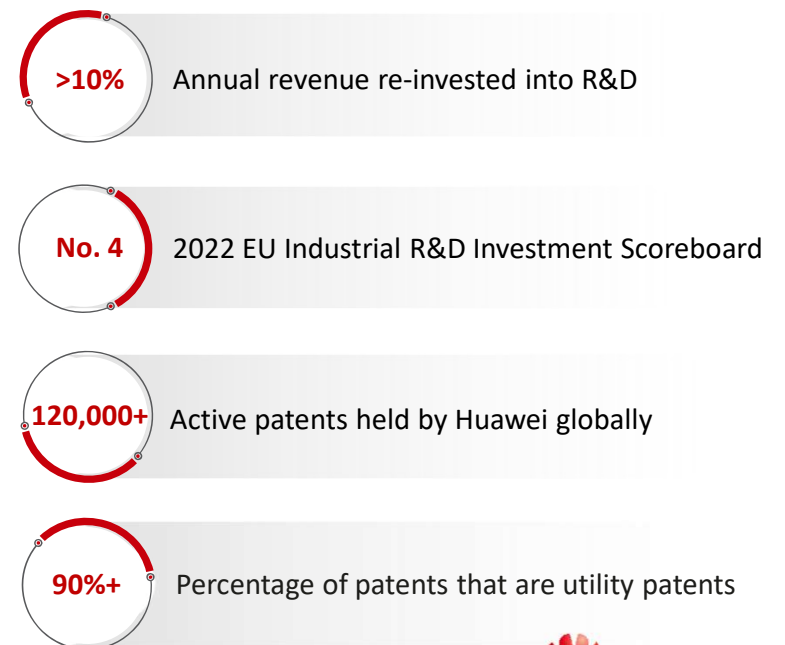Huawei is serving **170+** countries & regions, **207,000+** employees, **55.4%** R&D

>$130Bn R&D investment over the last 10 years.

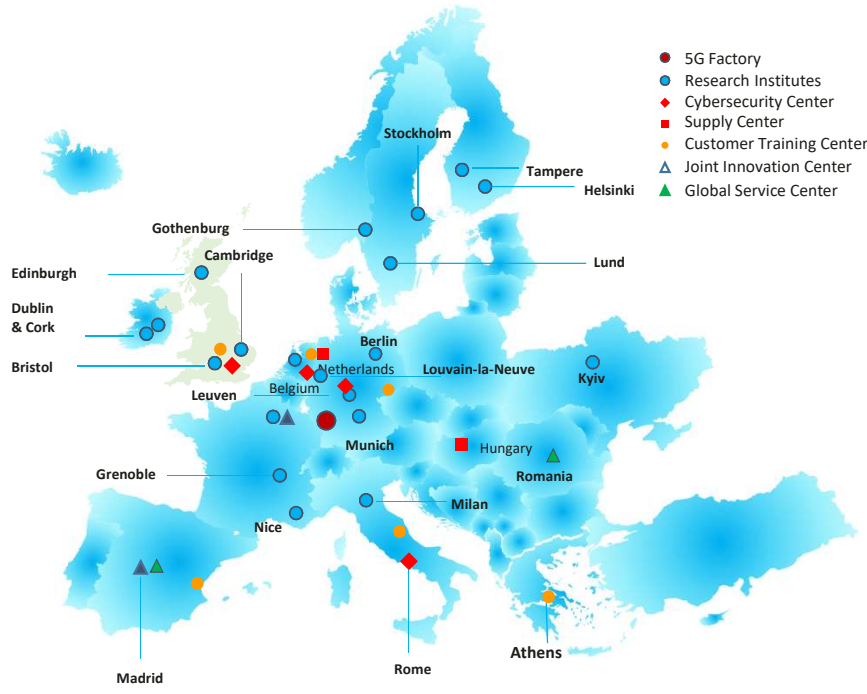## The company's operations in 2022 aligned with expectations

