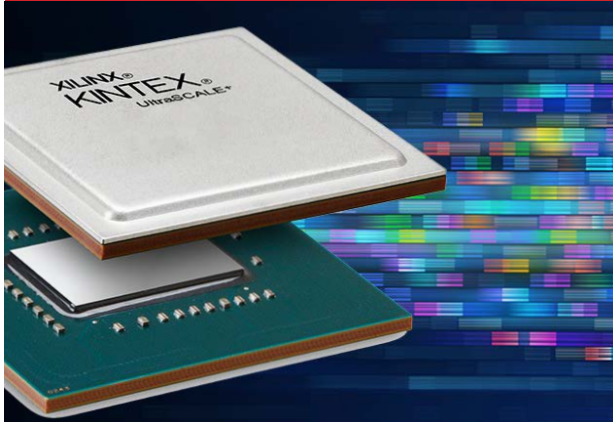


## Kintex UltraScale+ FPGAs



### Programmable System Integration

- Up to 1.1M system logic cells
- UltraRAM for on-chip memory integration
- Integrated blocks for PCI Express® Gen 3x16 and Gen 4x8

### Increased System Performance

- 6.3 TeraMACs of DSP compute performance
- Over 2X vs. Kintex-7 FPGAs
- 16G and 28G backplane-capable transceivers, capable of operating at 32.75Gb/s short-reach applications
- 2,666Mb/s DDR4 in the mid-speed grade

### BOM Cost Reduction

- 12.5Gb/s transceivers in slowest speed grade
- VCXO and fractional PLL integration reduces clocking component cost

### Total Power Reduction

- Up to 50% lower power vs. 7 series FPGAs
- Voltage scaling options for performance and power
- Tighter logic cell packing reduces dynamic power

## Best Price/Performance/Watt for the Mid-Range

Kintex® UltraScale+™ devices deliver the industry's most cost-effective solution for system performance-per-watt with ASIC-class serial connectivity. These devices expand the mid-range by delivering the highest throughput with lowest latency for medium-to-high volume applications that include wireless MIMO, NX100G networking, and DSP-intensive applications. Based on the ASIC-class advantage of the UltraScale™ architecture, Kintex UltraScale+ devices are co-optimized with the Vivado® Design Suite and leverage the UltraFAST™ design methodology to accelerate time to market.

## Re-architecting the core for massive bandwidth with the UltraScale architecture

The UltraScale+ families are based on the first all programmable architecture to span multiple nodes from planar through FinFET technologies, and from monolithic through 3D ICs. Xilinx UltraScale architecture provides diverse benefits and advantages to an array of markets and applications. The architecture combines enhancements in the configurable logic blocks (CLB), a dramatic increase in device routing, and a revolutionary ASIC-like clocking architecture, with high-performance DSP, memory interface PHYs, and serial transceivers. All UltraScale architecture-based FPGAs are capable of pushing the system performance-per-watt envelope enabling breakthrough speeds with high utilization. High system performance and multiple power reduction innovations make the UltraScale architecture the logical choice for many next-generation applications.

## Building on the success of Xilinx's UltraScale Portfolio

The UltraScale+ family of FPGAs, 3D ICs and MPSoCs, combines new memory, 3D-on-3D and MPSoC technologies, delivering a generation ahead of value. To enable an even higher level of performance and integration, the UltraScale+ family also includes a new IP interconnect optimization technology, SmartConnect. Built upon Xilinx's UltraScale Architecture, they leverage a significant boost in performance-per-watt using 16FF+ FinFET 3D transistors from the #1 service foundry in the world, TSMC. Xilinx provides for the lowest risk, and the highest value programmable technology. Xilinx provides scalability and package migration for the lowest risk and the highest value programmable technology.

