

EPSRC Programme Grant - Engineering Photonic Quantum Technologies

KETS Quantum Security

Chris Erven, CEO

Networked Quantum-Secured Communications with Hand-held and Integrated Devices

Bristol's Activities in the UK Quantum Communications Hub

Philip Sibson, David Lowndes, Stefan Frick, Alasdair Price, Henry Semenenko, Francesco Raffaelli, Dan Llewellyn, Jake Kennard, Yanni Ou, Fotini Ntavou, Emilio Hugues-Salas, Andy Hart, Richard Collins, Anthony Laing, Chris Erven, Reza Nejabati, Dimitra Simeonidou, Mark Thompson and John Rarity

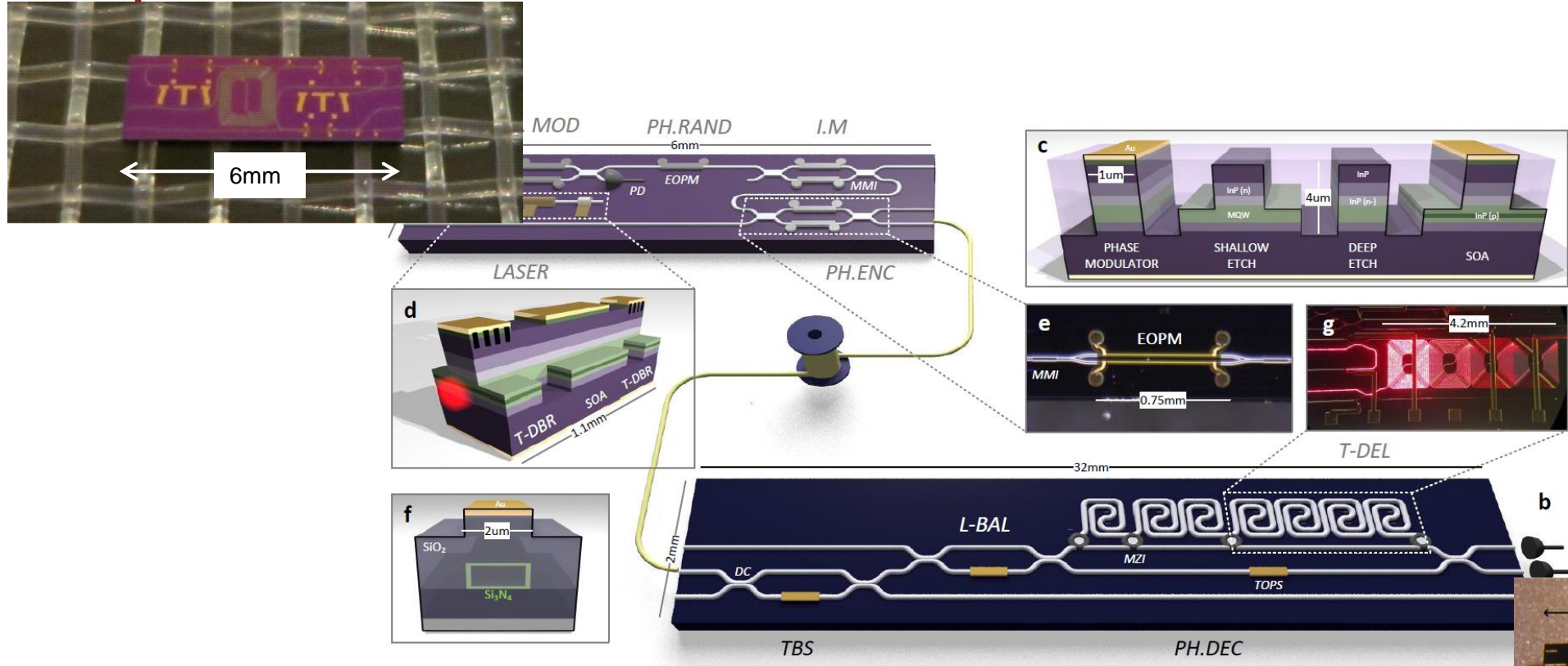
Quantum Engineering Technology Labs

University of Bristol, UK

QCrypt 2017

Sept 16, 2017

Chip-Based QKD

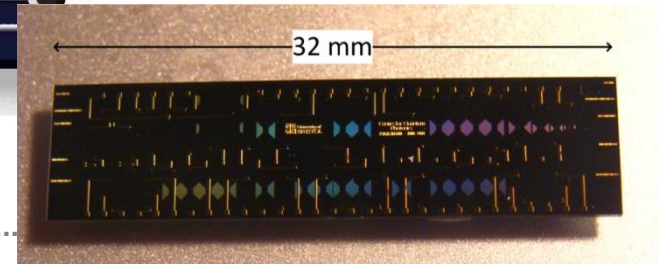


1.72GHz CLK

@20km Loss

565 kbps

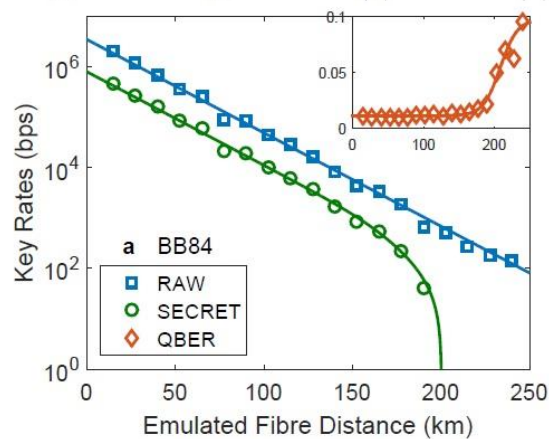
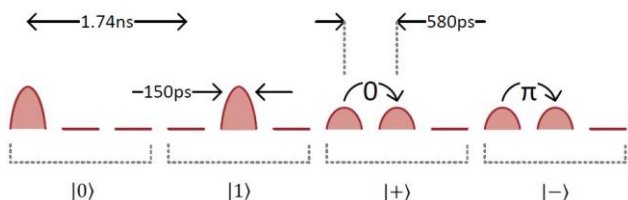
0.88% QBER



