

Designing Modularity into Rugged Optical Transceivers Supports Flexible System Solutions

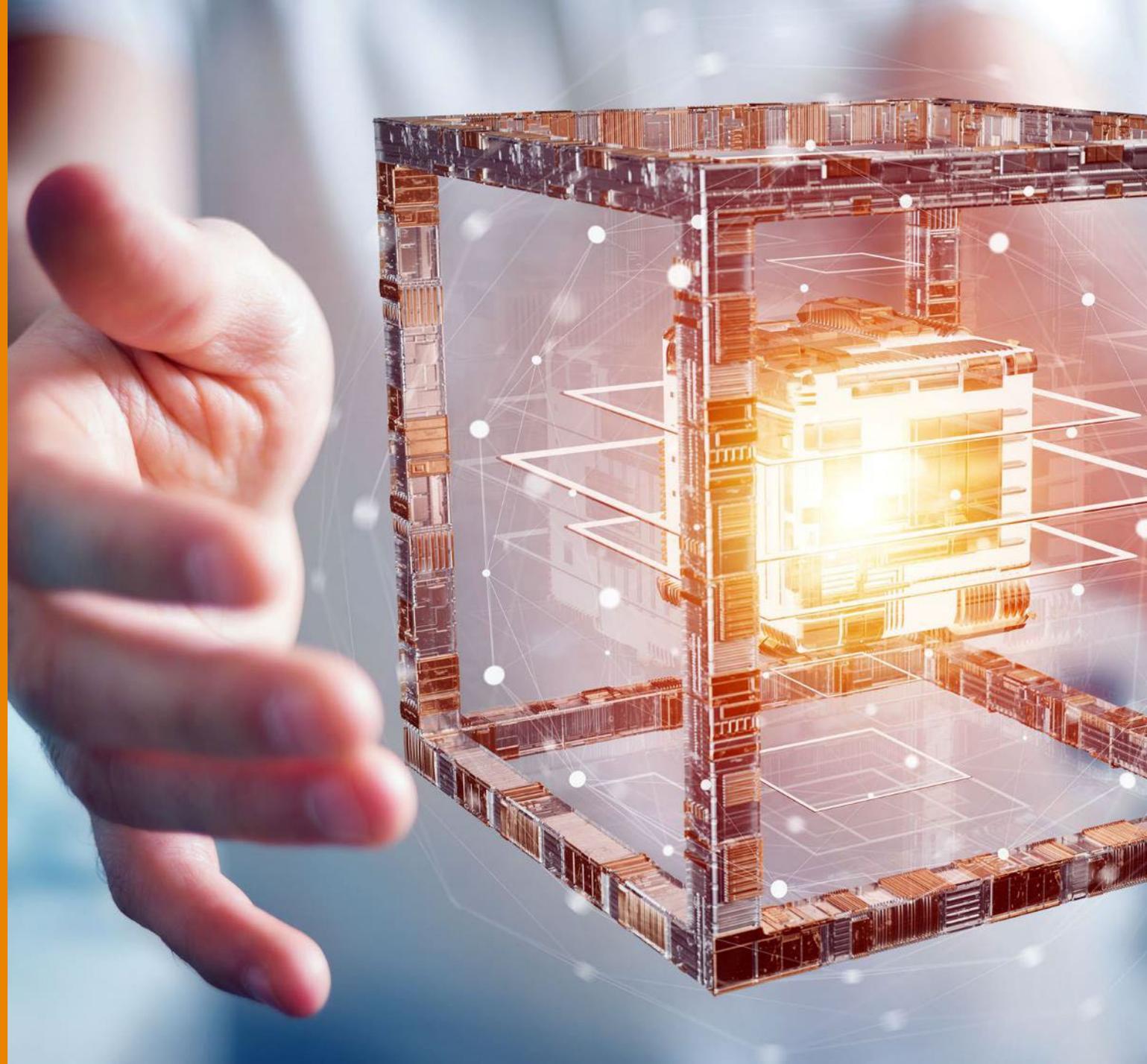
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Presentation Outline:

System Examples Needing Modularity

Light Engine Platform (LEP) Overview →

10G Transceiver on Your Fingertip

LEP & MULTIGIG RT 2 →

Chiclet Based Optical Transceiver (CBOT)

