



Securing Data in Motion

Uli Schlegel

30th of October 2015


ADVA Optical Networking Today



Mission

Our MISSION

is to be
the trusted partner
for innovative
networking solutions
that ADVANCE
next-generation
networks for cloud
and mobile services.



Ulrich Dopfer
CFO

Brian Protiva
Co-Founder & CEO

Christoph Glingener
CTO

Key Facts

Our NUMBERS

1.500 employees
€339* million revenue
20 years of innovation
**annual 2014*

Our CUSTOMERS

Hundreds of carriers
Thousands of enterprises

Our QUALITY

TL 9000, ISO 14001
Award-winning
supply chain

We bring differentiation, quality and ease-of-use to next-generation networks

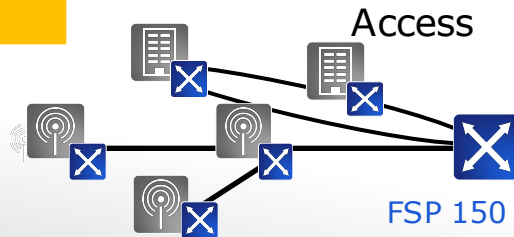
Our Solutions Overview

FSP Service Manager



Carrier Ethernet Access

Mobile Backhaul
Business Ethernet
Ethernet Wholesale



Metro

FSP 3000

Core

Carrier Infrastructure

Broadband Backhaul
Metro Networks
Long Haul



Private Enterprise Networks

Data Center Connectivity
Low-Latency Networks



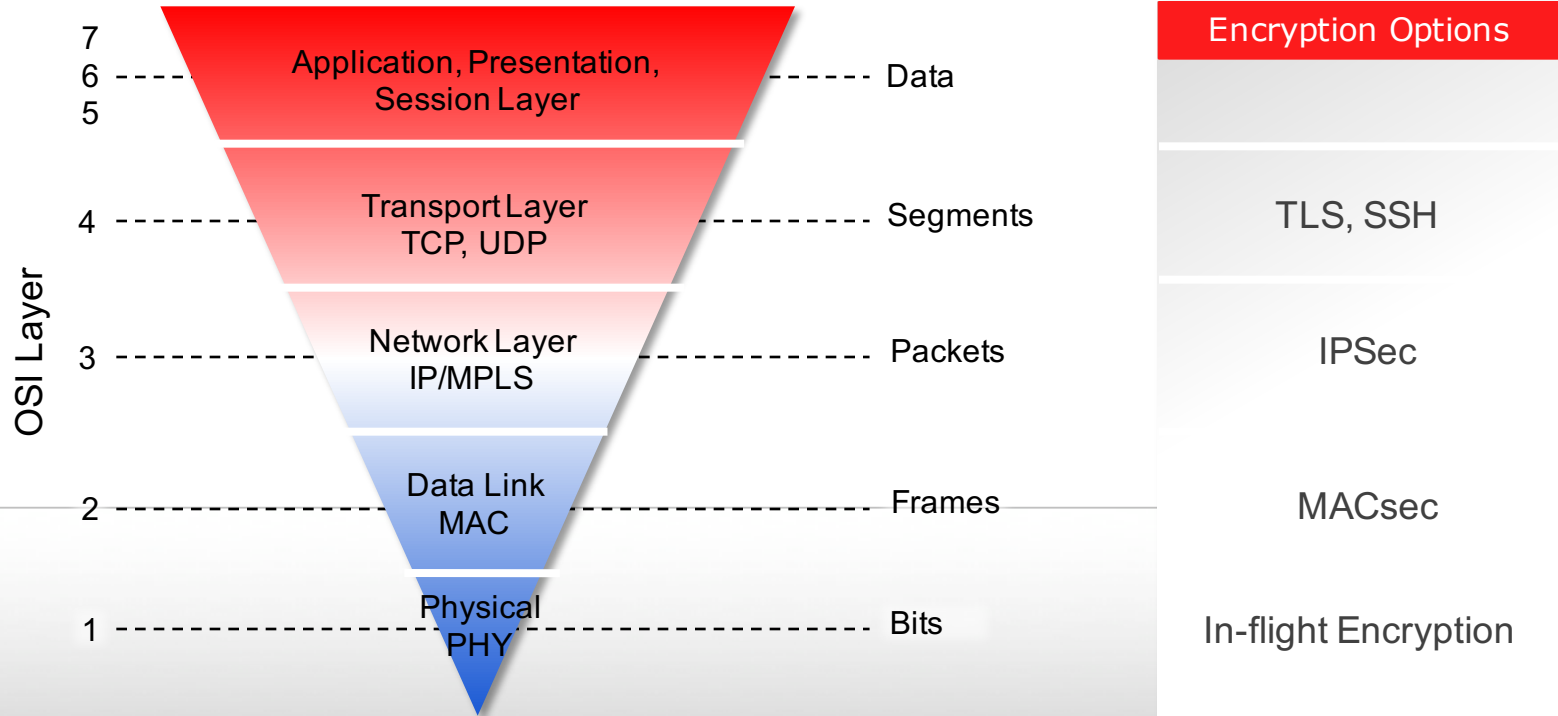
Automated service delivery and assurance from access to core