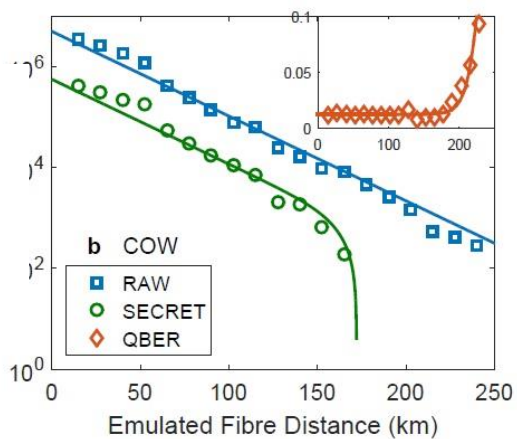
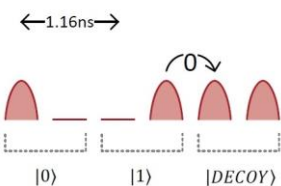
Chip-Based QKD

| Protocol | μ (per pulse) | State Rate (GHz) | QBER Time (%) | QBER Phase (%) | Key Rate (kbps) | Attack Security | Key Analysis |
|-----------|----------------------|------------------------|-----------------------------|----------------------|-----------------------|-------------------------|-----------------|
| BB84 | 0.45 | 0.56 | 1.17 ± 0.18 | 0.92 ± 0.11 | 345 ± 15 | General | Asymptotic |
| COW | 0.28 | 0.86 | 1.37 ± 0.15 | 1.36 ± 0.16 | 311 ± 50 | Collective [†] | Asymptotic |
| DPS | 0.28 | 1.76 | N/A | 0.88 ± 0.10 | 565 ± 89 | Collective [†] | Asymptotic |
| BB84 [34] | 0.42 | ~ 1 | $Q_{X,Z} \sim \{3.6, 4.3\}$ | | 4390 | Collective | Finite |
| COW [25] | 0.06 | 0.63 | 2.4 | 0.85 | 248 | Collective [†] | Finite |
| DPS [35] | 0.19 | 2.0 | N/A | 1.89 | 733 | Individual | Asymptotic |