MULTIGIG RT FO (Fiber Optic) Platform

CBOT Future Extensions

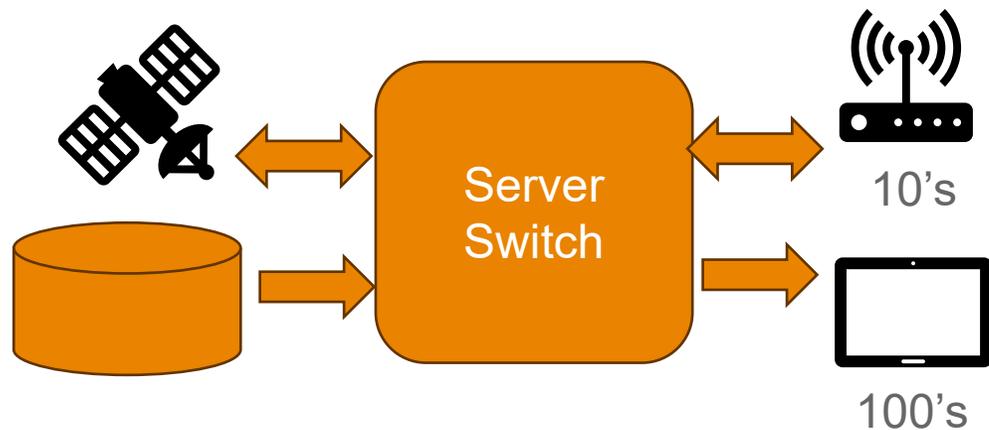
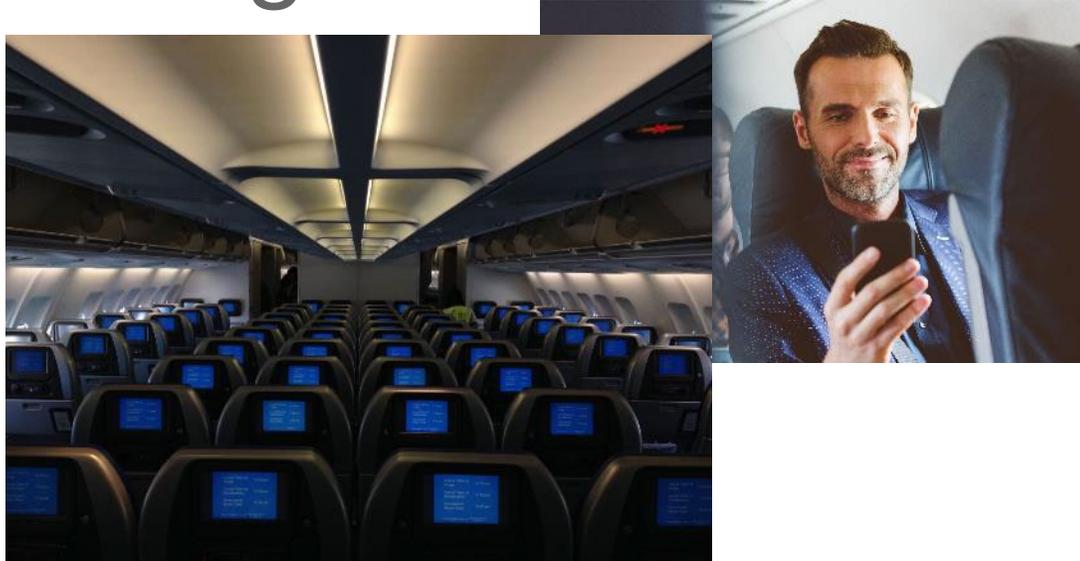
CBOT Leveraging MULTIGIG HD wafers