Network Encryption



Today and tomorrow

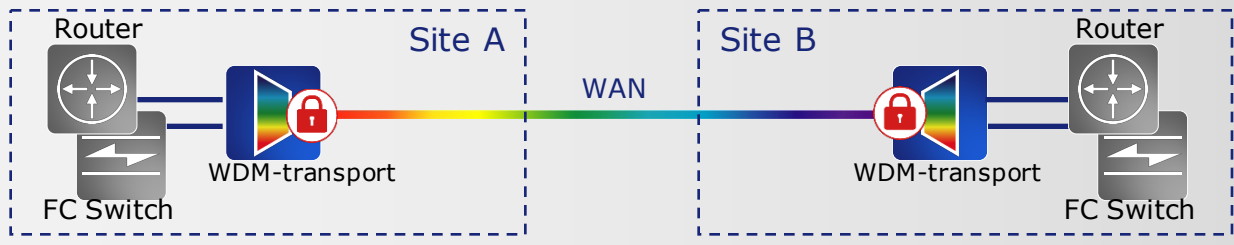
Securing Data in Motion



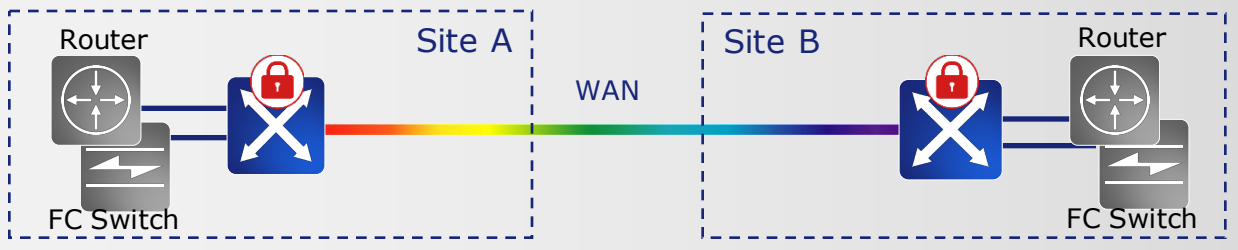
Optical transmission security

Speed of Encryption

xWDM based Encryption



Ethernet based Encryption



IPsec based Encryption



Speed, throughput and simplicity

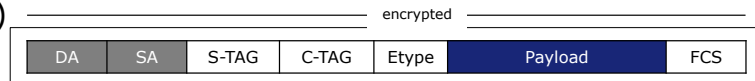
Flexibility and complexity

High Speed Encryption Modes



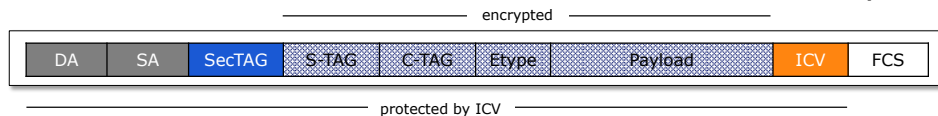
- Point-to-Point,
- Protocol/ I/F agnostic (ETH, FC/IB, Sonet/SDH)
- Integrated Solution with lowest latency

Bulk Mode (0 Bytes)



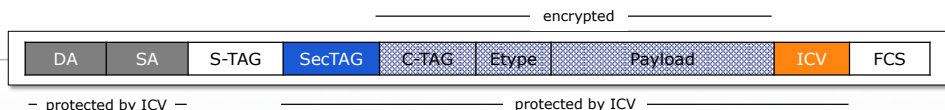
- Hop-by-Hop only
- Pure Ethernet based
- Overhead increase

MACsec + 32 Bytes



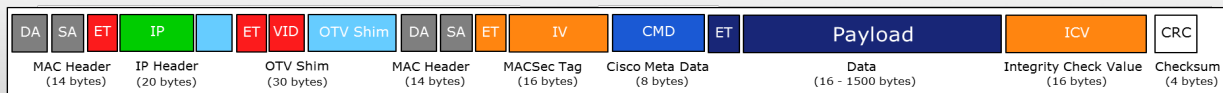
- **End-to-End PtP or Multi-Point**
- Pure Ethernet based
- Overhead increase

MACSEC+ 32 Bytes



- Huge overhead
- IP VPN Services
- Cisco Nexus

Cisco Overlay Transport Virtualization (OTV) +82 Bytes



ConnectGuard™ Ethernet Solutions



- Advanced MACsec transformation
- IEEE 1588 times tamping on MACsec ports
- Same L2 OAM, TM and PM features as GE114
- L3 capabilities
- SDN enabled