US$92.4 Bn

2022 sales revenue

ICT infrastructure
Consolidating digital infrastructure

Consumer business
Tech leadership in "1 + 8" domains

Huawei Cloud
Industry customers' preferred partner in cloud migration

Digital Power
Helping customers go low-carbon

IAS
Improving competitiveness and user experience
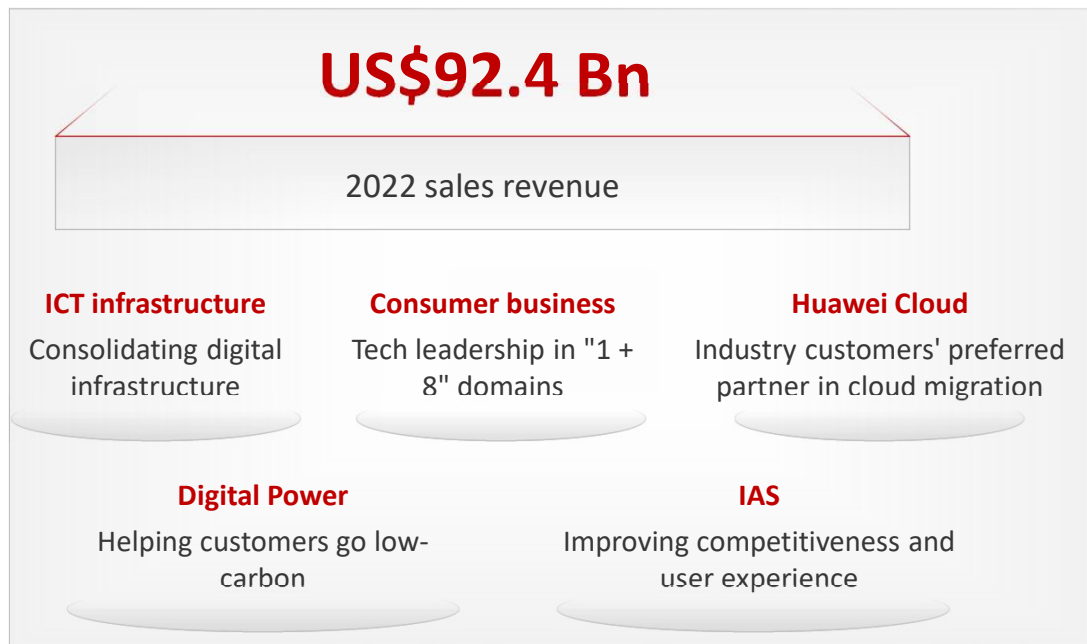
We maintained heavy R&D investment to drive future development through innovation

>10% Annual revenue re-invested into R&D

No. 4 2022 EU Industrial R&D Investment Scoreboard

120,000+ Active patents held by Huawei globally

90%+ Percentage of patents that are utility patents

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In Europe for Europe, Huawei Continuously Serves Partners and Society

Map legend:
- 5G Factory
- Research Institutes
- Cybersecurity Center
- Supply Center
- Customer Training Center
- Joint Innovation Center
- Global Service Center

Map labels: Stockholm, Tampere, Helsinki, Gothenburg, Cambridge, Lund, Edinburgh, Dublin & Cork, Bristol, Leuven, Berlin, Netherlands, Belgium, Louvain-la-Neuve, Kyiv, Munich, Hungary, Grenoble, Romania, Milan, Nice, Madrid, Rome, Athens

Total contribution to European value added	Tax revenues for European Gov.	Total number of European jobs created*	0 accident, best security operation records.
€12.3Bn	€5.2Bn	143,800	100%

Source: The economic contribution of Huawei in Europe in the year 2021
* Including direct, indirect and induced

top EMPLOYER EUROPE 2022 — CERTIFIED EXCELLENCE IN EMPLOYER CONDITIONS

- **12,000+** employees
- **3,400+** researchers **27** sites in **13** countries
- **230+** tech. partnership agreements with 150+ universities and institutes
- **140+** universities collaboration across Europe
- **10,000+** patents at the European Patents Office (EPO)

Huawei Quantum Key Distribution Research

Location: Munich

Started: September 2015

No technology transfer to China

Main achievements
- State-of-the-art CV-QKD prototypes
- System-level field trials with customers in operational environment
- >30 patents or patent applications