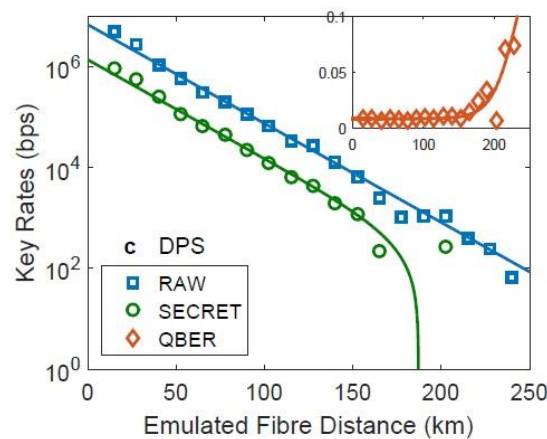
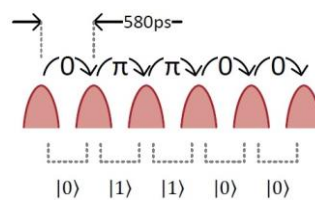
a BB84



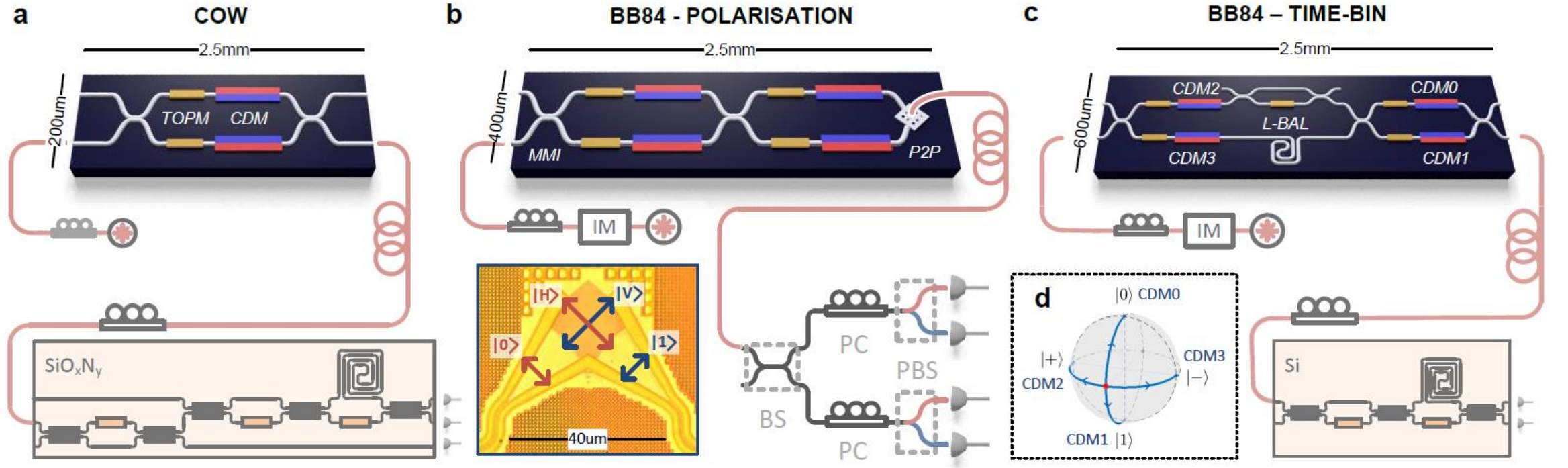
b COW



c DPS



Silicon Photonics – Quantum Key Distribution



CLK 1.72GHz
 QBER 1.01%
 RATE 0.92Mbps

CLK 1GHz
 QBER 1.1%
 RATE 0.33Mbps

QBER 2.1%

Sibson et al. 'Integrated silicon photonics for high-speed quantum key distribution', *Optica* 2017



