIN
20 KM
TESTING LENGHTS
20 KM
40 KM
55 KM

Multi-user QKD protecting the Port of Rotterdam

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Safe port

Untappable internet for port of Rotterdam offered by quantum technology

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05 October 2022

The port of Rotterdam stakeholders will be able to participate and benefit from an untappable,multi-user quantum network for their critical communication systems.

Port of Rotterdam

SINGLE QUANTUM
Excellence in photon detection

Quantum Delta
the Netherlands

Q*bird
quantum connectivity

Innovation Quarter


Tools
A13
A4
A4|A15
A15

MDI-QUEEN consortium working on next gen QKD

MDI QUEEN

EuroQCI

MDI QUEEN project objectives:

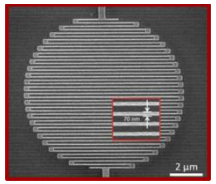
1. Develop and industrialize next-generation QKD devices
2. Strengthen the European ecosystem by building a resilient value chain
3. Certification and deployment in operational environments

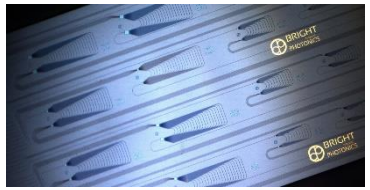
SINGLE QUANTUM
Excellence in photon detection

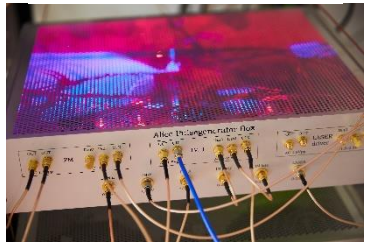
BRIGHT Integrated PHOTONICS

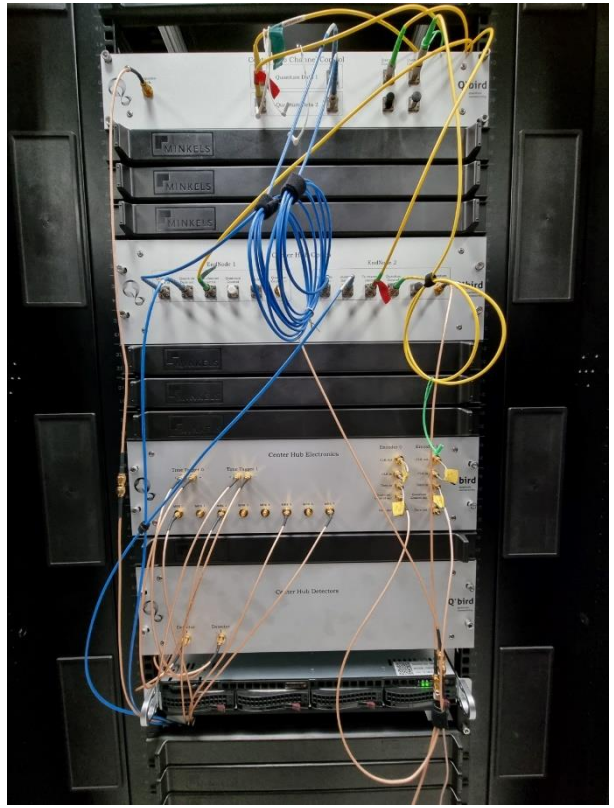
Q*bird quantum connectivity

Secura

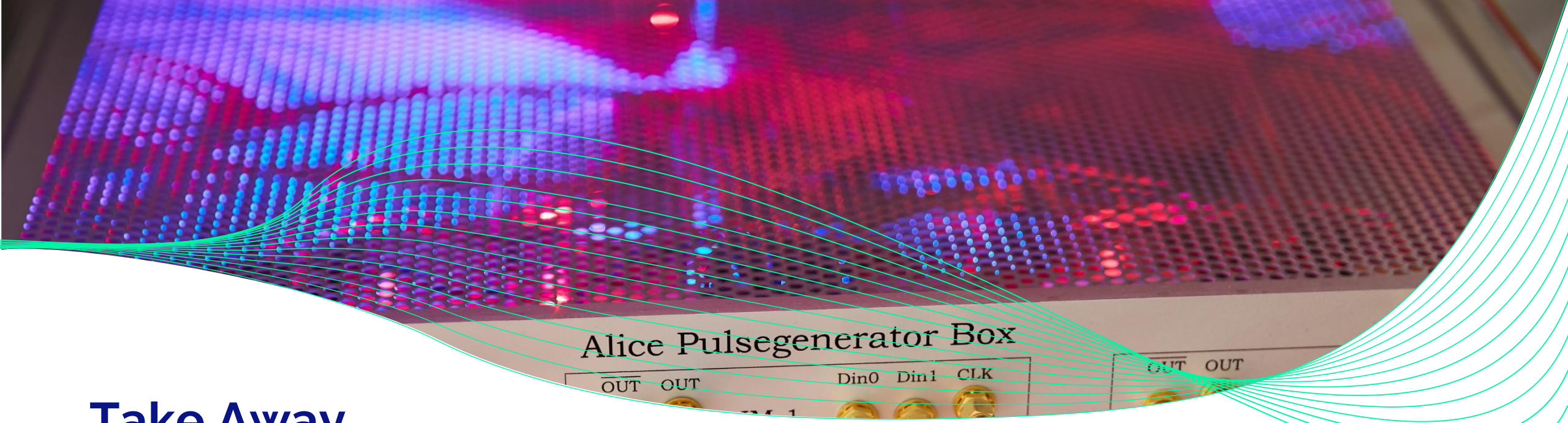








https://q-bird.nl/mdi-queen



Take Away

- We are building the next generation digital infrastructure
- Today, we build devices for quantum secured data communications
- Tomorrow, we will enable general purpose quantum connectivity
- We are ready to install our QKD systems in your networks; Join us in the quantum revolution!

Q bird

quantum connectivity

Thank You!

More information and connect: ingrid@q-bird.nl