Q&A

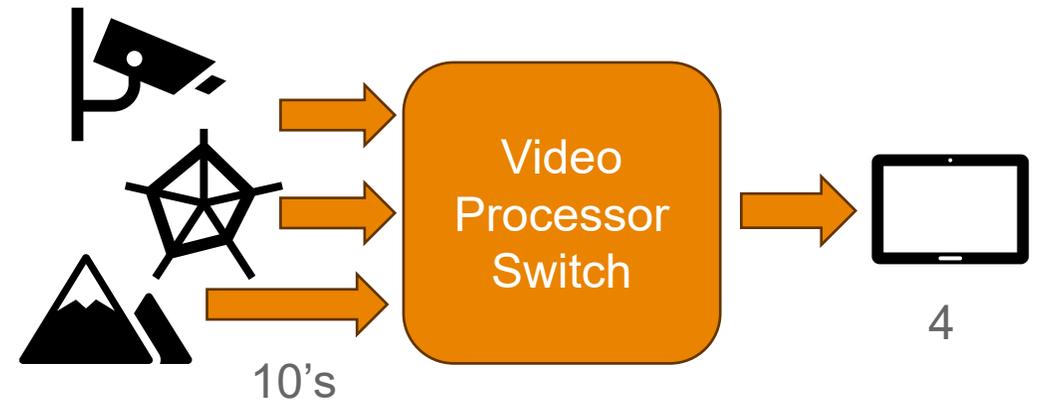


System Examples Needing Modularity

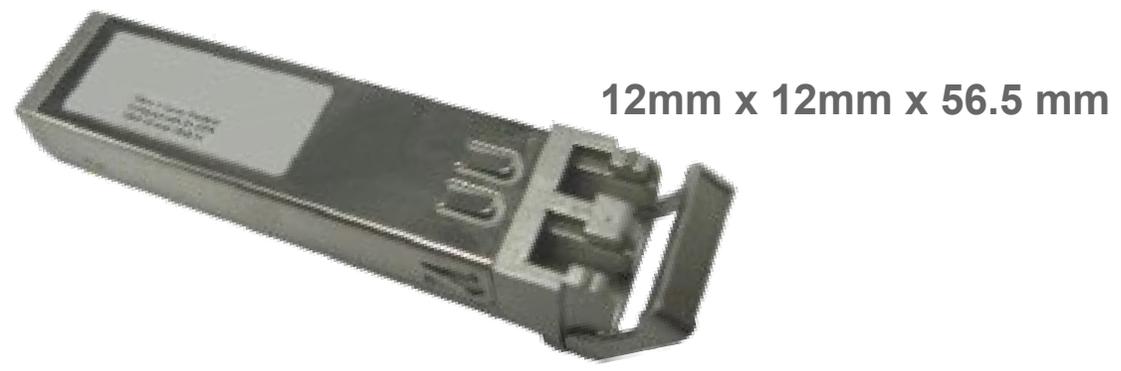
Inflight Entertainment



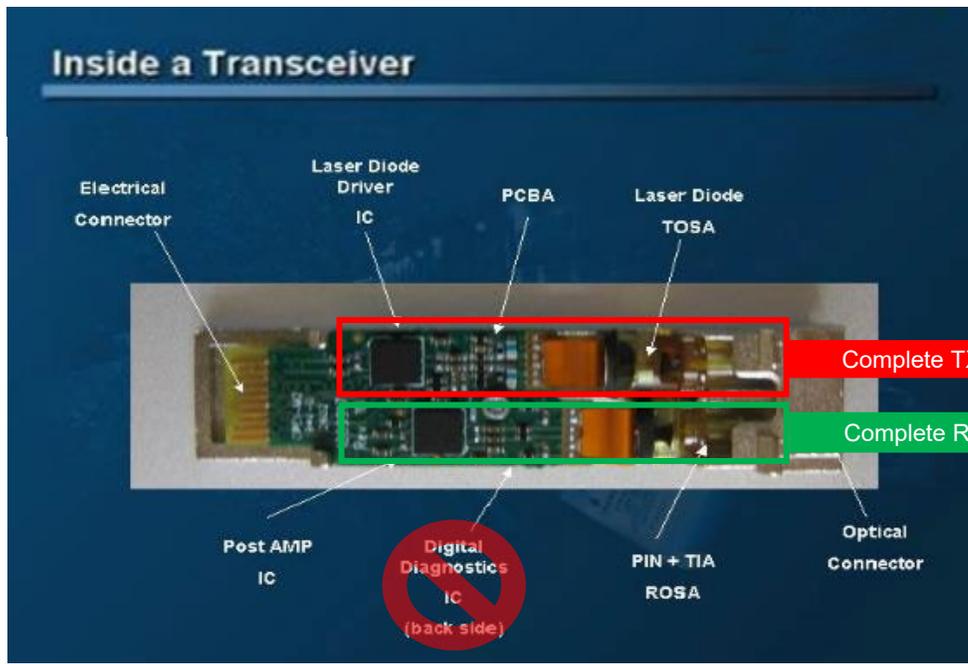
Avionics Displays



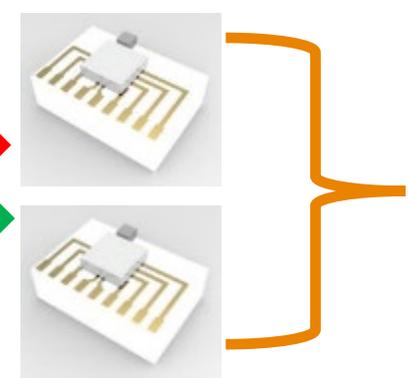
Light Engine Platform (LEP) Overview



10G Transceiver on Your Fingertip

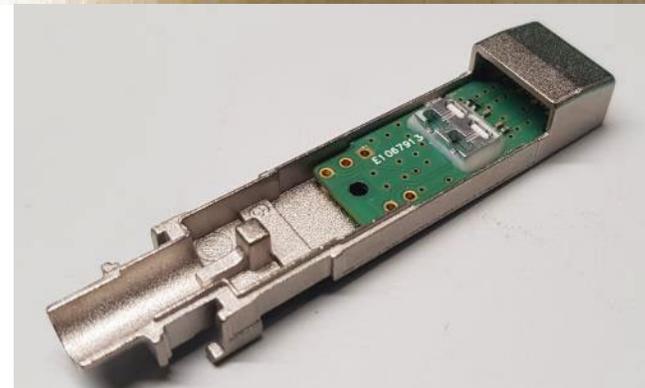
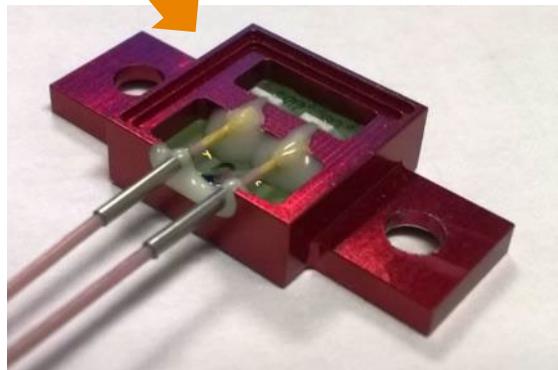