HUAWEI

Mosca's inequality

Worry, if

$$D + T \geq Qc$$

D is the duration we wish our data to be secure for

T is the time it takes to transition from classical to post-quantum security

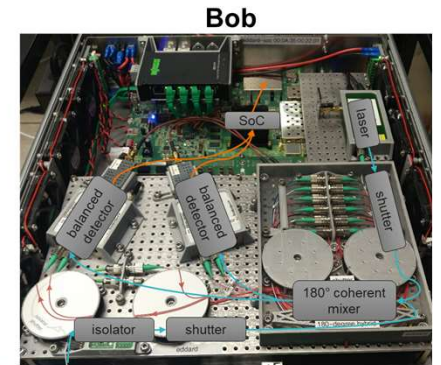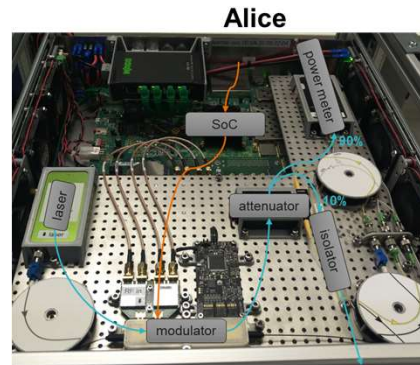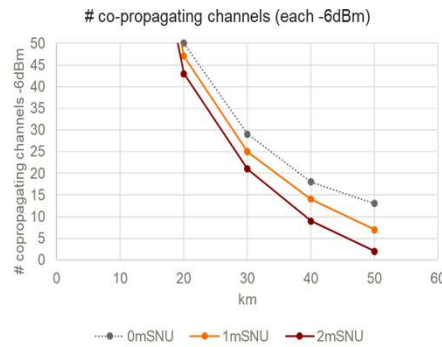Qc is the time until a cryptographically-relevant quantum computer is available
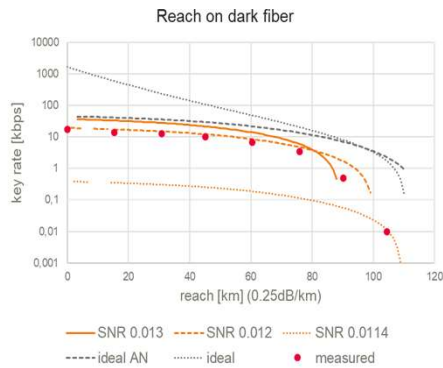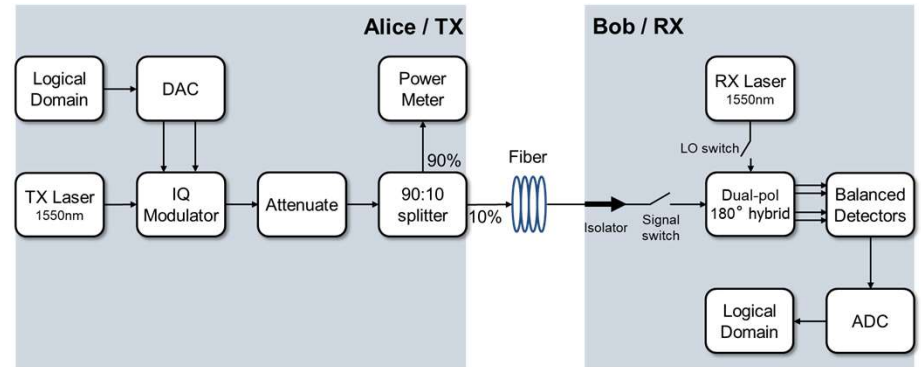
Low-complexity software-defined setup