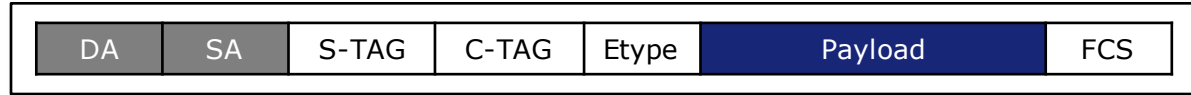
- Advanced MACsec transformation
- IEEE 1588 times tamping on MACsec ports
- Same L2 OAM, TM and PM features as the XG210

ADVanced MACsec Transformation

MACsec with VLAN bypass

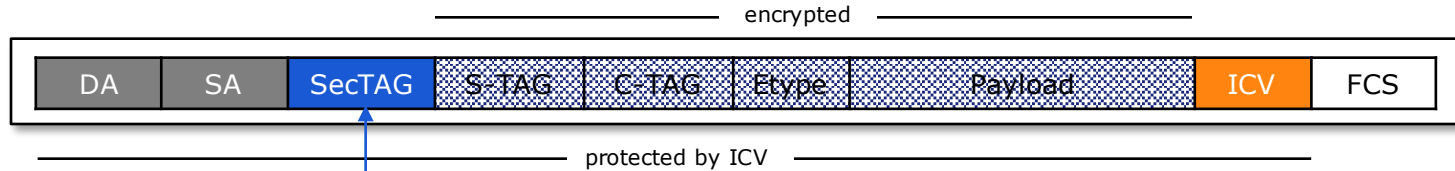


Unencrypted Frame

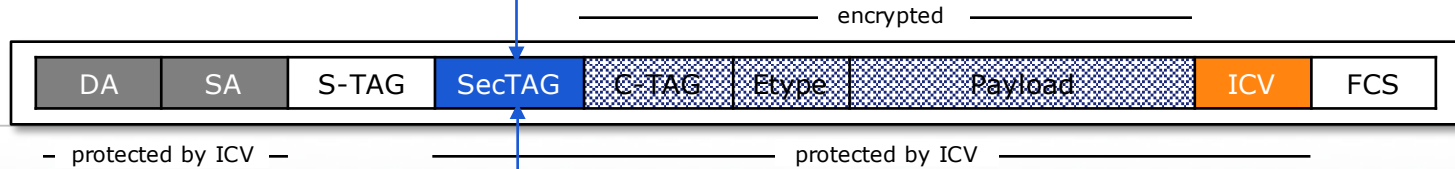


+ 32 Bytes

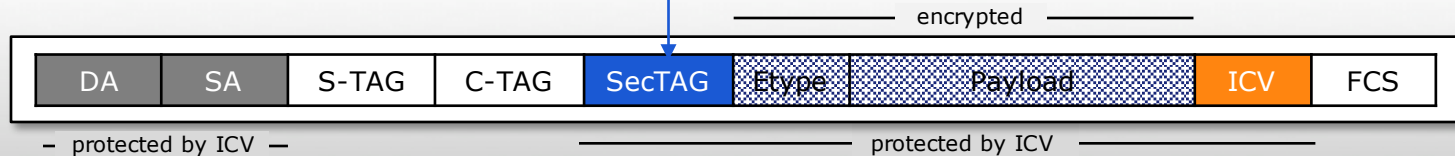
Standard MACSec Format



Single VLAN bypass MACsec Format



Double VLAN bypass MACsec Format

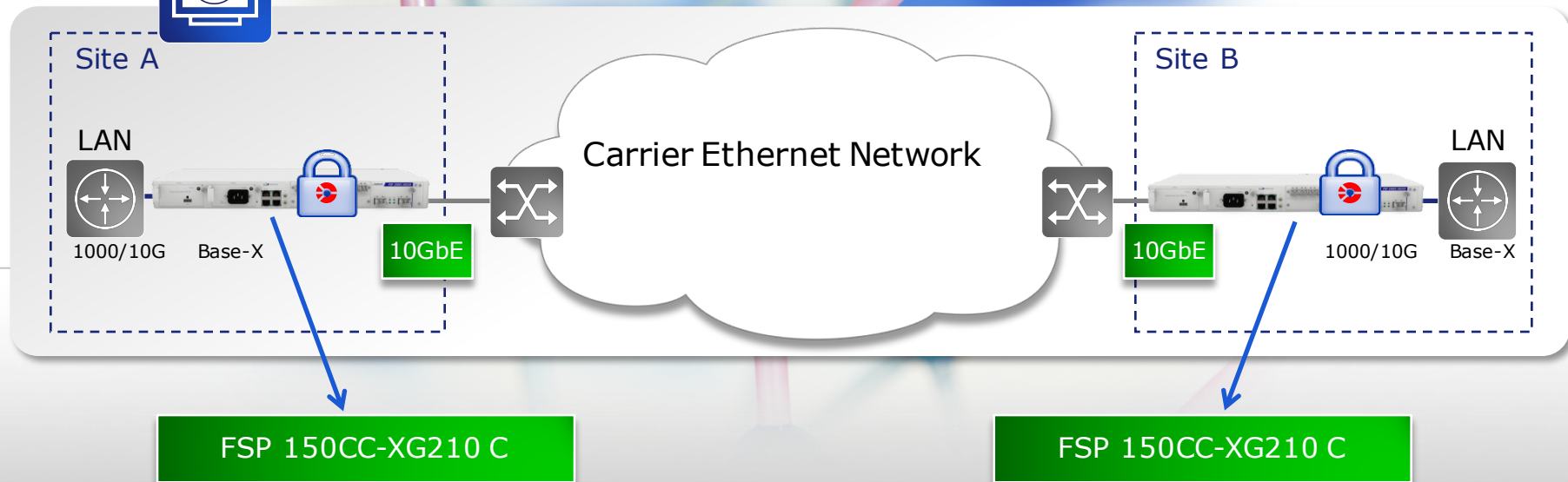


Encryption over L2 Carrier Networks

1Gbit - 10GbE Services Port based Point to Point



FSP Network &
Crypto Manager



FSP 3000 Enterprise

Lowest power consumption

- More than 50% lower power consumption compared to competitors

Lowest space requirement

- 50% higher rack space efficiency

