INTRODUCING THE FPGA FOR THE DATA-CENTRIC WORLD

Webinar

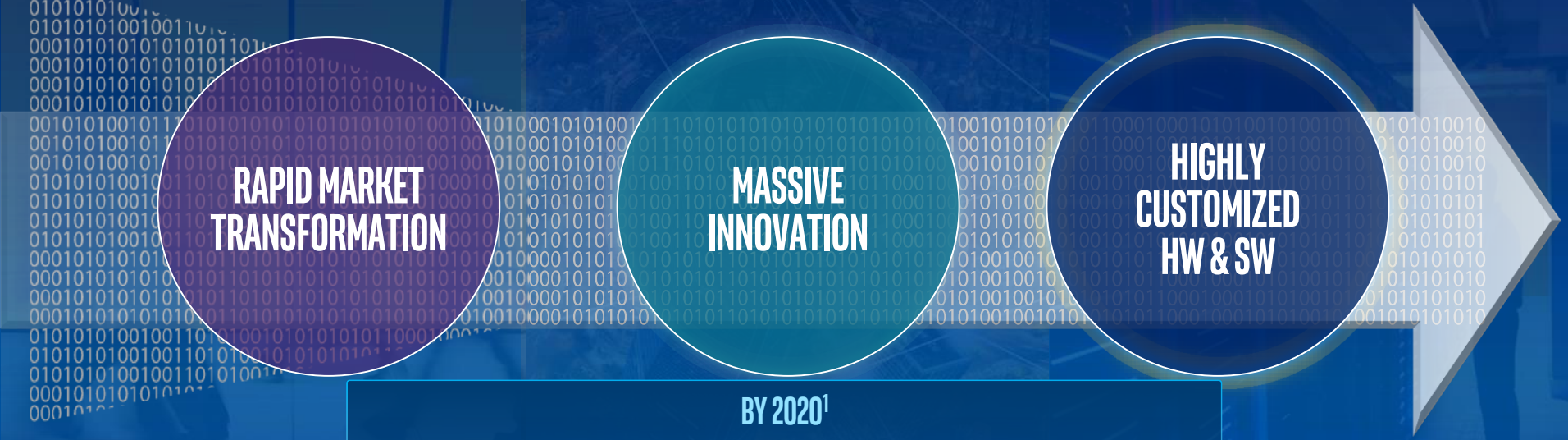
Today's Discussion

Markets are Transforming

A New Class of FPGA (with a New Name)

Solving Big Market Challenges

Massive Data Driving Market Change



BY 2020[1]

AVERAGE INTERNET USER	1.5GB DATA/DAY	CONNECTED AIRPLANE	40TB DATA/DAY
SMART HOSPITAL	3TB DATA/DAY	SMART FACTORY	1PB DATA/DAY
AUTONOMOUS AUTOMOBILE	4TB DATA/DAY		

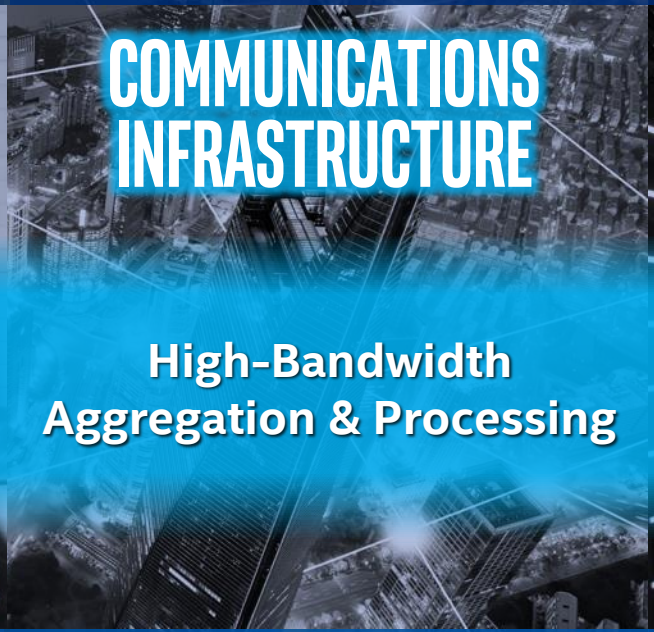
[1] Amalgamation of analyst data and Intel® analysis

