A Carrier-grade KMS

field deployment in DemoQuanDT and a path towards a European trusted node (QSplice)

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Infoshare: Quantum KMS Architectures and Services
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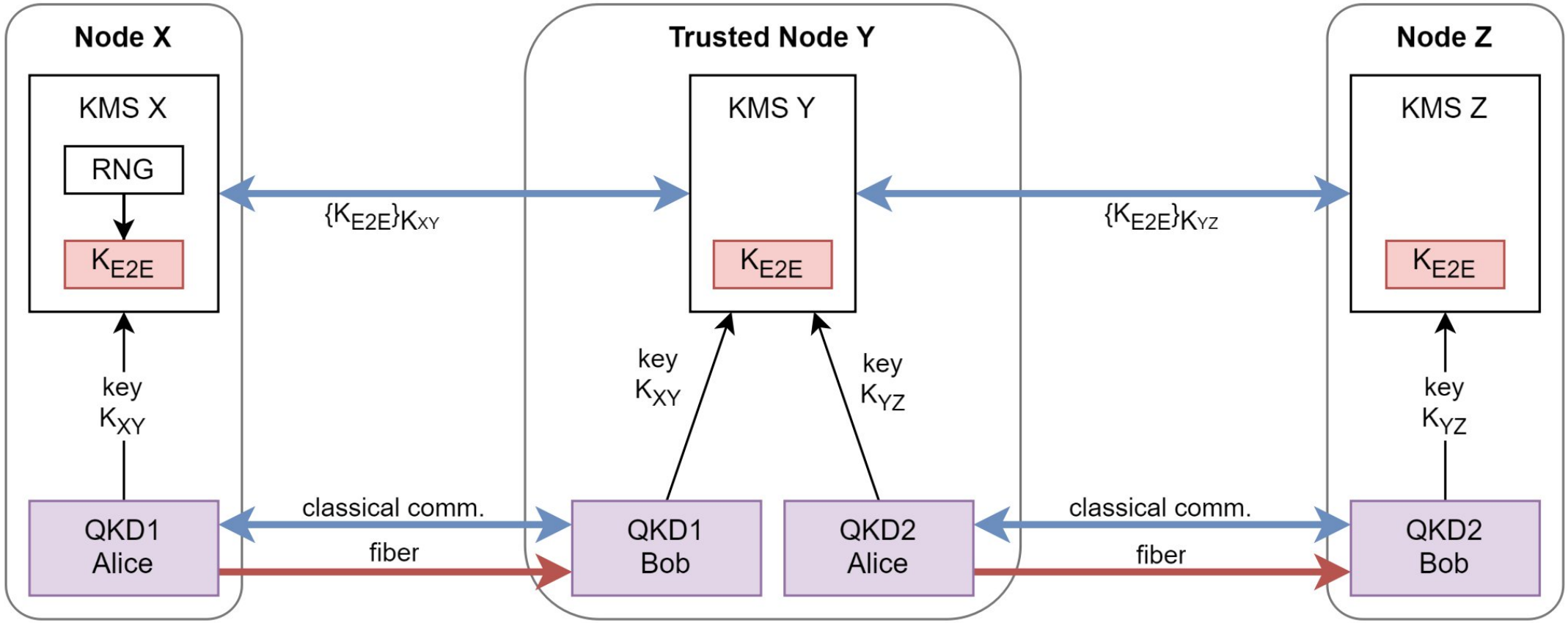
European
Quantum
Security

Key forwarding



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DemoQuanDT Goal

Keys as a Service

- Keys are generated, distributed, and managed by a centralized or distributed service
- Accessed on-demand by clients over secure interfaces
- Abstracted from the underlying quantum or classical key generation mechanisms

Carrier-Grade Network

- Highly reliable, redundant, and scalable.
- 24/7 operation, with low-latency, high throughput, and fault tolerance
- integrate into telecom or ISP backbones with standardized interfaces