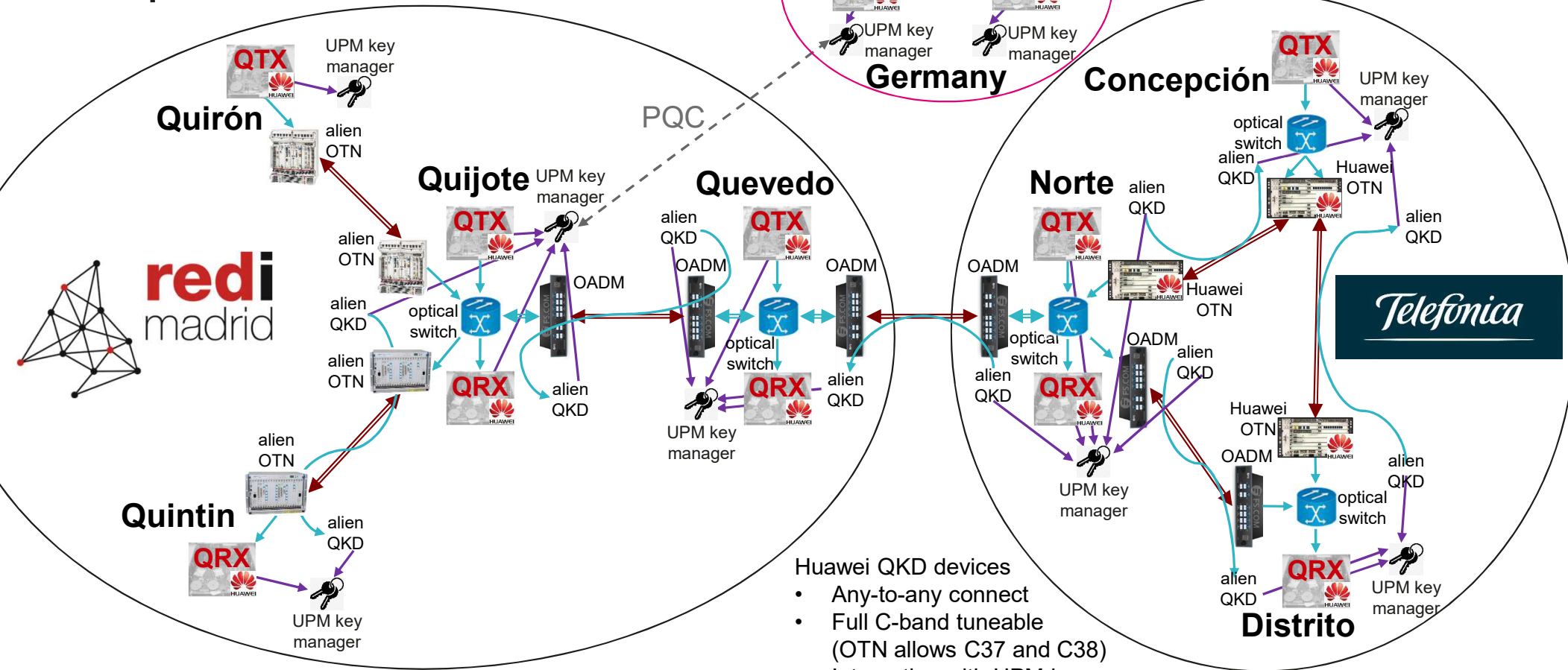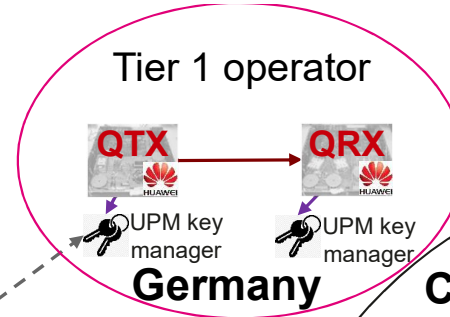Software defined with **low optical / analog complexity**
› Simplifies in-depth security analysis, increases trust
› Highly flexible, rapid prototyping, easy to control

Readily available components for coherent communication
› Low cost implementation
› Allows photonic integration

OpenQKD – Madrid testbed

Tier 1 operator

QTX → QRX

UPM key manager   UPM key manager

Germany

PQC

Quirón
QTX
UPM key manager
alien OTN

redi madrid

Quijote UPM key manager
QTX
alien OTN
alien OTN
alien QKD
optical switch
alien OTN
QRX
OADM
alien QKD

Quevedo
alien QKD
QTX
OADM
OADM
optical switch
QRX
alien QKD
UPM key manager

Quintin
alien OTN
alien QKD
QRX
UPM key manager

Concepción
QTX
UPM key manager
optical switch
alien QKD
Huawei OTN
alien QKD

Norte
alien QKD
QTX
Huawei OTN
OADM
optical switch
alien QKD
QRX
OADM
alien QKD
UPM key manager