Lowest latency transport

- Latency optimized transponder cards for synchronous enterprise applications

Lowest TCO

- Most cost effective system in the market
- Simple and straight forward system architecture allows for fast and easy setup and maintenance

Leading feature set

- Support of all enterprise protocols and I/Fs:
FICON, 1/2/4/8/10/ 16G FC, Video
GbE, 10/40/100GE, RoCE, IB (SDR, DDR, QDR), 40G, 100G
- Qualifications for all major enterprise apps (e.g. IBM GDPS)
- Optical line monitoring (OLM, OTDR, OSA)
- Encryption: 1Gbit to 100Gbit seamless
- Sophisticated optical layer: ROADMs, EDFAs, RAMAN, DWDM 196λ



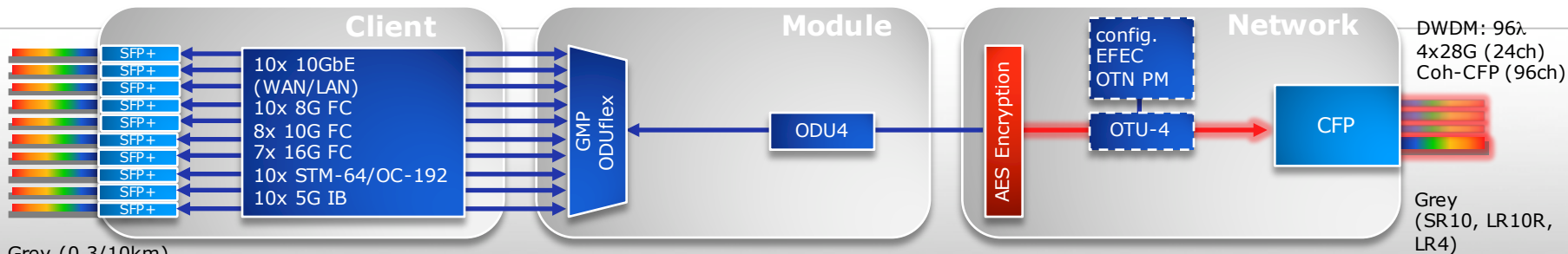
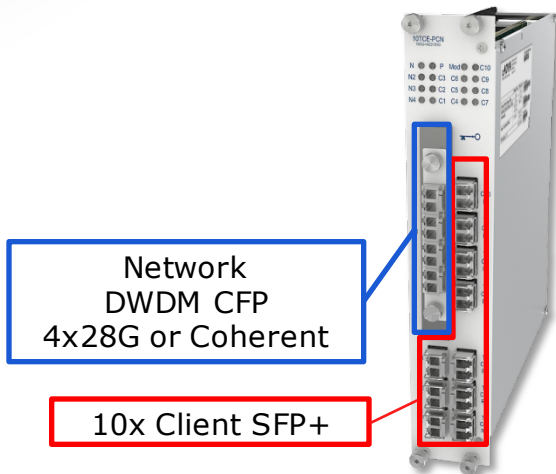
The scalable optical transport solution



100G Muxponder with Encryption

10TCE-PCN-16GU+AES100G- (BSI)