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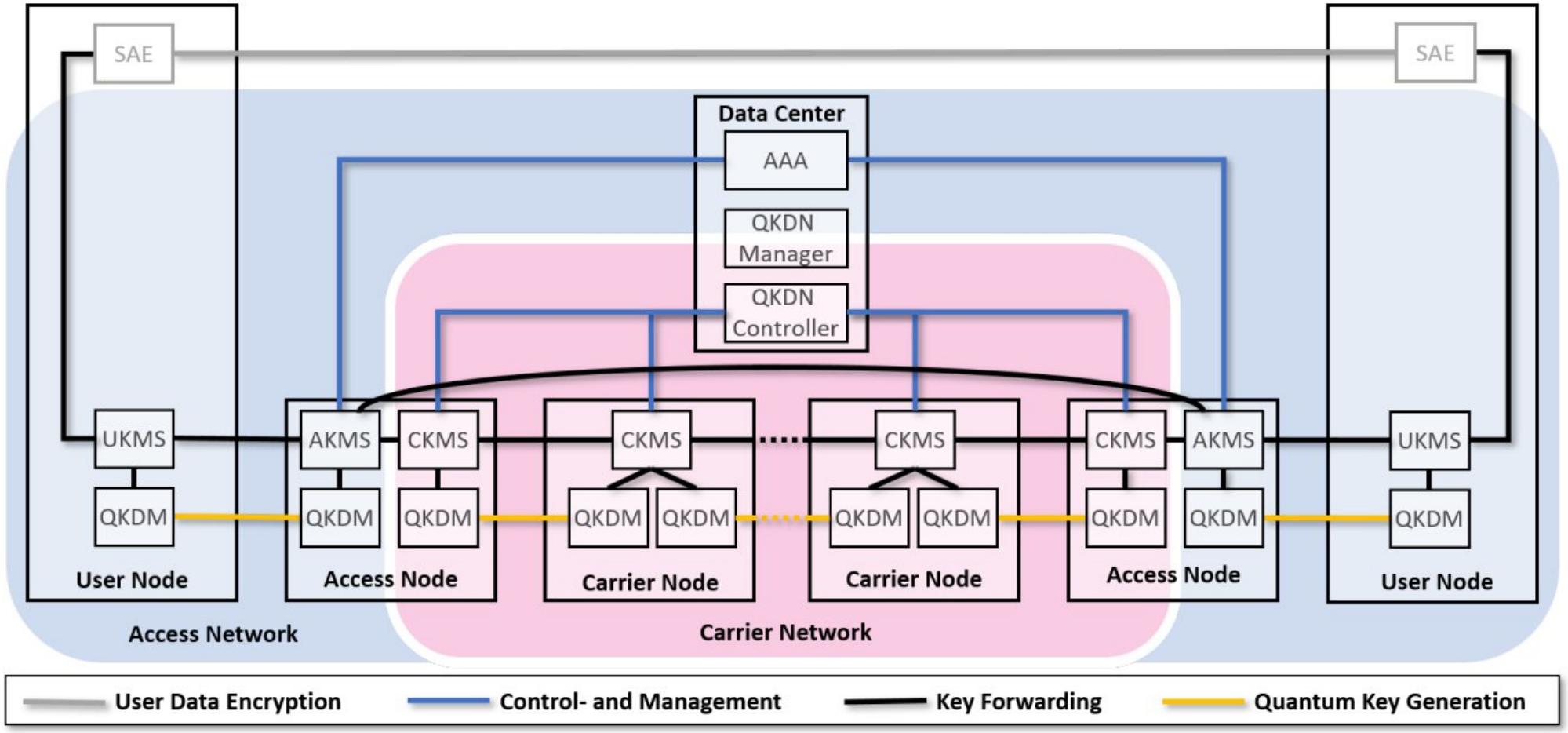
P. Horoschenkoff et al., "DemoQuanDT: A Carrier-Grade QKD Network," arXiv:2503.21186, 2025