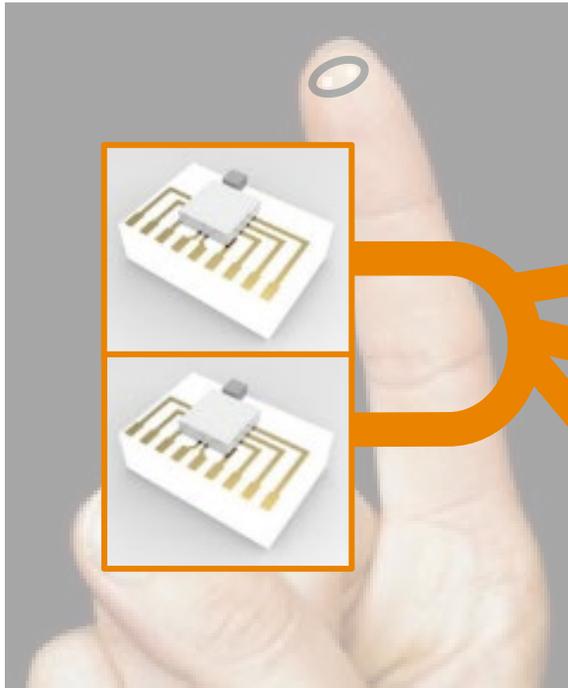


1.5mm x 2mm x 1 mm



LEP Overview ... 10G Transceiver on Your Fingertip

Rugged LEP TX or RX → Design TRx into optical link where it makes more sense!

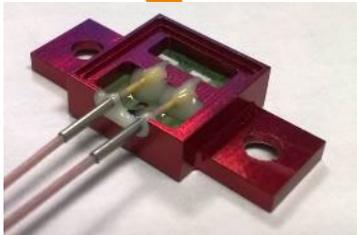
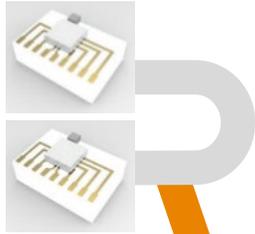


LEP & MULTIGIG RT 2 → Chiclet Based Optical Transceiver (CBOT)

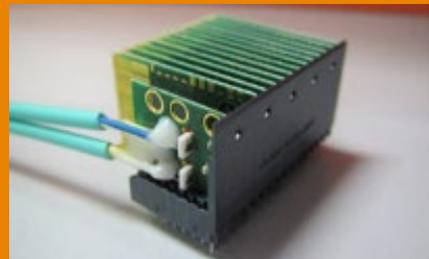
CBOT: A modular optical transceiver platform developed by TE