Rapid Market Transformation Driving Innovation

New Demands Driving Customization Needs

EMBEDDED / EDGE

Real-Time Actionable Intelligence



COMMUNICATIONS INFRASTRUCTURE

High-Bandwidth Aggregation & Processing

CLOUD / ENTERPRISE

Managing, Organizing & Processing the Explosion of Data


intel
AGILEX™
inside™

Introducing Intel® Agilex™ FPGAs

Intel innovation for ultimate agility and flexibility

HIGH-PERFORMANCE COMPUTE

10nm Process

Memory-Coherent Intel® Xeon® Processor Acceleration

Massive Bandwidth

ANY-TO-ANY INTEGRATION

Memory, Analog, Logic

Any Node, Supplier, IP

Rapid Intel® eASIC™ Devices Optimization

ANY DEVELOPER

Intel® Quartus® Prime Design Tool for Hardware Developers

One API for Software Developers

The FPGA for the Data-Centric World

PROCESS DATA

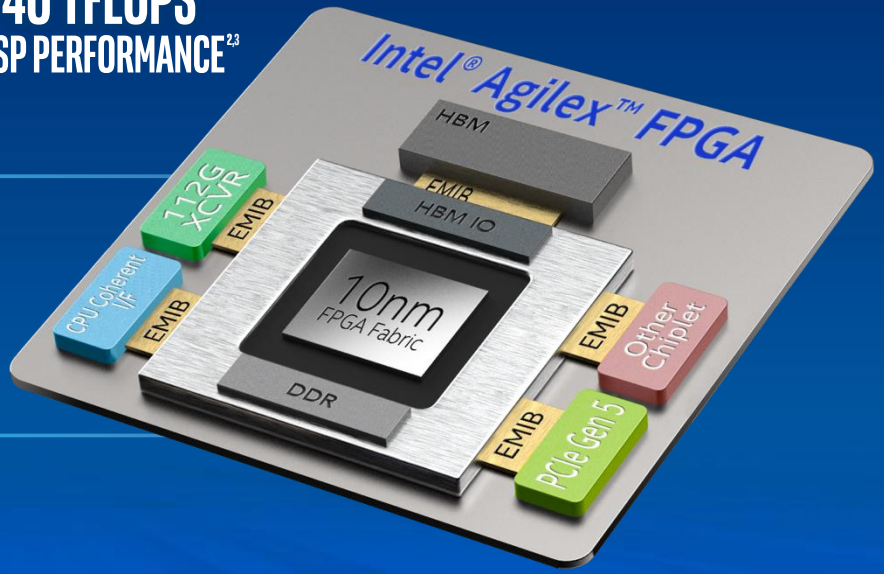
- 2ND GENERATION INTEL® HYPERFLEX™ ARCHITECTURE
- UP TO 40% HIGHER PERFORMANCE[1,3]
- UP TO 40% LOWER POWER[1,3]
- UP TO 40 TFLOPS DSP PERFORMANCE[2,3]

STORE DATA

- DDR5 & HBM
- INTEL® OPTANE™ DC PERSISTENT MEMORY SUPPORT

MOVE DATA

- INTEL® XEON® PROCESSOR COHERENT CONNECTIVITY & PCIe GEN5
- 112G TRANSCEIVER DATA RATES



[1] Compared to Intel® Stratix® 10 FPGAs
[2] With FP16 configuration
[3] Based on current estimates, see slide 23 for details