Carrier-Grade Architecture

AAA = Authentication, authorization, and accounting

UKMS = User-KMS
AKMS = Access-KMS
CKMS = Carrier-KMS



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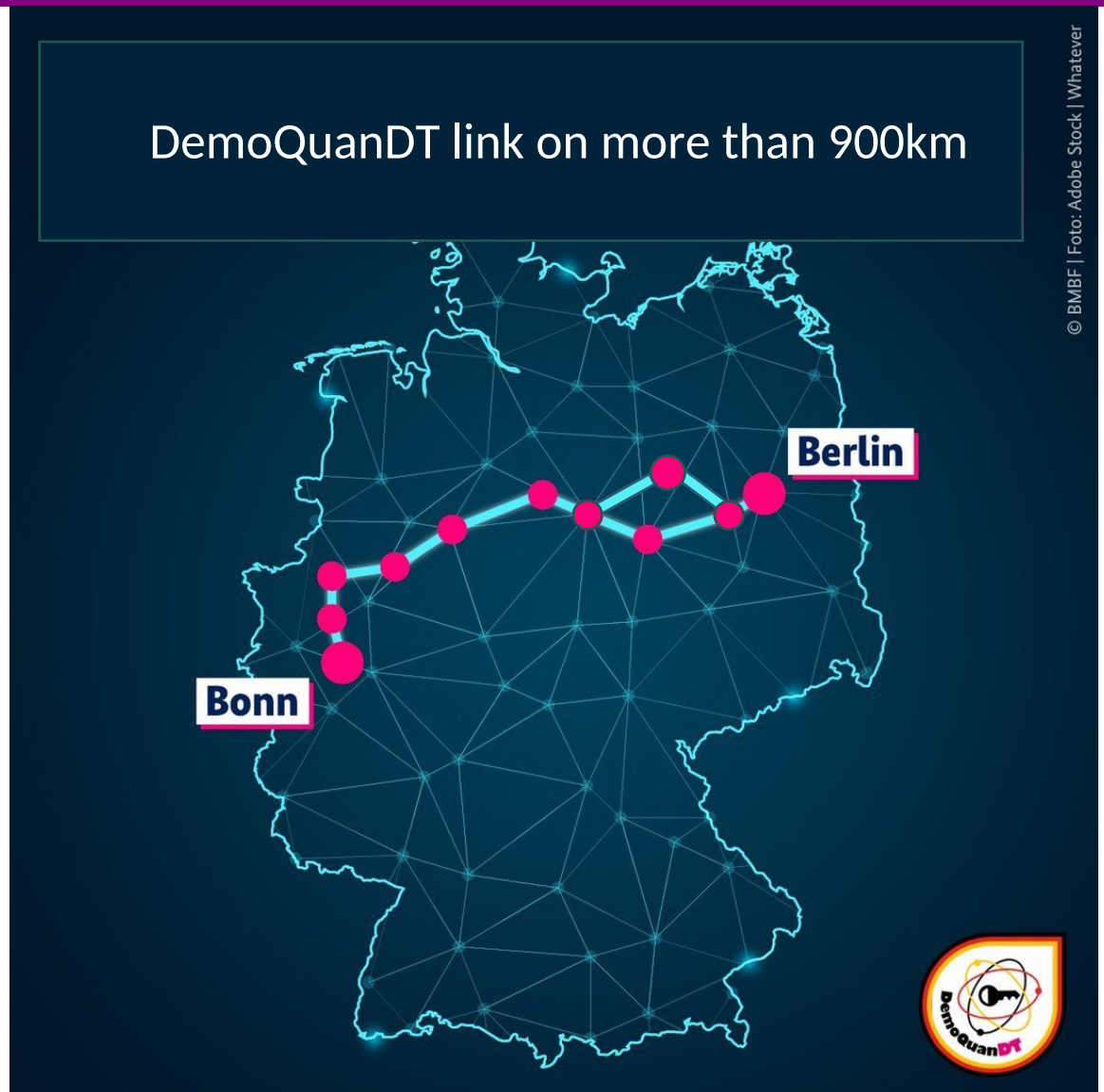
DemoQuanDT at a glance

- 923 km carrier-grade QKD network
- 15 nodes, 3 vendors, from Bonn to Berlin
- Dual-route topology with key purge on security alarms
- First intra-domain, cross-vendor KMS-to-KMS interface
- Blueprint architecture for future QCI deployments



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DemoQuanDT Problems

- Trusted nodes require armored server cabinets weighing ~500 kg each
- High logistical effort for transport, installation, and maintenance
- Not scalable for widespread or flexible QKD deployments