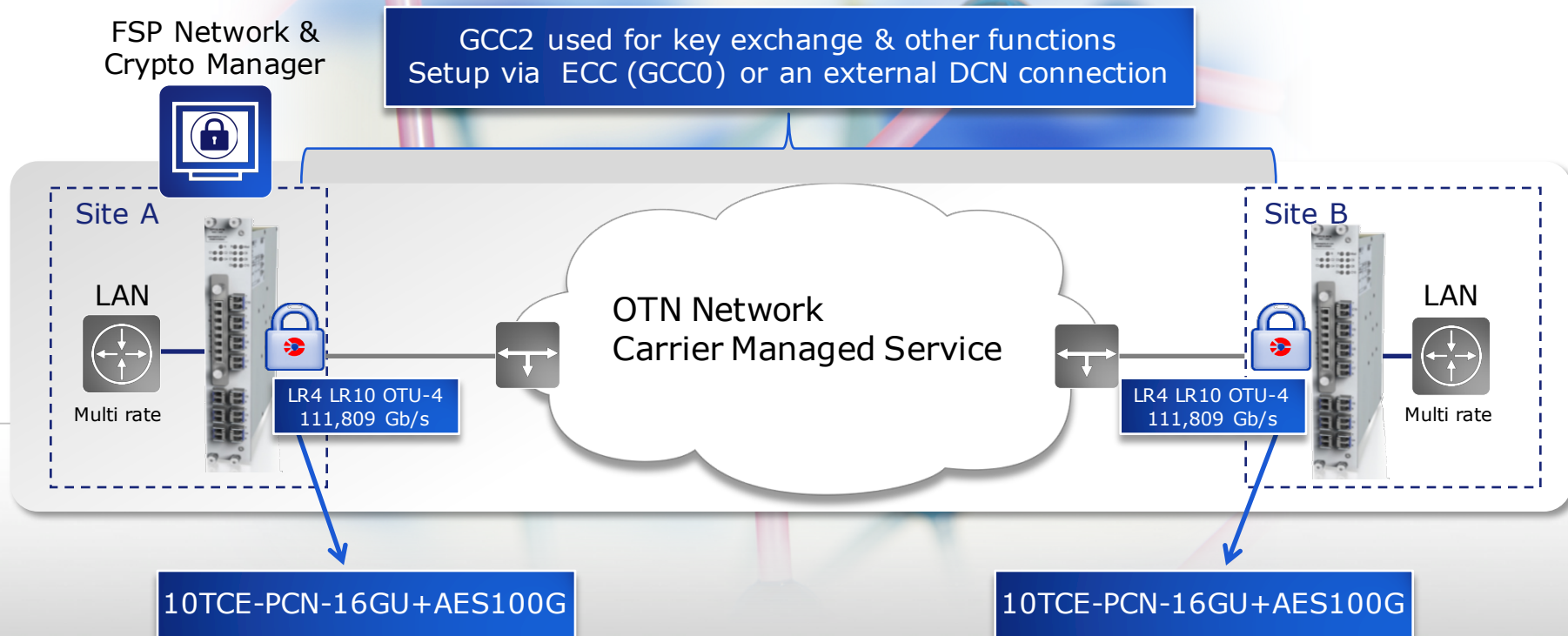
- AES256 encryption
- Next level random number generation w/ inbuilt validation
- Dynamic key exchange using PACE with 2048bit key (60/h)
- Message Authentication Code (MAC)
- Up to 10 x multi-service
 - 10GbE, STM-64/OC-192, FC8/10/16, 5G IB
 - 40GbE/100GbE via break out cable
- Client Channel Card Protection
- GFEC for 4x28 CFP, GFEC/EFEC Coh-CFP



Grey (0.3/10km)
CWDM (8ch+4ch), DWDM (40ch C-band)

Encryption over L1 Carrier Networks

10GbE, 40GbE, 100GbE Services



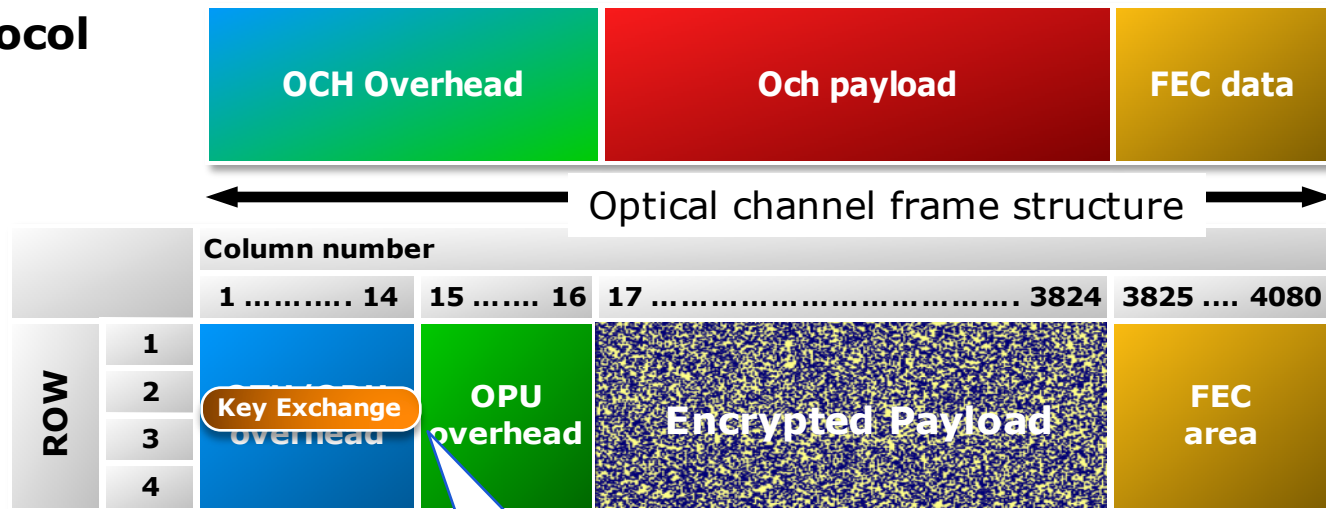
Encryption using G.709 / OTH Link Protocol