Telefónica

Huawei OTN
OADM
optical switch
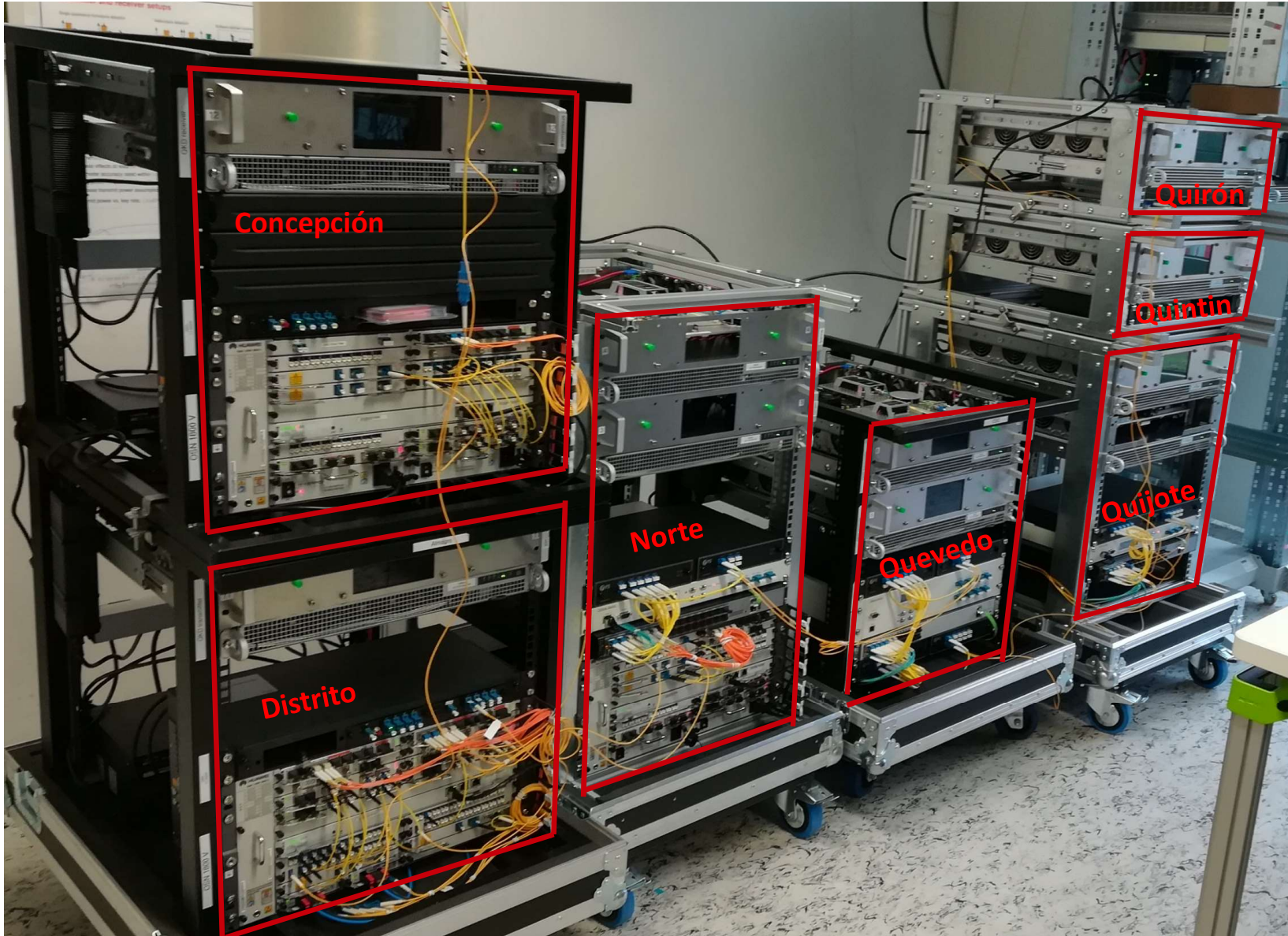alien QKD
QRX
alien QKD
UPM key manager

Distrito

Huawei QKD devices
- Any-to-any connect
- Full C-band tuneable (OTN allows C37 and C38)
- Integration with UPM key manager and configuration controller
- Zero-touch integration in existing OTN