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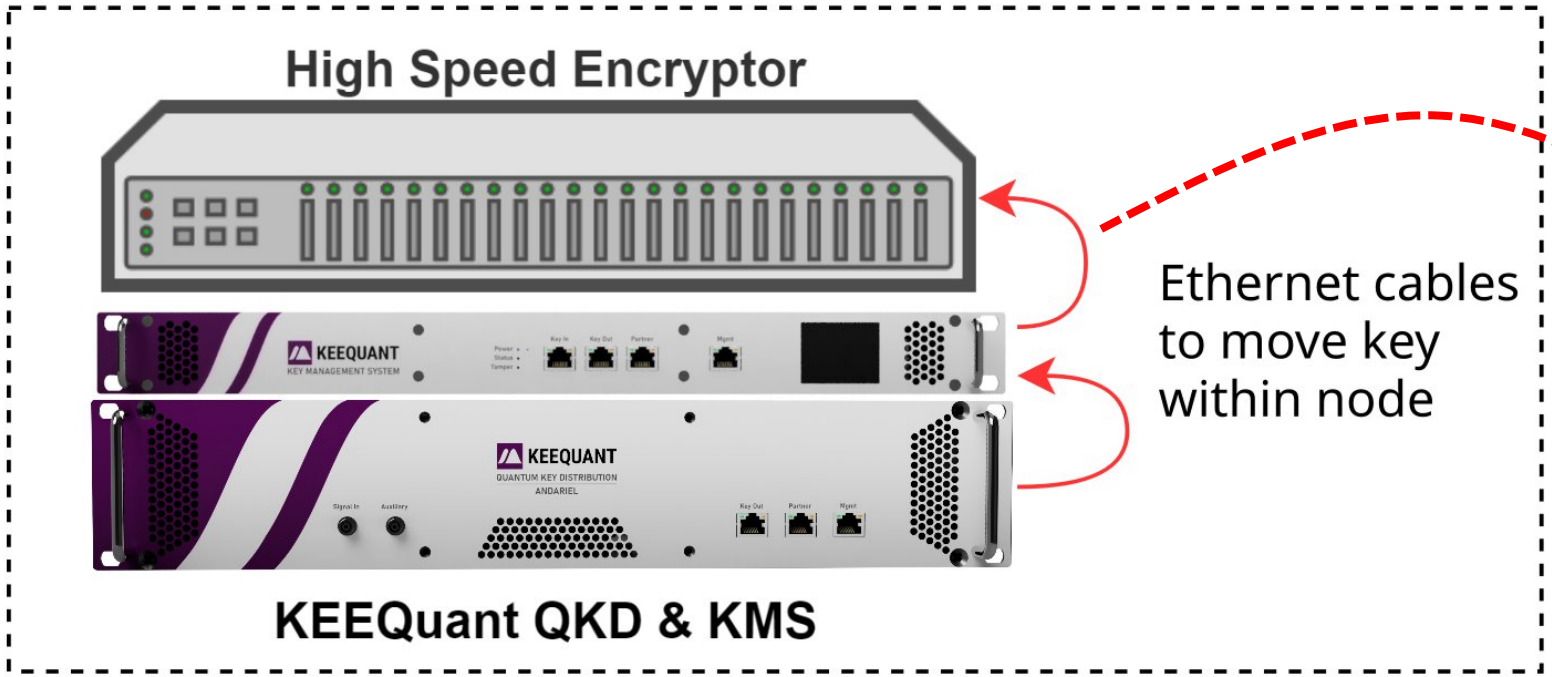
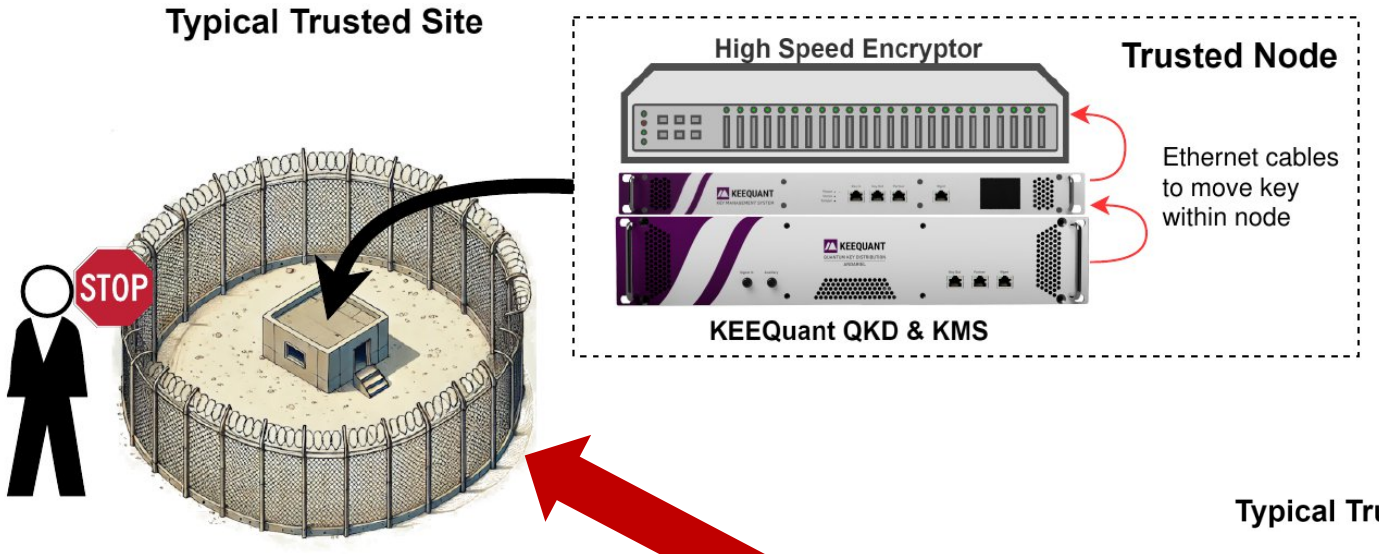
Typical trusted node