- Shipping since 2022 for commercial air and VPX applications
- 20Mbps to 10Gbps - IEEE 10G Base-SR compliant
- Wavelength of operation at 850 nm
- Low power dissipation, less than 130 mW per transceiver at 10.3125G
- Operating temperature range from -40°C to +85°C
- Supports wide range of fiber optic cables and termini and 1 to 12 channels
- Tested to applicable DO-160G, VITA 47, and MIL- 883 requirements

MULTIGIG RT FIBER OPTICS MID-BOARD TRANSCEIVER PLATFORM
850 nm MULTIMODE



MULTIGIG RT FO CBOT Modular Cost Effective Rugged 4G & 10G Multimode



MULTIGIG RT FO Platform – Parametric Based & Customized



Parametric Part Number YYXXZ-BCDEFGLLLT:



Z	Chiclet Design
F	Full height - Dual Pigtail
H	Half height - Single Pigtail

YY	ON RX	ON TX	HH	FH	FH ext'd
Prefix	Data Rate	Comparator	μController	Monitor PD	Possible for Chiclet Design
YB	10 G	Yes	No	No	x
YC	10 G	No	Yes	Yes	x
YG	10 G	No	No	No	x
YD	4 G	Yes	No	No	x
YF	4 G	No	Yes	Yes	x
YQ	4 G	No	No	No	x

XX	Fiber Type**
M1	50/125, OCC, OM3, 1.8mm cable, tight buffer
M2	Aerospace grade round ribbon cable, tubed/jacketed OM3
M3	50/125, LSZH, BI, OM3
M4	OM4 bend insensitive 1.8 mm
M5	Reserved
M6	900um OD, OM4 Tether fiber optic cable
M7	50/125, OFS, OM4, BI, 1.8mm cable, tight buffer
M8	Reserved (TBD)
M9	Mil multi-fiber bend insensitive round OM4
S1	Bend insensitive SM 1.8mm
S2	Multifiber bend insensitive Round SM
S3	Flight SM 1.8mm
S4	SM cable: 9/125μm . Buffer: 915um. Jacket: 1.8mm

** Fiber types M2, M9, & S2 are 12 or 24 fiber variants used with MT ferrules; i.e. T=M applications.

C,E,G	Chiclet Fiber Direction
R	Single Rx for Z=H, Dual Rx for Z= F.
T	Single Tx for Z=H, Dual Tx for Z= F.
X	Transceiver; only for Z=FF.

LLL	Pigtail Length
100-999	(mm)
000	1 M
A00	2 M
B00	3 M
C00	4 M
C00	5 M
E00	6 M

B	D	F
Highest Chiclet count	Next Highest Chiclet count	Lowest Chiclet count

T	Fiber Termini
M*	MT Single MT of proper fiber count, 12,24 as needed, PC for MM, APC for SM.
Q	EB16
A	ARINC 801
J	LC
K	MC5
N	29504
blank	None

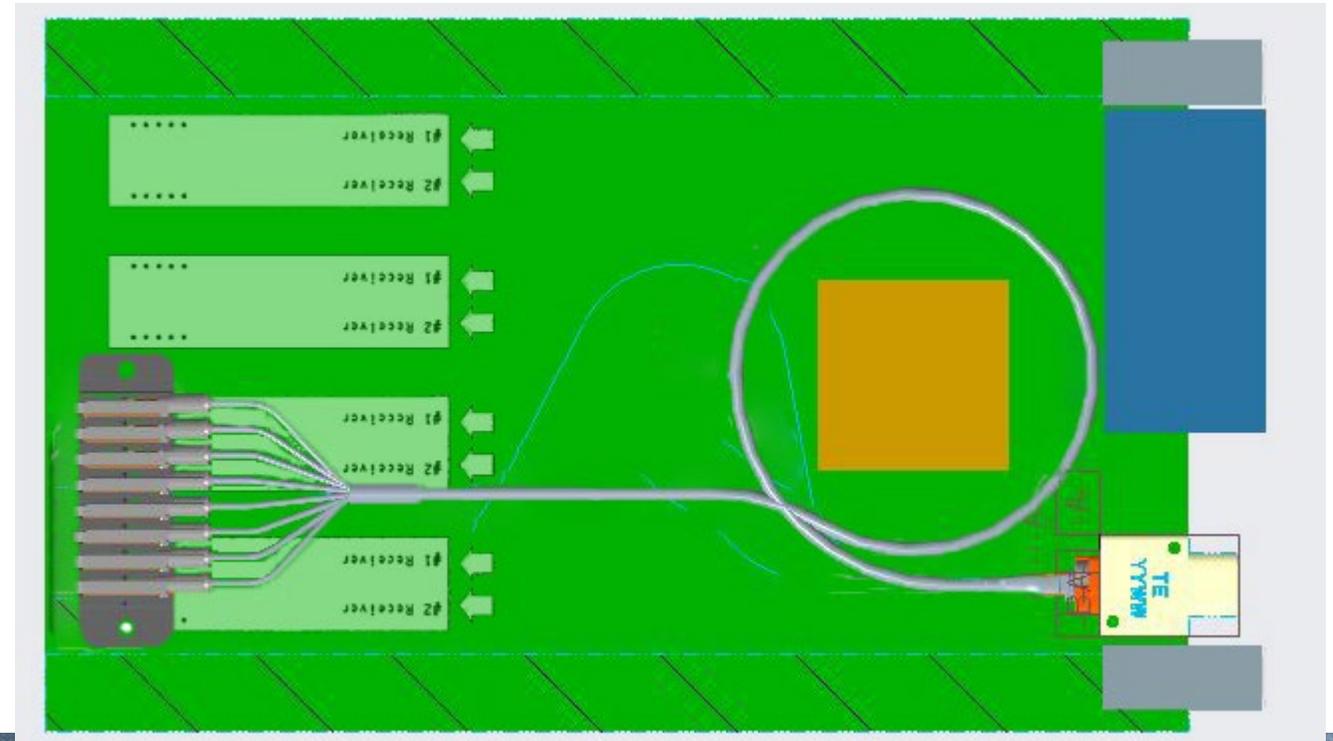
T*	MT Spring/Pins
S	Spring
P	Male Pins
B	Both
blank	None
M	MPO Pins
F	MPO Female