Any-to-Any Heterogenous 3D Integration

EMBEDDED MULTI-DIE INTERCONNECT BRIDGE

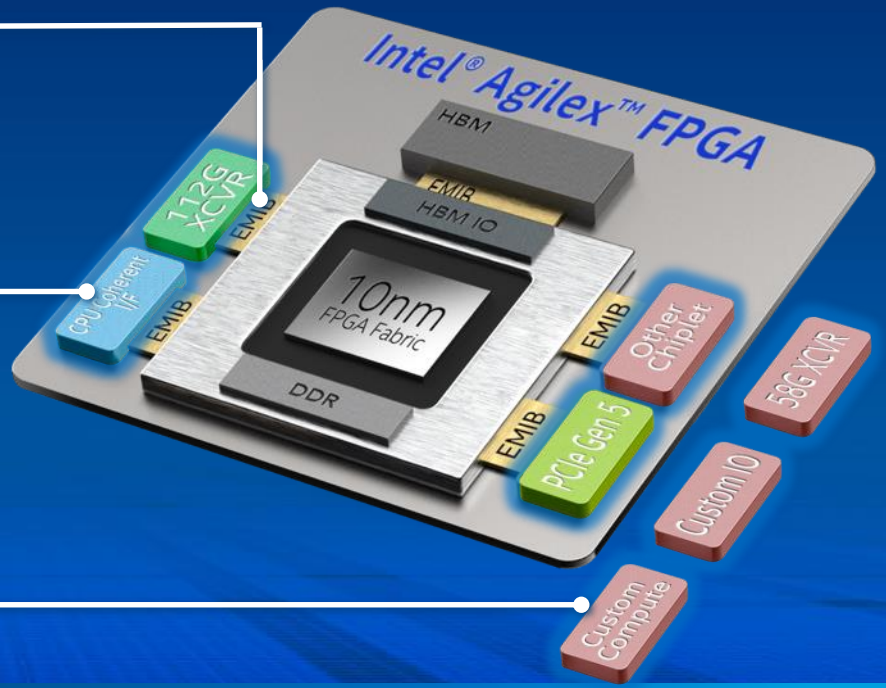
No-compromise die-to-die 3D packaging interconnect

CHIPLET-BASED ARCHITECTURE

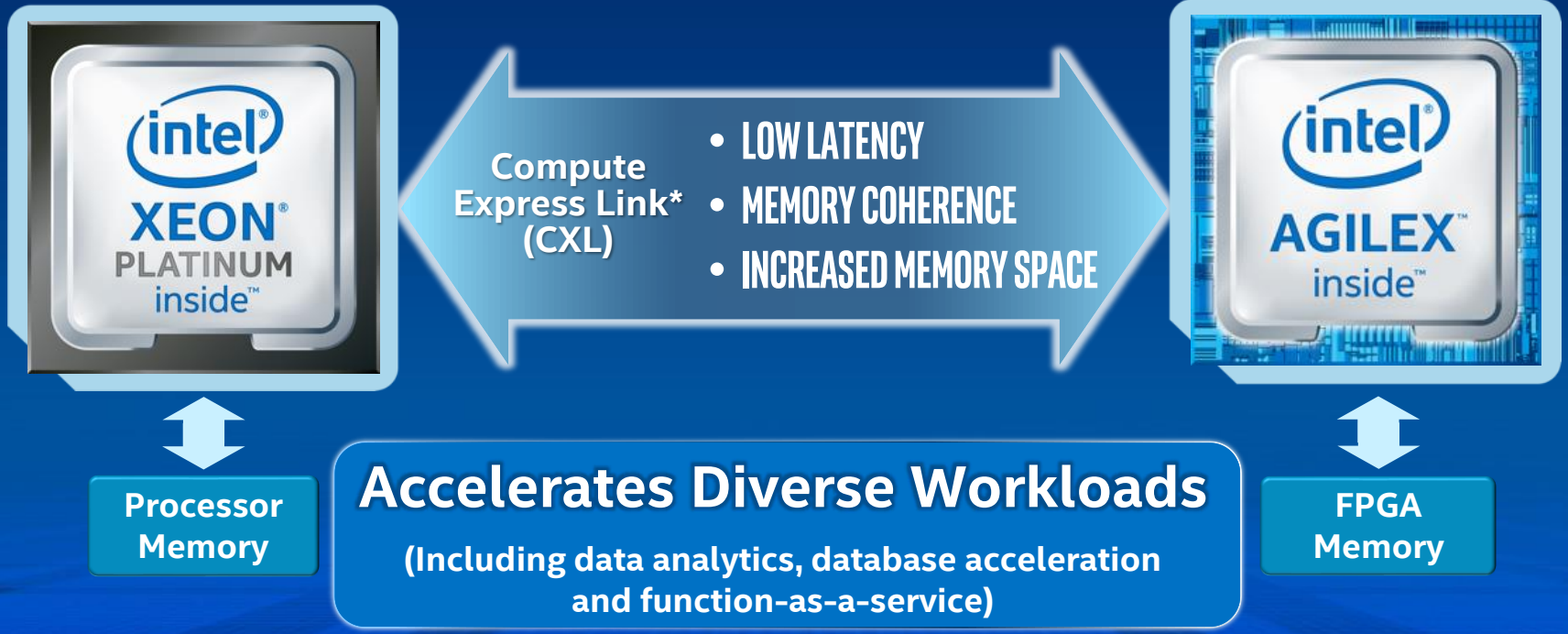
Library of chiplets: transceivers, custom I/O & custom compute tiles