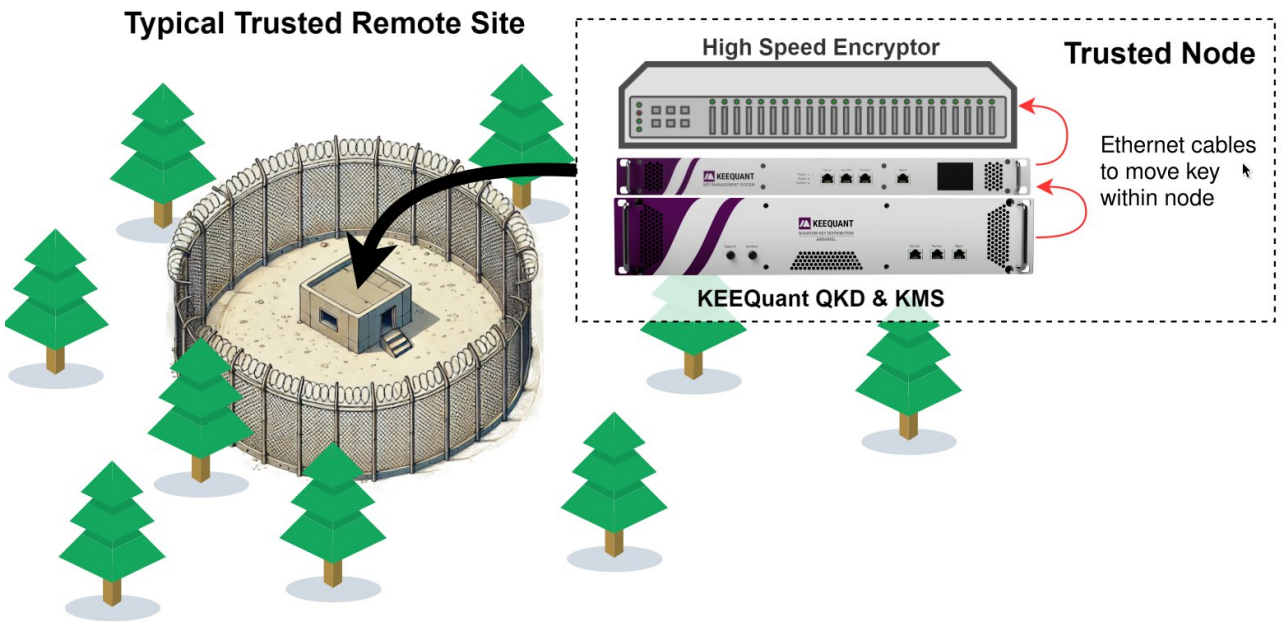
Ethernet cables to move key within node

Eve will tap the red ethernet patch cords

Trusted site vs. remote site



trusted site
vs.
remote site



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