* Only used if Fiber Termini is M
10 N or 20 N spring per MT fiber count

System Example – CBOT Space Savings

3U VPX Upgrade:

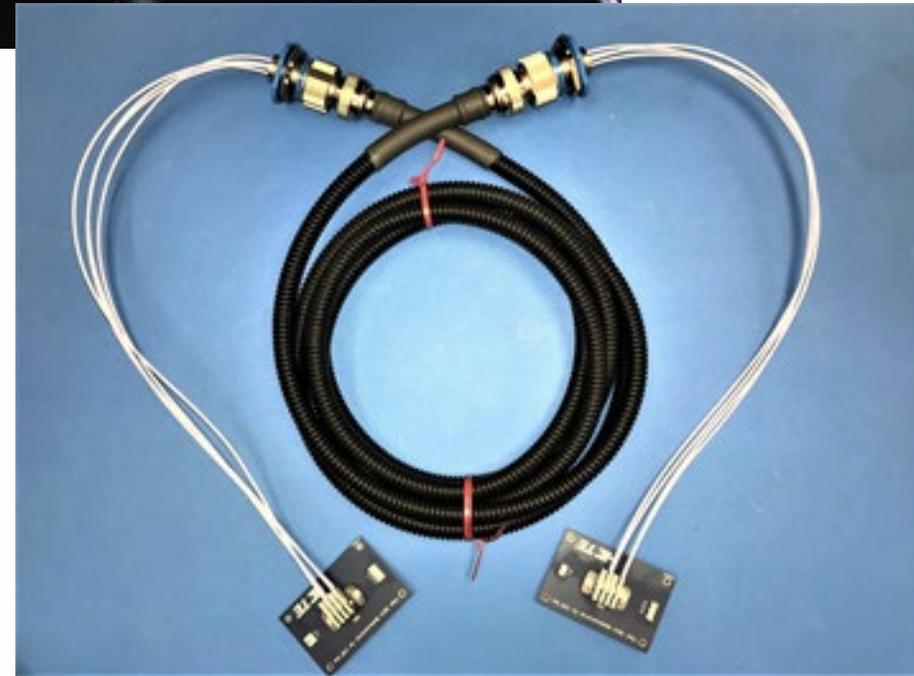
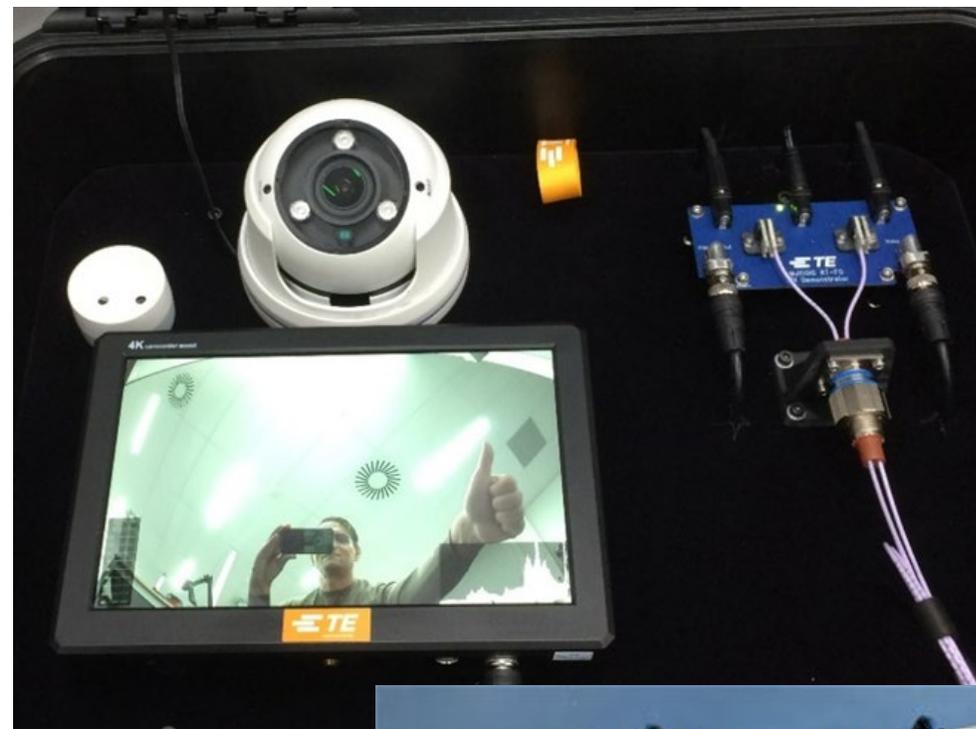
- Replace 4 COTS SM Dual Rx
- With 8 half height CBOT SM Rx blades
- ~70% PCB area savings & simpler fiber optic harness



