Helios Regular Expression Processor

HIGH-PERFORMANCE CONTENT PROCESSING

The Helios Regular Expression Processor is a unique, fully scalable, hardware accelerated solution for content awareness and security processing. Helios is a Soft Intellectual Property (IP) optimized for Xilinx programmable products, and targeted for a wide range of applications supporting line rates from 10Gb/s to 100Gb/s and beyond. It provides at-speed, in-depth, rich syntax, packet and data inspection. Target applications include AppID, Snort PCRE, Suricata, ClamAV, Malware/APT detection, and URL filtering. The accompanying Helios SDK provides a notation-independent RegEx compiler, API, and reference design to simplify the integration of the enhanced RegEx capability.

Key Benefits

- Leadership performance due to specialized RegEx processors
- RegEx throughput rates to 80 Gbps
- High throughput performance per watt
- Deep rule tables
- Processor offload
- SNORT® PCRE and Suricata RegEx hardware acceleration
- Extensive set of tools, API and drivers for low friction design and integration
- Versatile deployment across multiple products using unified API

Applications

- Next Generation Firewalls (NGFW)
- Deep Packet and Flow Inspection (DPI)
- Intrusion Prevention Systems (IPS)
- DDoS Mitigation
- Network Monitoring
- Data Loss Prevention (DLP)
- Smart NICs
- Grammar based content processing spam, URL, adware filtering
- Advanced auditing and policing of user/application security policies
- Financial data mining - parsing of streamed financial feeds
- Big data forensics
Key Features

- High throughput enabled by multi-character datapaths
- Scalable RegEx throughput/instantiation 10G, 20G, 40G, 80G
- Cross Packet Inspection support
- Incremental rule compile
- Run-time rule update
- Easy to use Native FIFO interface
- POSIX/PCRE compatible regular expressions
- Comprehensive SDK - sample applications, RegEx compiler, utilities and control functions
- High-level API with HW abstraction

Helios processes multiple characters and multiple regular expressions in parallel. The product can be tuned for the combination of throughput, rule depth and rule complexity desired. Depending on requirements, Helios can use only on-chip memory or a combo of on-chip and off-chip memory such as DDR3 or DDR4.

SDK, API, Compiler

SDK: Helios is provided with a Software Development Kit including Reference Applications, utilities, tutorials, and source code examples for the development of user applications. Communication between the host and Helios is managed by function calls using the Application Program Interface (API).

Helios Compiler: Compiles text-based content search rules, captured as a list of regular expressions based on PCRE, POSIX or proprietary notations. It is an offline tool and can reside as part of the security control and management toolset on a remote server or PC. The Helios compiler is platform independent and can be easily embedded into customer applications.

Capability & Resources

The Helios Soft IP can be configured for capabilities per instantiation in RegEx processing ranging from 10G to 20G, 40G, and beyond. Helios is optimized for Xilinx Kintex and Virtex product lines; resource usage for Xilinx Ultrascale products is shown below.

<table>
<thead>
<tr>
<th>HELIOS REGULAR EXPRESSION PROCESSOR SOFT IP RESOURCES</th>
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<tbody>
<tr>
<td>RegEx Bandwith @ 156 Mhz</td>
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<tr>
<td>40G</td>
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<tr>
<td>20G</td>
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<td>10G</td>
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Helios soft IP handles a wide variety of rule types including L7, Snort PCRE, Suricata, ClamAV URL, and IP. Rule capacities for the cores in the chart above are 13K for L7, 27K for SNORT PCRE, and 1.8M for IP.