INTEL® eASIC™ TILE CUSTOMIZATION

Ultimate customization with integrated Intel® eASIC™ tile



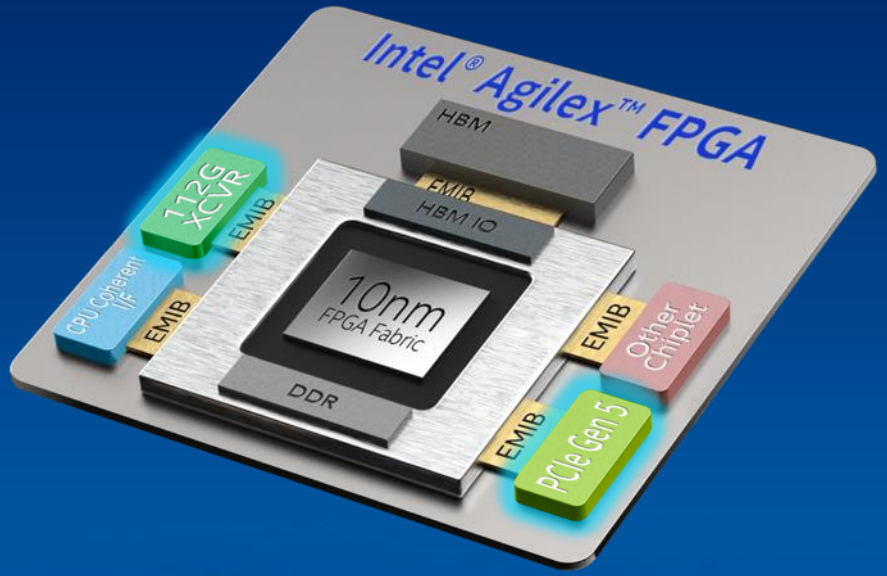
First Memory-Coherent Accelerator for Intel® Xeon® Scalable Processors



Transceiver Leadership

112G

PCIe* GEN5



High Bandwidth for Applications Including 400G Networks, Edge Analytics, Data Center Workloads

Well Suited for Artificial Intelligence Applications

UP TO
40 TFLOPS[3]
FP16 PERFORMANCE

UP TO
92 TOPS[4]
INT8 PERFORMANCE

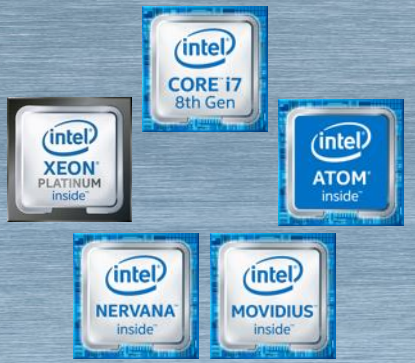
Configurable DSP

- FP32
- BFLOAT16
- FP16
- INT8 through INT2

AI+ Usage Model:
Flexibility for evolving workloads and multi-function integration (networking, ingest, security, etc.)

Only FPGA supporting hardened BFLOAT16 & FP16

Complementary to:



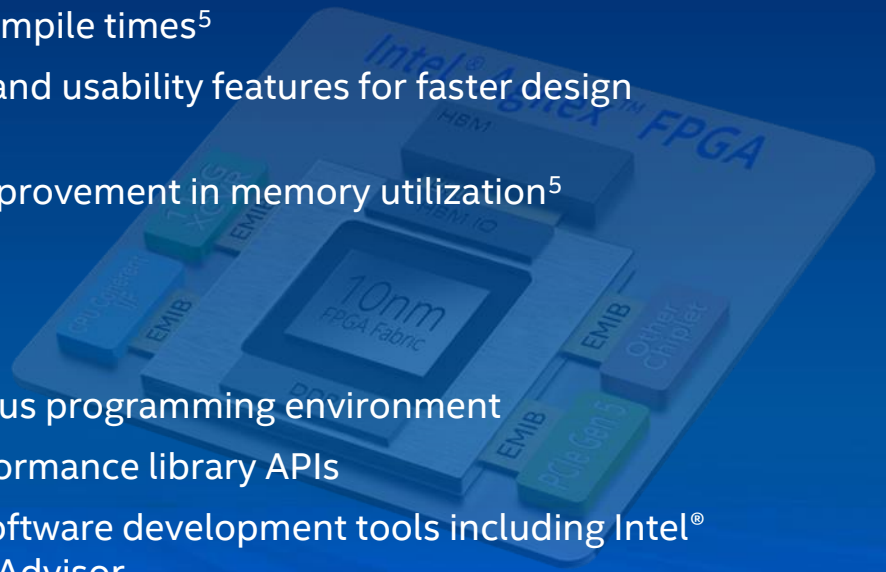
OpenVINO™ toolkit **One API**

[3,4] based on current estimates, see slide 23 for details

Intel® Agilex™ FPGA Tools for Developers

Hardware Developers

- Higher productivity:
  - 30% improvement in compile times[5]
  - New productivity flows and usability features for faster design convergence
- Higher efficiency: 15% improvement in memory utilization[5]



ONE API

Software Developers

- Single source, heterogenous programming environment
- Support for common performance library APIs
- FPGA support with Intel software development tools including Intel® VTune™ Amplifier & Intel® Advisor

[5]See slide 23 for details

Intel® Agilex™ FPGA Family

F-SERIES

For wide range of applications

- Up to 58G transceivers
- PCIe* Gen4
- DDR4
- Quad-Core ARM* Cortex*-A53 SoC Option

I-SERIES

For high-performance processor interface and bandwidth-intensive applications

- Up to 112G transceivers
- PCIe* Gen5
- DDR4
- Quad-Core ARM* Cortex*-A53
- Coherent attach to Intel® Xeon® Scalable Processor option (CXL)

M-SERIES

For compute-intensive applications

- Up to 112G transceivers
- PCIe* Gen5
- DDR4, DDR5 and Intel® Optane™ DC Persistent Memory support
- Quad-Core ARM* Cortex*-A53
- Coherent attach to Intel® Xeon® Scalable Processor option (CXL)
- HBM Option

Intel® Quartus® Prime Design Software Support April 2019; First Device Availability Q3 2019