CBOT Future Extensions

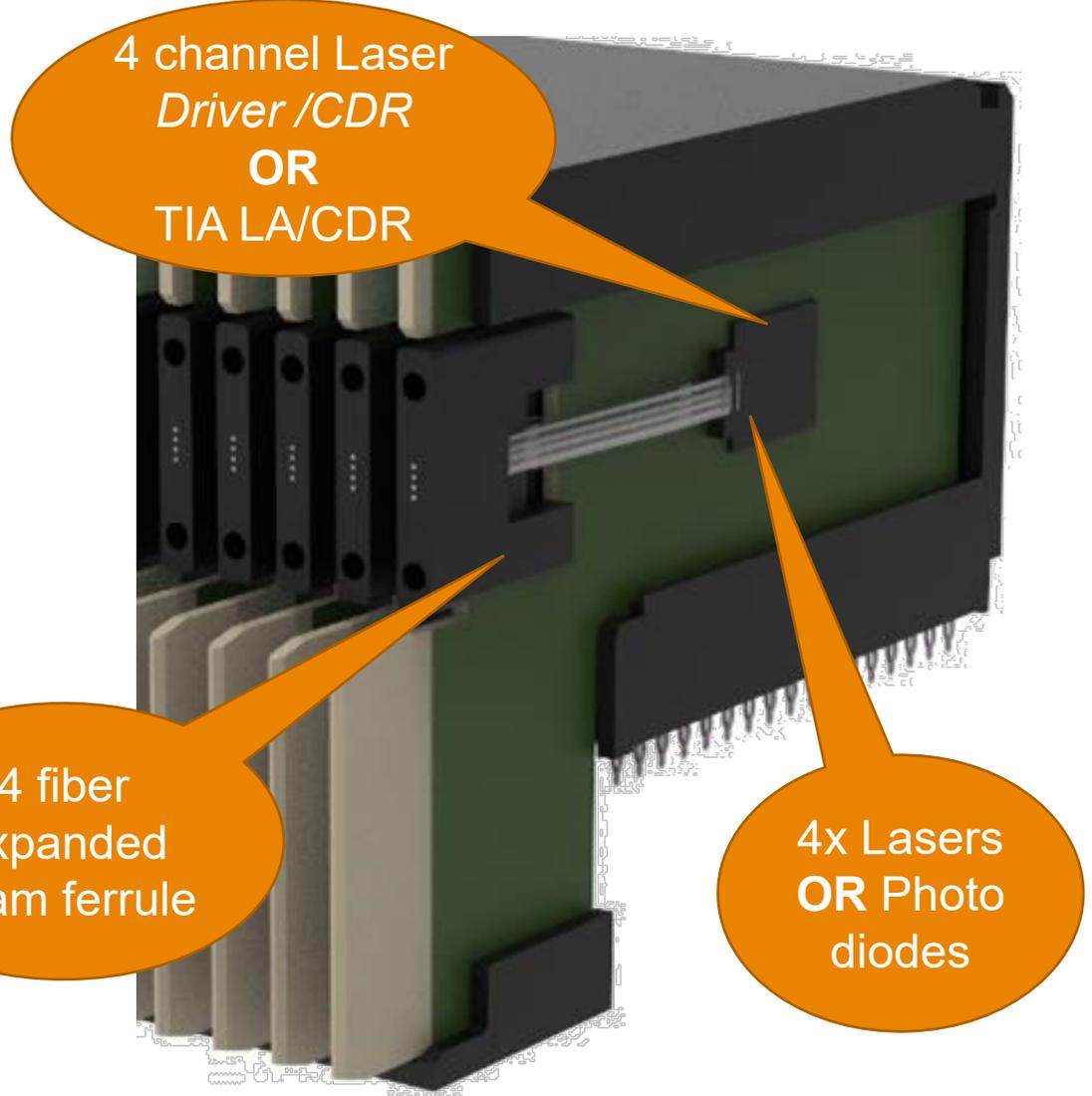
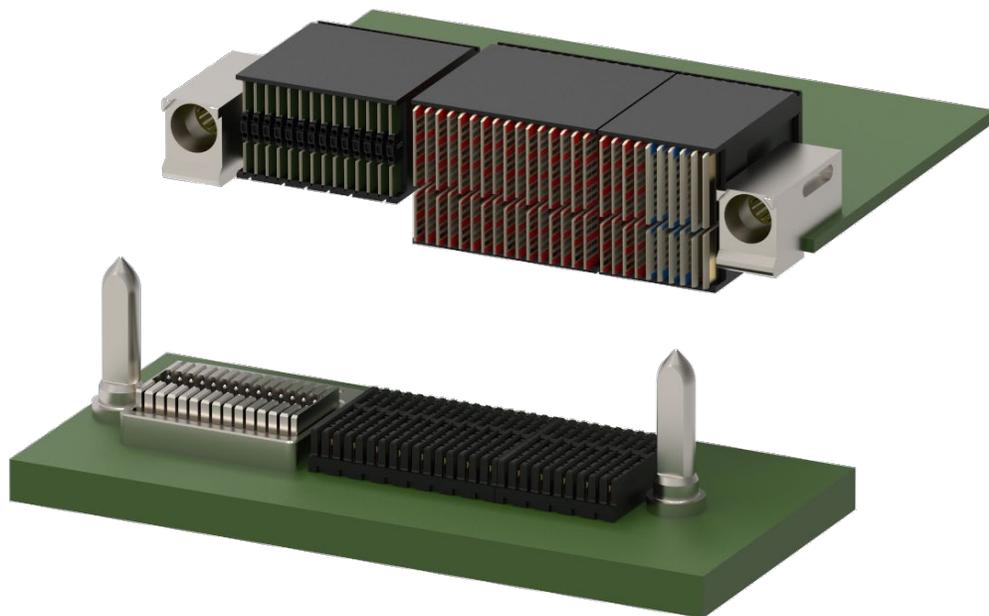
CBOT Platform Extensions:

- Single mode 1310 nm Tx & Avalanche Photodiode Rx
- Linear modulation, i.e. RF over Fiber
 - Mix and match RF / Digital, SM / MM in one housing
- Extending Data Rates up to 25 Gbps
- Incorporate Diagnostic Monitoring capability
- Media Conversion: Video, CANBus, ...



CBOT leveraging MULTIGIG HD Wafers

- Initial CBOT platform is based on MULTIGIG RT 2 wafer designs and press fit pin terminations
- 4 Tx or 4 Rx options 56G PAM4 would be supported by the 4 high speed data pairs on MULTIGIG HD like wafers
- Leverages TE's MULTIGIG HD high speed press fit PCB attachment being developed
- Separable expanded beam interface concept at the backplane in development
- Full position module is 14 ferrules (56 fibers)



4 channel Laser Driver /CDR
OR
TIA LA/CDR

4 fiber expanded beam ferrule

4x Lasers OR Photo diodes

MULTIGIG HD CBOT Implementation



Q&A

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THANK YOU

Mark Benton
Sr, Principal Development Engineer

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DEPENDS ON IT.
BECAUSE IT DOES.**

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