5TCE-10G card, 10TCE-100G card



5TCE-10G link protocol

- Supports
 - OTU-2
 - OTU-2e
 - OTU-2f



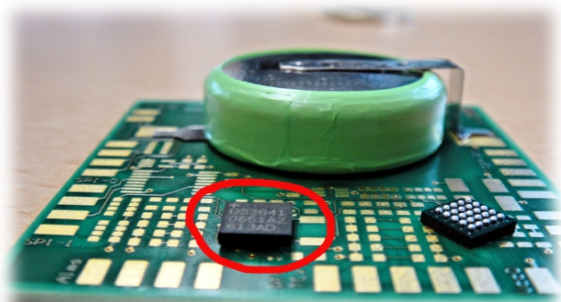
10TCE-100G link protocol

- Supports
 - OTU-4

Secure Storage & Tamper Detection



Maxim DS3641



- battery-buffered non-imprinting RAM with high-speed erase
- three digital inputs for tamper detection
- programmable temperature sensor
- crystal oscillator tamper monitoring
- voltage tamper monitor
- latching and time stamping of tamper events
- developed according FIPS 140-2 level 4

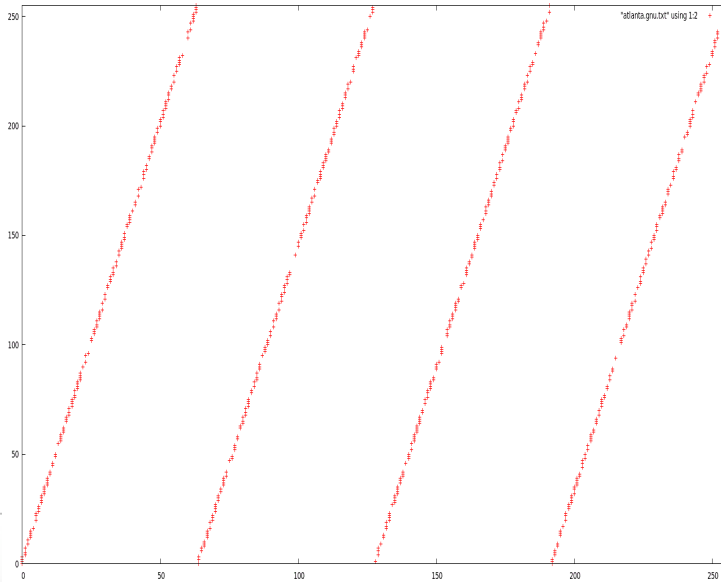
10Mbit/s to 100Gbit/s Transport Security



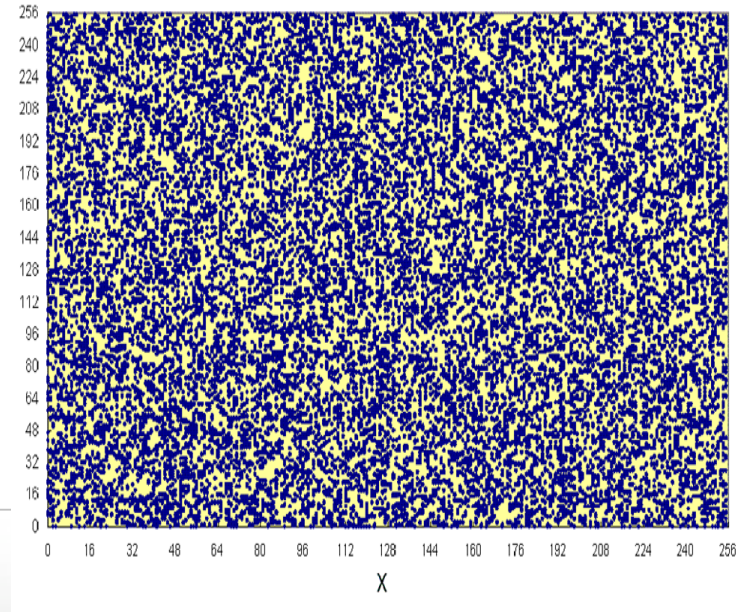
100GbE	Layer 1 Encryption	100G
40GbE		40G
FC 1,2,4,8,10,16G		1G – 10G
STM-16/64 - OC-48/192	FSP 3000 with 10G/100G AES	
10GbE	Layer 2 Encryption	
GbE	FSP 150-XG210 (C)	
100/1000 Base-X	Layer 2 Encryption	1G
10/100/1000 Base-T	FSP 150-GE114Pro (C) (CS)	10M – 1G
Dark Fiber	Access Link Monitoring (ALM)	Fiber