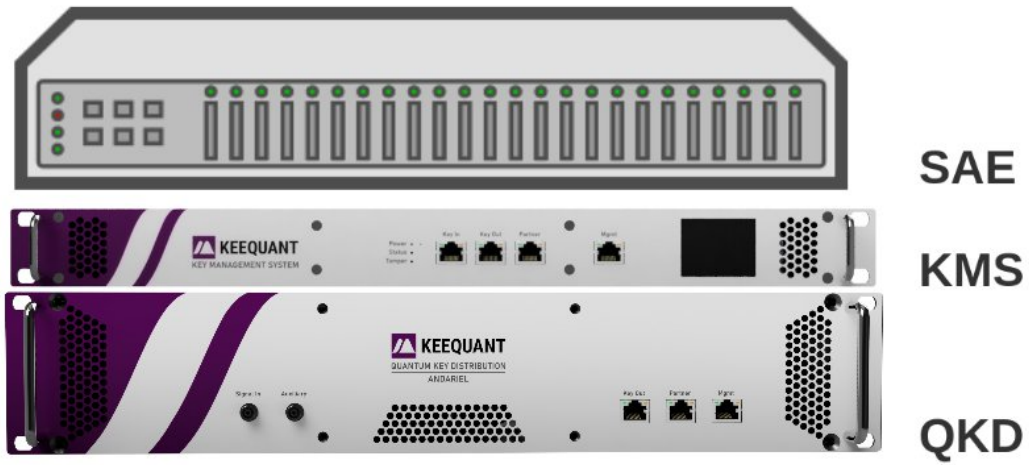
End node vs. relay node

End Node



SAE

KMS

QKD

Relay Node

KMS

QKD

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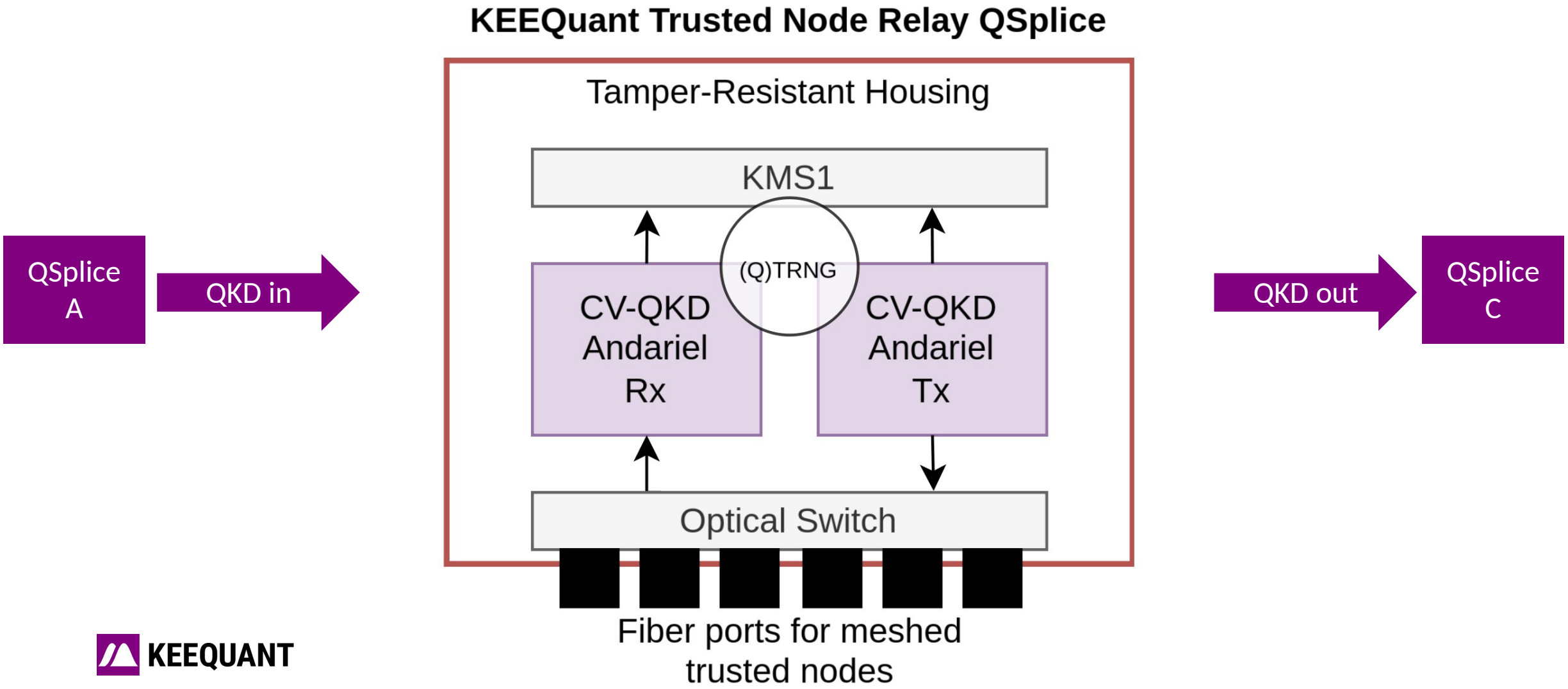
The solution: QSplice

