Multicore Processors Drive the Software-Defined Network: A Heavy Reading Competitive Analysis

EXECUTIVE SUMMARY

Multicore processors are the key to meeting carriers' and other customers' demanding requirements for flexible systems and multicore processors are now the heart of almost every type of networking device. This allows network system developers to define much of the network functionality in software and make systems more flexible to support industry developments such as OpenFlow and software-defined networking. Multicore processors are highly integrated system-on-chip devices with up to 100 cores and hardware acceleration for security and low-level packet processing. Multicore processors can be programmed in C or other high-level languages and are directly supported by multicore operating systems and applications software from companies such as 6WIND, Enea, and Wind River.

The market for multicore processors in networking continues to grow. Many companies are using common blades with multicore processors for a wide range of functions. This reduces development costs and allows telecom equipment manufacturers to use standardized platforms such as ATCA. Most multicore processor vendors now have a range of devices with different numbers of cores and hardware acceleration engines. This allows system developers to meet a range of different performance and functional demands using multicore processors that are software compatible across all their systems.

The first integrated multicore processors, using 130nm and 90nm technology, were introduced in 2004. The development of 40nm, 32nm and 28nm silicon technology has allowed the integration of significantly more memory, high-performance cores, and enhanced network interfaces. Most multicore processor vendors have announced new solutions in the last year. The latest multicore processors integrate up to 20MB of cache memory, up to 500 hardware accelerators, and significantly more than 100Gbit/s networking I/O bandwidth.

Multicore Processors Drive the Software-Defined Network: A Heavy Reading Competitive Analysis surveys vendors developing high-performance multicore processors. As such, it not only provides granular information on the components themselves – of interest to chip manufacturers and purchasers – but also provides insights into how the overall market for multicore processors is likely to develop – of interest to a wide audience, including carriers and investors.

This report is based on interviews conducted with 16 multicore processor, IP core and software vendors, and product documentation supplied by these vendors. Most interviews were conducted during the second quarter of 2012. These in-depth interviews offer insight into how the market for multicore processors is likely to develop in the future. For a full list of companies analyzed in this report, click here.

This report analyzes the multicore processor market by parsing devices into three groups:

- **General-purpose multicore processors**: Multicore processors based on general-purpose CPUs that can be used in high-performance networking systems
• **Integrated multicore processors**: Multicore processors with integrated packet processing instructions, hardware acceleration engines, and networking-specific interfaces

• **10/100-Gbit/s network processors**: Network processors with a mix of high-performance packet engines and hardware acceleration engines

The report contains detailed information on more than 80 devices or groups of devices. The tables presented in the report were compiled using data provided during these interviews and from product documentation. Once the tables were compiled, the relevant data was provided to all the vendors for confirmation, feedback, and updating.

**Excerpt 1: Leading Integrated Multicore Processors in Production**

<table>
<thead>
<tr>
<th>COMPANY/DEVICE</th>
<th>CPU TYPE</th>
<th>32/64 BIT</th>
<th>MAX CPU SPEED</th>
<th>CPU #</th>
<th>TECHNOLOGY</th>
<th>POWER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broadcom XLP 8/4xx Family</td>
<td>MIPS 64 r2</td>
<td>64</td>
<td>1.6 GHz</td>
<td>Up to 8</td>
<td>40nm</td>
<td>N/D</td>
</tr>
<tr>
<td>Cavium Octeon II CN68xx</td>
<td>MIPS 64 r2</td>
<td>64</td>
<td>1.5 GHz</td>
<td>16, 24, or 32</td>
<td>65nm</td>
<td>N/D</td>
</tr>
<tr>
<td>Freescale QorIQ MPCP4080</td>
<td>Power Arch. e500mc</td>
<td>64</td>
<td>1.5 GHz</td>
<td>8</td>
<td>45nm</td>
<td>30W max</td>
</tr>
<tr>
<td>LSI Axxia ACP3448</td>
<td>Power Arch. 476</td>
<td>32</td>
<td>1.8 GHz</td>
<td>4</td>
<td>45nm</td>
<td>28W typ</td>
</tr>
<tr>
<td>Marvell Armada XP MV78460</td>
<td>ARM v7</td>
<td>32</td>
<td>1.6 GHz</td>
<td>4</td>
<td>40nm</td>
<td>N/D</td>
</tr>
<tr>
<td>Tilera TILE-Gx36</td>
<td>VLIW</td>
<td>64</td>
<td>1.4 GHz</td>
<td>36</td>
<td>40nm</td>
<td>20-30W</td>
</tr>
</tbody>
</table>

*Source: Heavy Reading*

The excerpt below shows the latest multicore processor family developed by NetLogic, recently acquired by Broadcom. The 40nm XLP processor builds on the 90nm XLR architecture developed by RMI. The NetLogic multicore architecture is built around a shared memory switch that connects the eight MIPS64 cores and distributed interconnects to the 8MB Layer 3 cache, memory controllers and networking I/O.

**Excerpt 2: Broadcom XLP Multicore Processor**

*Source: Broadcom*
Report Scope & Structure

Multicore Processors for Network Systems: A Heavy Reading Competitive Analysis is structured as follows:

Section I includes a full executive summary and report key findings.

Section II presents an overview of multicore processor applications and architectures, including generic block diagrams.

Section III focuses on general-purpose multicore processors, including detailed vendor profiles and a competitive analysis of products now in production and announced products not yet available in production quantities. Full details for these products are presented in Appendix A.

Section IV covers integrated multicore processors, with detailed vendor profiles and full feature comparisons for current and forthcoming offerings. Full details for these products are presented in Appendix B.

Section V includes detailed vendor profiles and full feature comparisons for both current and announced 10- to 100Gbit/s network processors. Full details for these products are presented in Appendix C.

Multicore Processors for Network Systems: A Heavy Reading Competitive Analysis is published in PDF format.