X-Y Plot of the RNG output



A FIPS approved RNG



The RNG used by ADVA

Technology Outlook



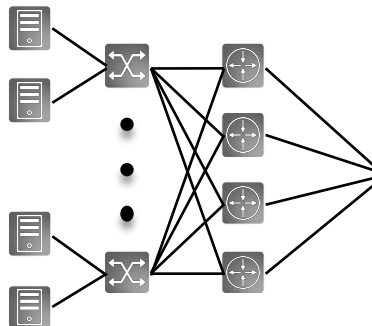
Data Center Interconnect Solution



Highest fiber capacity: 25.6T to 50T
Highest density: 25.6T per 42RU Rack
Highest power-efficiency: 0.5W/Gbit/s



Mega Data Center



8Tbit/s Transport
80 100G Client
Up to 800 10G

Open Optical
Line System

128 Channels
37.5GHz

In-Flight
Encryption

Co-Lo Sites

2.8Tbit/s Transport
28 100G Client
Up to 280 10G

Smaller Edge Sites

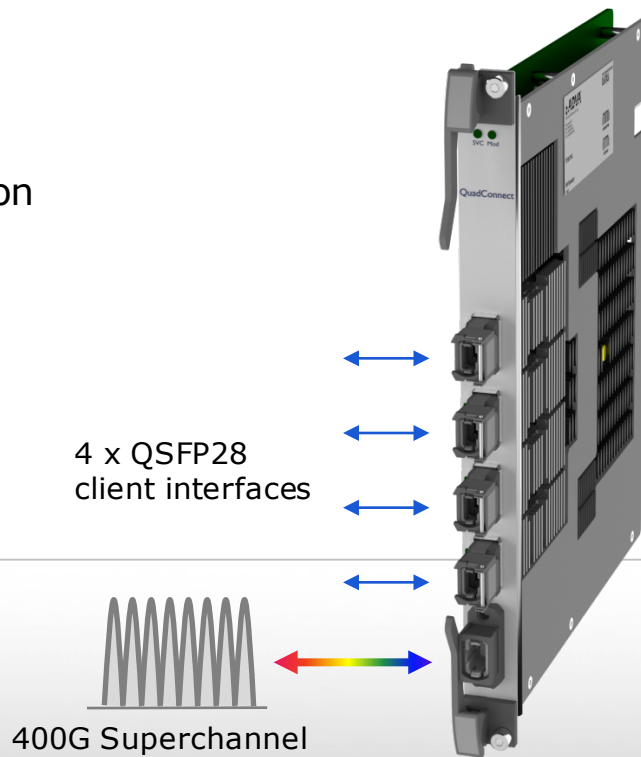
10x10GbE: 1-100GbE

400G DCI Optimized module

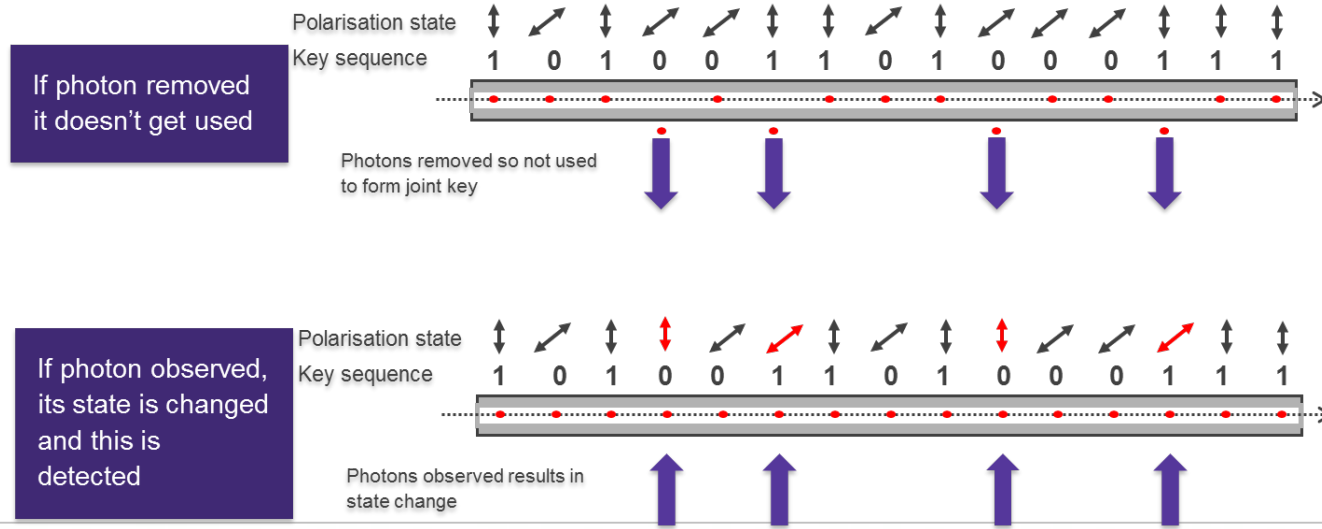
QuadConnect