THE FUTURE OF SECURE COMMUNICATIONS



Winner 2018

UK's
Most Innovative
Small Cyber
Security Company

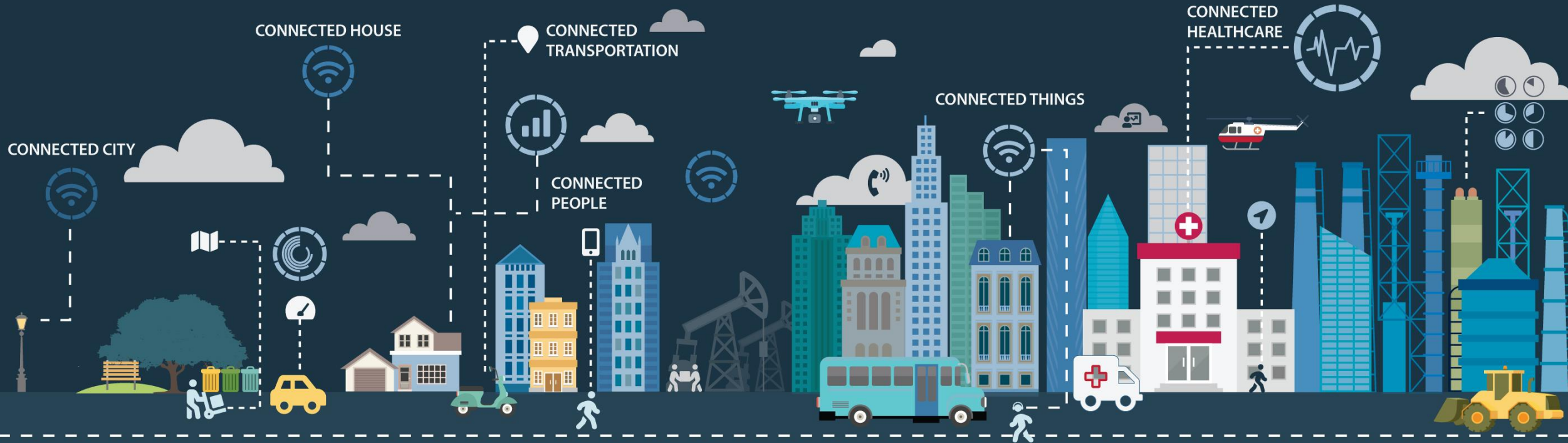
Chris Erven

CEO & Co-Founder

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KETS

QUANTUM SECURITY

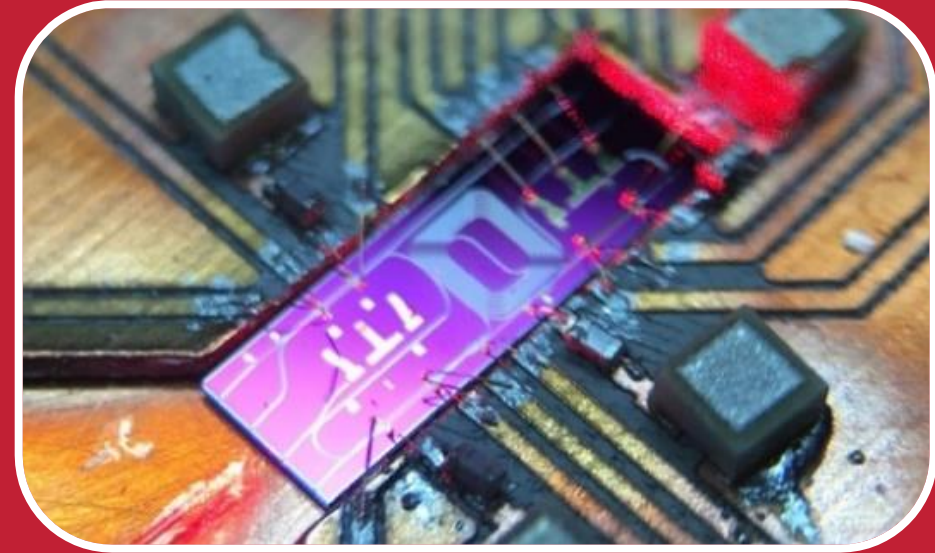
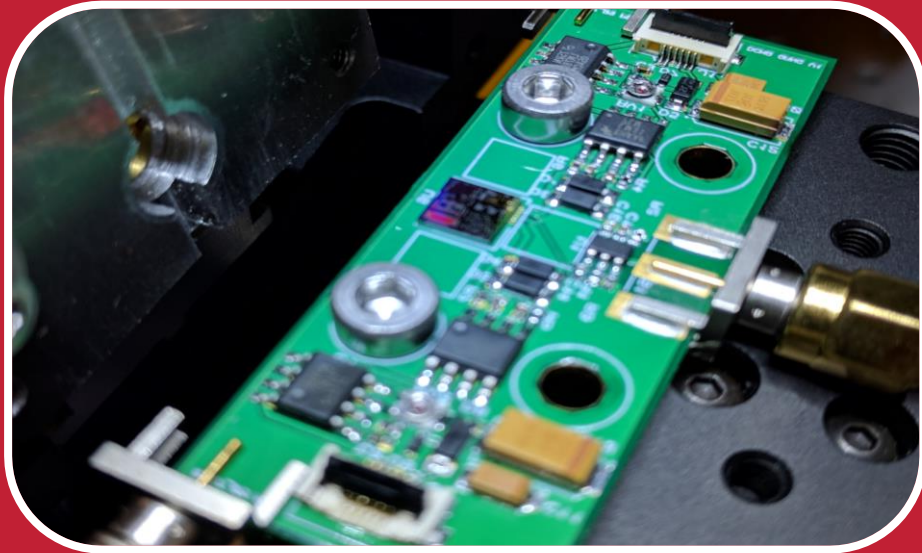