a trusted node for EuroQCI



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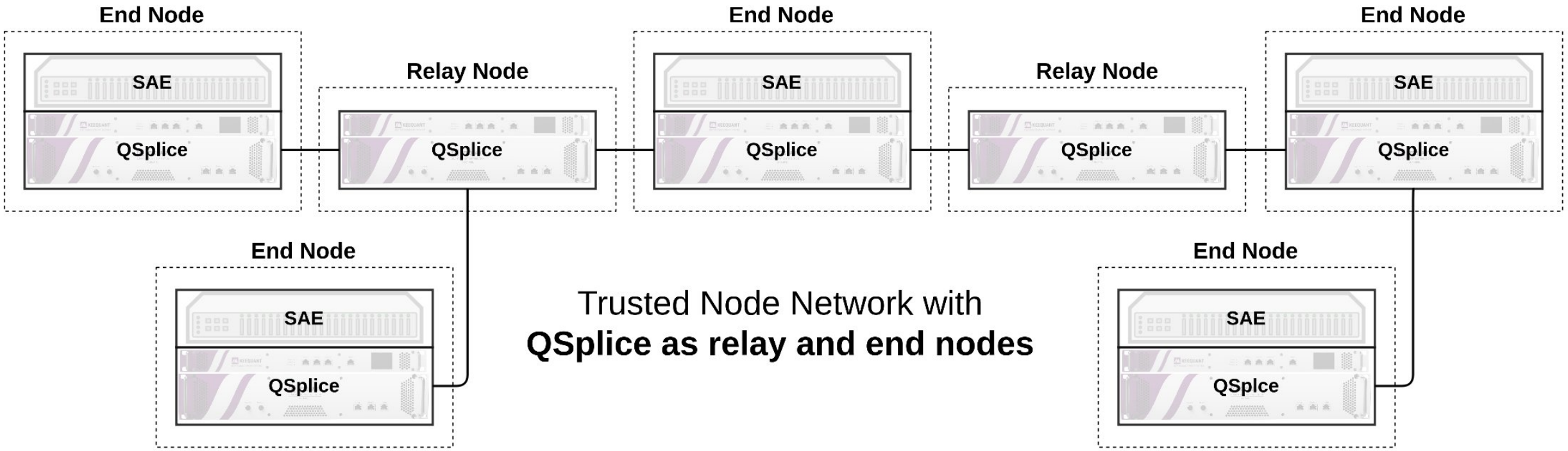
Trusted node network



Thank You!

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