6

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Any-to-any connectivity
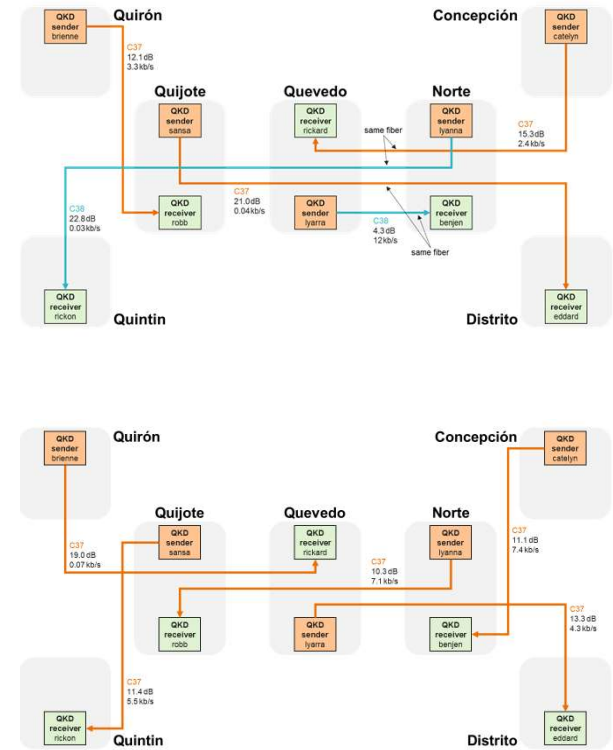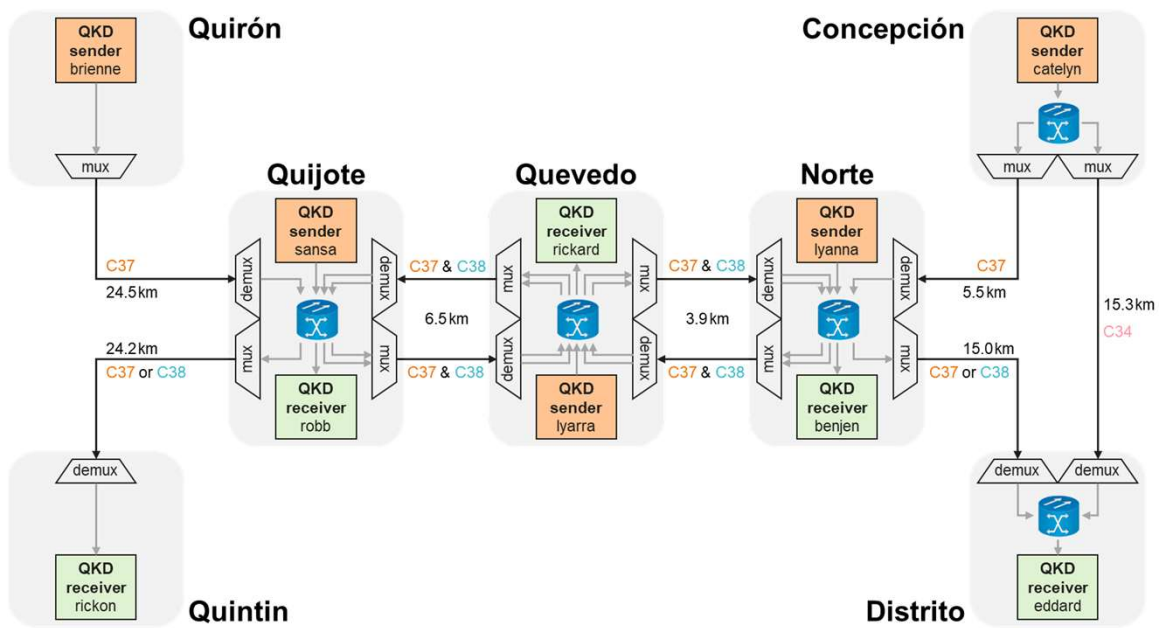
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Benefits of Huawei QKD

› Thoroughly investigated and robust QKD implementation

› Software-defined for maximal flexibility and central configuration

› Low-cost implementation with a clear road for full integration and high volume

› Reach and key rate optimal for metro environment

› High tolerance to co-propagation of classical channels

› Possibility of zero-touch integration (plug into existing OTN without modification)

› Field deployment and integration with existing hardware has been demonstrated

› Any-to-any connectivity with ~N devices in N-node networks

➔ **Scalable towards simpler, cheaper, smaller implementation**

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Thank you !

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