Massive Market Demand

2023 SILICON TAM* >$20B

Edge Inference
Industrial
Military/AERO

EMBEDDED / EDGE

5G
NFV
Optical Networks

COMMUNICATIONS INFRASTRUCTURE

Financial
Database
AI
Genomics

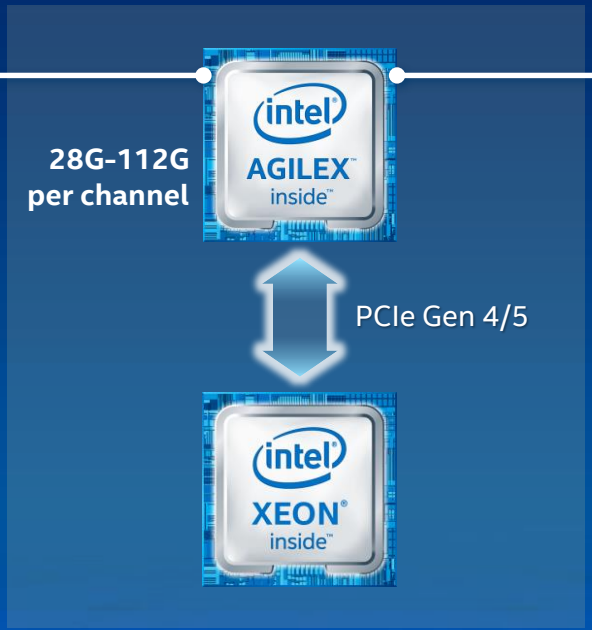
CLOUD / ENTERPRISE

Efficient Network Transformation

DATAPATH ACCELERATION

VNF PERFORMANCE OPTIMIZATION
Load Balancing | Data Integrity
Network Translation

SIGNIFICANT IMPROVEMENTS [1]
Throughput | Jitter | Latency



INFRASTRUCTURE OFFLOAD

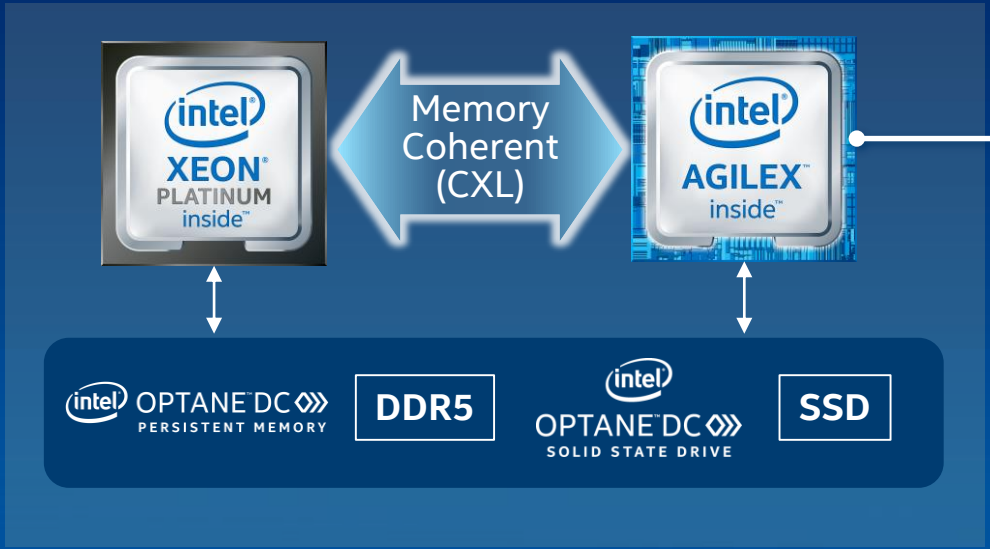
OPTIMIZED ARCHITECTURE
vSwitch | vRouter | Security

SMALL FORM FACTOR & LOW POWER
Wide Range of Servers

First FPGA Providing Flexibility and Agility From 100Gbps to 1Tbps

[1] Compared to Intel® Stratix® 10 FPGAs

Converged Workload Acceleration for the Datacenter



INFRASTRUCTURE ACCELERATION
Network | Security | Remote Memory Access

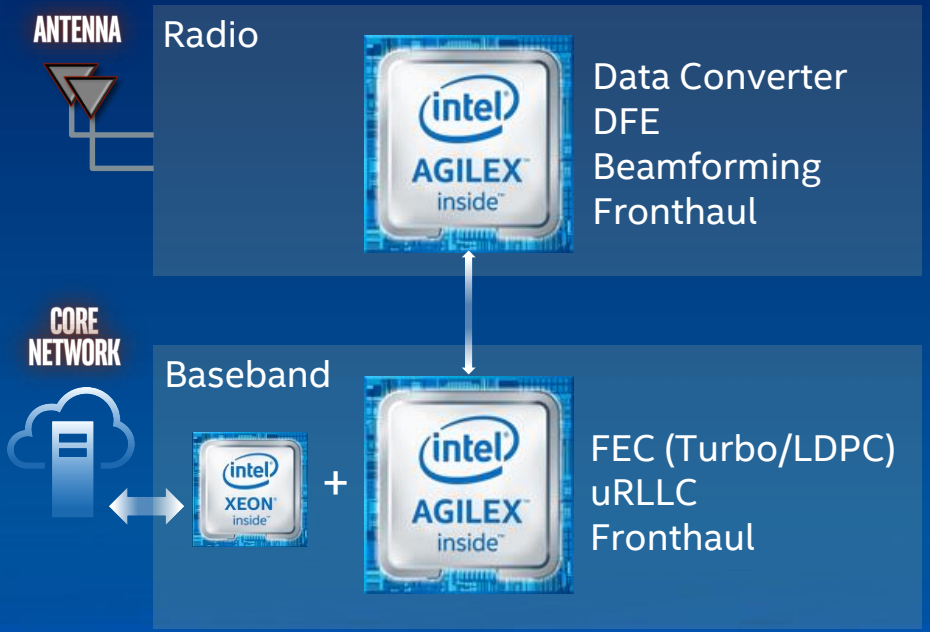
APPLICATION ACCELERATION
AI | Search | Video Transcode | Database
40 TFLOPs of DSP Performance[1]