## FEATURES OVERVIEW

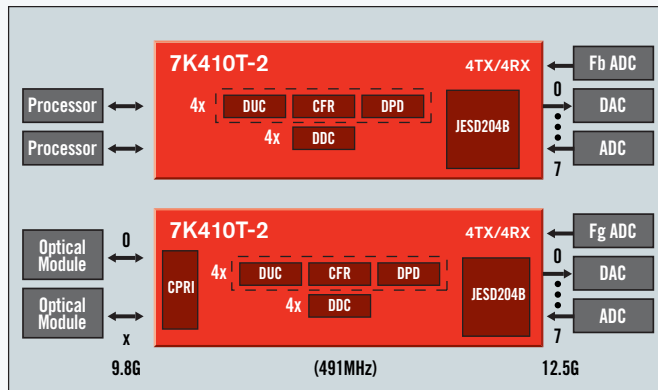
<p><b>16nm low power FinFET+ process technology from TSMC</b> Industry leading process from the #1 service foundry delivers a step function increase in performance-per-watt</p>	<ul style="list-style-type: none"> <li>Over 2X performance-per-watt over Kintex-7 FPGAs</li> <li>The same scalable architecture and tools from Kintex UltraScale FPGAs</li> </ul>
<p><b>UltraRAM™ for deep memory buffering</b> Up to 36Mb for SRAM device integration</p>	<ul style="list-style-type: none"> <li>For deep packet and video buffering</li> <li>8X capacity-per-block vs. traditional embedded memory</li> <li>Deep-sleep power modes</li> </ul>
<p><b>SmartConnect technology</b> System-wide interconnect optimization tools and IP</p>	<ul style="list-style-type: none"> <li>Matches optimal AXI interconnect to the design</li> <li>Automatic interface bridging</li> <li>Additional 20-30% advantage in performance-per-watt</li> </ul>
<p><b>Massive I/O bandwidth and dramatic latency reduction</b> 50% greater serial bandwidth than Kintex UltraScale devices, and 4X greater than Kintex-7 devices</p>	<ul style="list-style-type: none"> <li>16G and 28G backplane support</li> <li>32.75G chip-to-chip and chip-to-optics support</li> <li>High-Density I/O for greater area and power efficiency per pin</li> </ul>
<p><b>Next-generation routing, ASIC-like clocking, and enhanced fabric</b> Enabling breakthrough speeds with high utilization</p>	<ul style="list-style-type: none"> <li>Smaller area and greater power consistency</li> <li>Up to two speed-grade advantage vs. comparable solutions</li> <li>Efficient CLB use and placement for reduced interconnect delay</li> </ul>
<p><b>Massive memory interface bandwidth</b> Next generation DDR and serial memory support</p>	<ul style="list-style-type: none"> <li>DDR4 support of up to 2,666Mb/s</li> <li>Support for server-class DIMMs (8X capacity vs. Kintex-7)</li> <li>Hybrid Memory Cube serial memory support of up to 30G</li> </ul>
<p><b>PCI Express® integrated blocks</b> Complete end-to-end solution for multi-100G ports</p>	<ul style="list-style-type: none"> <li>Gen3 x16 and Gen4 x8 for 100G bandwidth per block</li> <li>Expanded virtualization for data center applications</li> <li>Enhanced tag management for increased buffer space</li> </ul>
<p><b>Integrated 100G Ethernet MAC and 150G Interlaken Cores</b> ASIC-class cores for breakthrough performance in packet processing</p>	<ul style="list-style-type: none"> <li>60K-100K system logic cell savings per port</li> <li>Up to 90% dynamic power savings vs. soft implementation</li> <li>Built-in RS-FEC (Ethernet MAC) for optics error correction</li> </ul>
<p><b>Enhanced DSP slices for diverse applications</b> Enabling a massive jump in fixed- and floating-point performance</p>	<ul style="list-style-type: none"> <li>Up to 6.3 TeraMACs of bandwidth at 891 MHz operation</li> <li>Double-precision floating point using 30% fewer resources</li> <li>Complex fixed-point arithmetic in half the resources</li> </ul>
<p><b>High-speed memory cascading</b> Removes key bottlenecks in DSP and packet processing</p>	<ul style="list-style-type: none"> <li>Eliminates fabric usage when building deep memories</li> <li>Reduces routing congestion</li> <li>Lowers dynamic power consumption</li> </ul>
<p><b>Up to 50% power savings over Kintex-7 devices, and 30% power saving over Kintex UltraScale devices</b> Static- and dynamic-power optimizations at every level</p>	<ul style="list-style-type: none"> <li>Optimal voltage tuning</li> <li>Power-optimized transceivers and block RAM</li> <li>More granular clock gating of logic fabric and block RAM</li> </ul>
<p><b>Next-generation security</b> Enhanced features to protect IP and prevent tampering</p>	<ul style="list-style-type: none"> <li>AES-GCM decryption, RSA-2048 authentication</li> <li>DPA Countermeasures and permanent tamper penalty</li> <li>Improved SEU performance</li> </ul>