Quantum Computers will break our current, convenient digital security



KETS' TECHNOLOGY

KETS is pioneering a complete quantum encryption solution on a chip.



Ultra
secure



Hacker
detection



Future
proof



Low size,
weight, power



High
performance



Scalable
manufacture

ADOPTION CASCADE

First adoption will start with backbone systems that already have a large market.



BACKBONE, BESPOKE
Defence, Telecommunications



CRITICAL INFRASTRUCTURE, REFIT/UPGRADE
Power stations, Airports, Industrial control systems



CONSUMER, STANDARDISED PRODUCT
Finance, Data Centres, Medical

SOM £365M

SAM £5B

TAM £244B

TARGETING THE BACKBONE



Demonstrate next generation secure fibre backbone.



Demonstrate next generation secure optical links for Defence & Govt



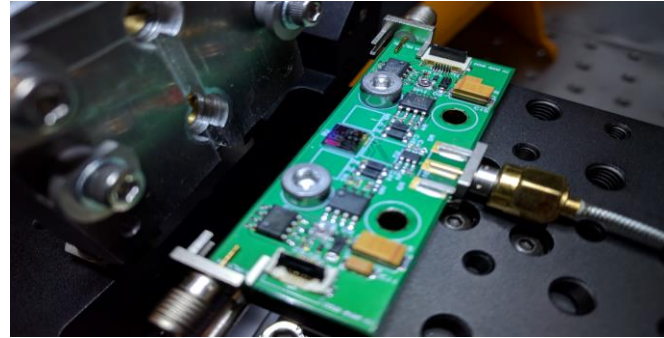
Innovate UK

KETS already has initial projects with two of the largest players in our initial markets.

EARLY BUSINESS MODEL



Development Kits



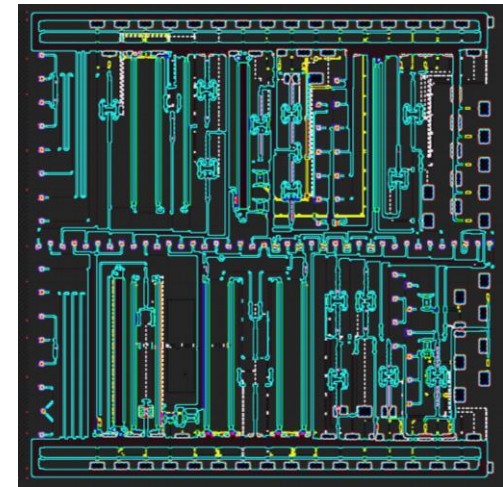
OEM Modules



Licencing



Licencing



Our initial business model is to get dev kits in the hands of early adopters quickly.



COMPANY SNAPSHOT

Funding:

Closed Seed Round
(£1.92m – Nov '19)

Incorporated: July 2016

Heritage:

World leading deep tech



University of
BRISTOL

Alpha prototype
demonstrated on
the bench

Significant early
traction
Defence & Telco

On-chip solution
Easily integrated
Patented

Seeking early customers/field trials.