STORAGE ACCELERATION
Compression | Decompression | Encryption
Memory Hierarchy Management

First FPGA with Comprehensive Memory Support and Coherent Attach to Intel® Xeon® Scalable Processors

[1] with FP16 configuration, based on current estimates, see slide 23 for details

Agility & Flexibility for All Stages of 5G Implementation



CUSTOM LOGIC CONTINUUM

FPGA FLEXIBILITY
High Flexibility | Short Time-to-Market

RAPID INTEL® eASIC™ DEVICE OPTIMIZATION
Power & Cost Optimization

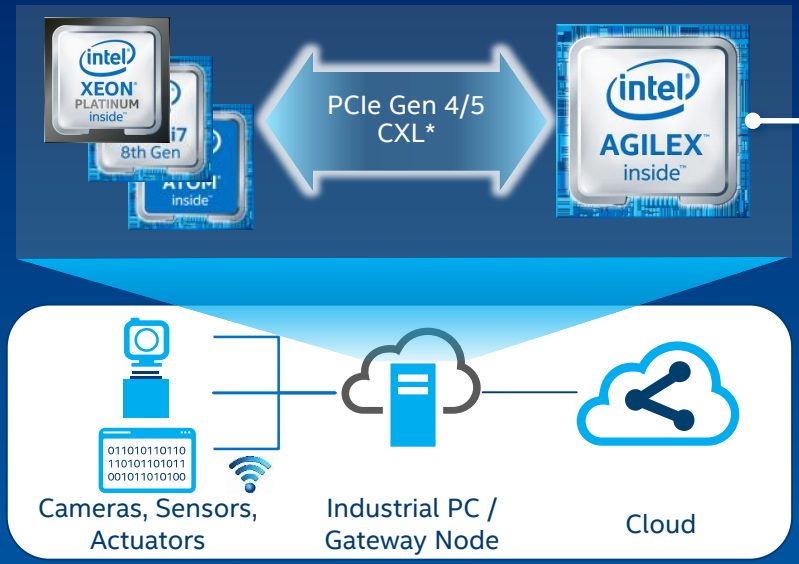
FULL CUSTOM ASIC OPTIMIZATION
Best Power[1] | Best Performance[1] | Best Cost[1]

APPLICATION-SPECIFIC TILE OPTIONS
Data Converter | Vector Engine | Custom Compute

Only Intel® Provides All of These Customization Options

[1] Compared to the other customization options shown

Smart, Safe, Secure Factory Acceleration



ACCELERATION AND ANALYTICS
In-Line Protocol Acceleration
Look-Aside Application Acceleration

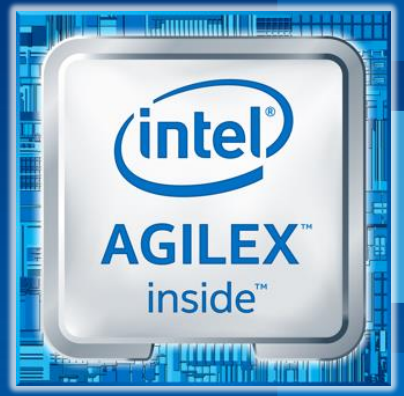
SAFETY AND SECURITY
Secure Boot | Encryption | Authentication

CUSTOMIZED CONNECTIVITY
Time Sensitive Networks | Flexible IO

First FPGA Enabling Real-Time Analytics with Optimized Interfaces to Intel® Processors

*Compute Express Link

Intel® Agilex™ FPGAs for the Data-Centric World



Intel® Agilex™ FPGAs for transformative applications in edge computing, embedded, networking (5G/NFV) and data centers

Any-to-Any integration enables Intel® FPGAs with application-specific optimization and customization, delivering new levels of flexibility & agility

First FPGAs leveraging Intel's unmatched innovation:
10nm process, 3D integration, Intel® Xeon® Scalable Processor memory coherency (CXL), 112G XCVRs, PCIe* Gen 5, Intel® eASIC™ devices, One API, Intel® Optane™ DC Persistent Memory support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