## Enabling Next-Generation Systems

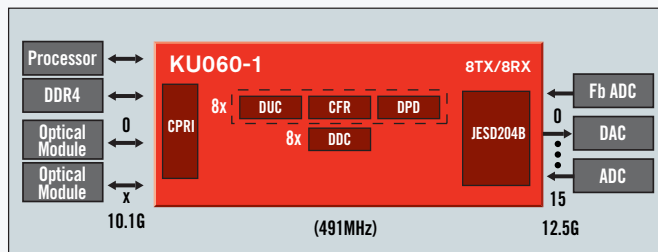
### Point-to-point 1024-QAM Microwave Modem

Key UltraScale+ Portfolio Benefits:

#### Existing Infrastructure



#### Kintex UltraScale+ Solution



- Reduced power with 491 MHz timing closure, typically pushbutton
- Increased resources for end-product differentiation and single chip solution
- Higher performance to integrate modem and packet processing in a smaller form factor

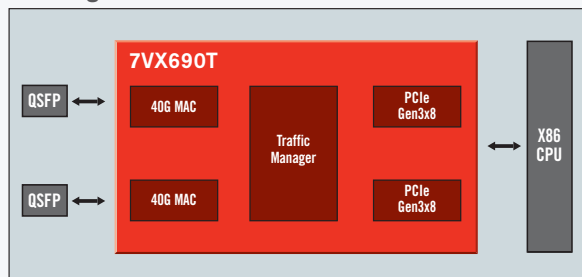
#### Solution Benefits

System Integration <b>2 Device ⇒ 1 Device</b>
System Performance <b>+25%</b>
BOM Cost <b>-40%</b>
Total Power <b>-31%</b>
Accerated Productivity <b>Vivado HLS Radio &amp; Connectivity IP</b>

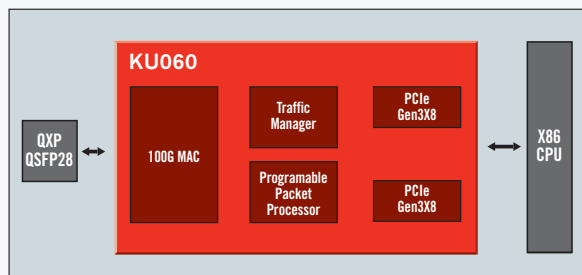
### 1 GHz eBand Modem

Key UltraScale+ Portfolio Benefits

#### Existing Infrastructure



#### Kintex UltraScale+ Solution



- Reduced power with 491 MHz timing closure, typically pushbutton
- Increased DSP resources to maximize digital integration and scalability
- Higher performance to integrate modem LDPC in a single smaller form factor

#### Solution Benefits

System Integration <b>1 Device ⇒ 1 Device</b>
System Performance <b>+20%</b>
BOM Cost <b>-71%</b>
Total Power <b>-30%</b>
Accerated Productivity <b>Integrated 100G Ethernet MAC Integrated PCIe Gen3</b>

### **Corporate Headquarters**

Xilinx, Inc.  
2100 Logic Drive  
San Jose, CA 95124  
USA  
Tel: 408-559-7778  
[www.xilinx.com](http://www.xilinx.com)

### **Europe**

Xilinx Europe  
Bianconi Avenue  
Citywest Business Campus  
Saggart, County Dublin  
Ireland  
Tel: +353-1-464-0311  
[www.xilinx.com](http://www.xilinx.com)

### **Japan**

Xilinx K.K.  
Art Village Osaki Central Tower 4F  
1-2-2 Osaki, Shinagawa-ku  
Tokyo 141-0032 Japan  
Tel: +81-3-6744-7777  
[japan.xilinx.com](http://japan.xilinx.com)

### **Asia Pacific Pte. Ltd.**

Xilinx, Asia Pacific  
5 Changi Business Park  
Singapore 486040  
Tel: +65-6407-3000  
[www.xilinx.com](http://www.xilinx.com)

### **India**

Meenakshi Tech Park  
Block A, B, C, 8th & 13th floors,  
Meenakshi Tech Park, Survey No. 39  
Gachibowli(V), Seri Lingampally (M),  
Hyderabad -500 084  
Tel: +91-40-6721-4747  
[www.xilinx.com](http://www.xilinx.com)



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