- Optimized **Datacenter** Interconnect
- 1 x integrated, 400G interface
- 8 x 28GBd HOM Superchannel with direct detection
- Up to 4.8Tbit/s fiber capacity
 - Future 9.6Tbit/s
- 4 x QSFP28 client interfaces
 - 25GbE, 100GbE, OTU4, 32G FC, 128G FC
- Reach 100km
- AES 256 Encryption
- Power Consumption : typ 100W



Quantum Key Distribution: Unhackable



Quantum mechanics has proven that the act of observing something changes its state in a non-reversible way



Thank You



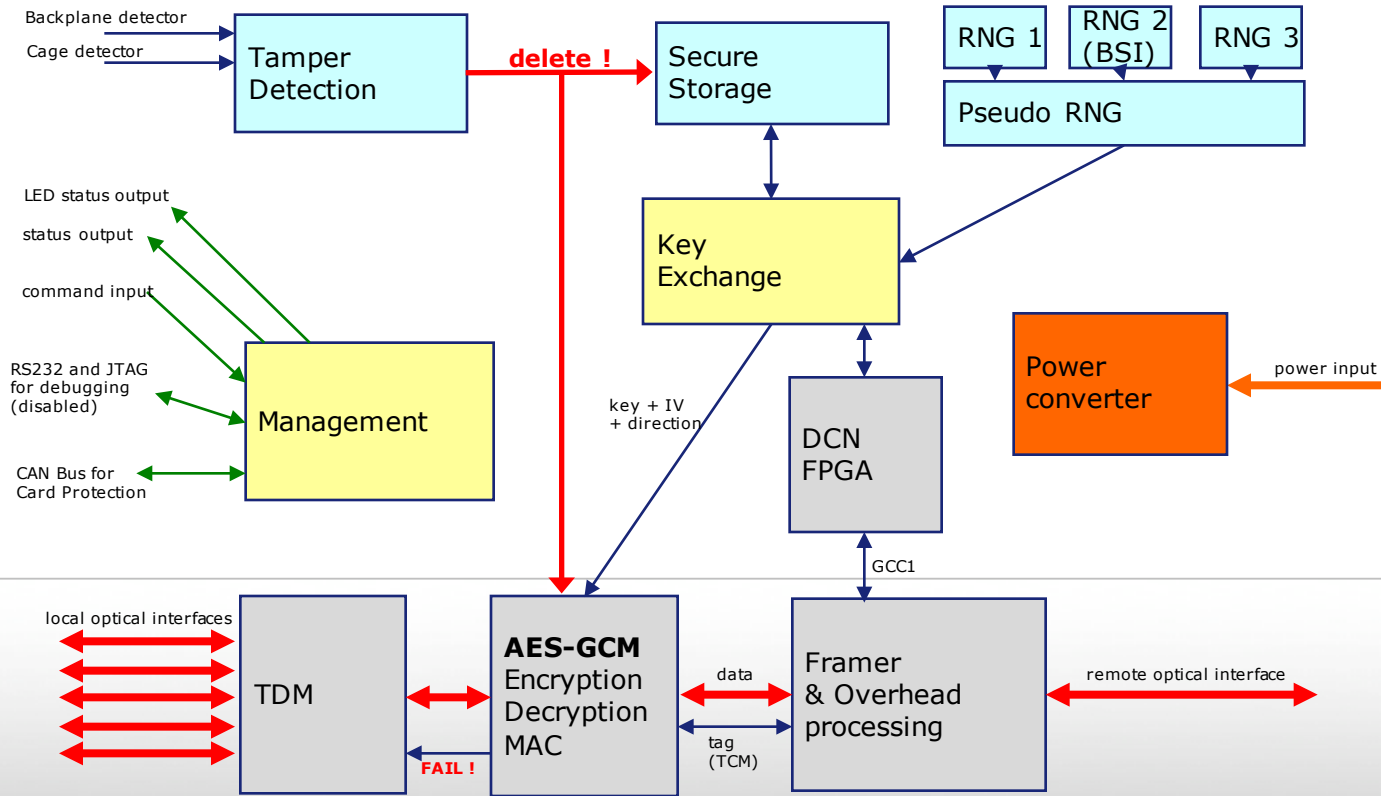
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10TCE-AES Block Diagram



World's First QKD + 100Gbps Field Trial

