Enea OSEck®

Optimized DSP RTOS
Single-core, Multi-core, and Heterogeneous SoC for Telecom

OSEck is a fully-featured RTOS optimized to suit the specific requirements of high performance DSPs, both single-core and multi-core, as well as for heterogeneous SoC (with DSP) solutions. Purpose built for telecom applications, OSEck brings rich functionality with true real-time determinism. It also features high performance networking, advanced packet processing capabilities, and a powerful Eclipse based IDE debug environment targeted for the most demanding telecom applications. OSEck is HW agnostic. It supports multiple HW architectures and is easily ported to any platform.

OSEck RTOS Environment
OSEck is more than a simple DSP kernel. It is a full RTOS that contains an optimized real-time kernel with extensions, networking, packet processing, and tools. See Figure 1-
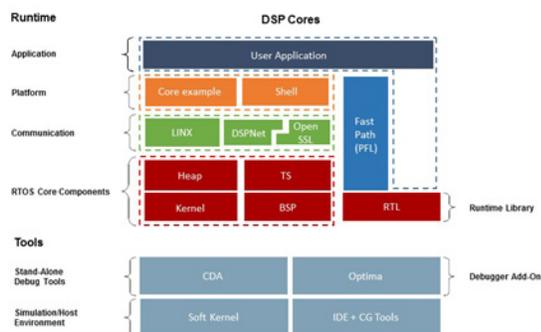

Figure 1- OSEck architecture.

OSEck Core
The OSEck Core consists of four components: a) Kernel, b) Heap, c) Timer Support (TS), and d) BSP abstraction layer. The kernel features a scheduling model that is fully pre-emptive priority based that is optimized for low and deterministic interrupt latency simultaneously with high throughput. It is compact enough to meet the limited memory requirements for small memory footprint applications, but scalable enough to support very high end DSPs with large memory. Both standard Heap management and High Resolution timer support are completely integrated with the kernel. OSEck BSP support features two models for device drivers – kernel interrupt handling, and user interrupt handling, depending on real-time requirements.

OSEck Communications Layer
All modern DSPs need a powerful IPC mechanism for either inter-core communications for multicore DSPs or for communications with external control GPPs, either integrated in a SoC or on external control processors. In telecom applications, IP networking is often required as well.

Enea LINX IPC
All Enea OSE based operating systems are "message passing" based, ideal for distributed communications. LINX provides the external communications extension to OSEck for inter-core communications to any other external device, whether in a SoC or otherwise.
LINX is a transparent, reliable, high-performance, inter-process communications service that make complex distributed systems easier to conceptualize, model, partition, and scale. LINX is available on all Linux GPP processors and is the only IPC technology that scales from DSPs and microcontrollers to 64-bit CPUs. See http://sourceforge.net/projects/linx/

DSPNet
DSPNet is an IPv4/IPv6 BSD 4.4 compatible TCP/IP stack that is designed for maximum performance as well as minimum memory footprint. The base DSPNet product supports simultaneous use of raw IP, UDP and TCP. DSPNet comes in 3 different flavors: IPv4, IPv4+IPv6, IPv4+IPSec. DSPNet supports Secure Shell (SSH), Internet Key Encryption (IKE), and Secure Socket Layer (SSL).

Packet Forwarding Library
The Packet Forwarding Library (PFL) is an implementation that supports fast path processing for multicore DSPs based on the Open Event Machine processing model. It offers an easy programming concept for scalable and dynamically load balanced multicore data plane applications with very low overhead. See http://sourceforge.net/projects/eventmachine/

Tools and Debugging
The OSEck debugging environment consists of a) Optima IDE for OSEck, b) Crash Dump Analyzer (CDA), and c) the "Soft Kernel" simulation environment.

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Optima for OSEck

Optima is an Eclipse based IDE and features a wealth of performance and debugging enhancement tools, such as:

- System Browser –explore and manage OSEck kernel system state and resources.

- Memory Browser – analyze and optimize memory usage.

- System Profiler – analyze kernel and application resource usage over time.

- Log Manager -record kernel and application events in a log file.

- Log Analyzer – visualize kernel and application events from the Log Manager.

- DSP specific environments, like TI Code Composer Studio (CCS), etc.

Crash Dump Analyzer (CDA)

CDA is an offline tool that enables viewing of the entire OSEck kernel state with some application specific data after a crash. This crash state information may be uploaded after DSP reset, then post processed in a text file format.

Soft Kernel

The Soft Kernel (SFK) is a complete OSEck simulation environment. Write your OSEck DSP code, and then run in a simulation in your development environment before HW availability to test the functional validity (but not timing) of your SW. Some HW simulation features are available.

SoC and Servers

OSEck supports a variety of emerging Heterogeneous SoC solutions, like the TI Keystone II, Freescale B4860, and others. OSEck is also part of the solution for the Proliant m800 server platform, based on the TI Keystone II that includes Enea Linux on the ARM cores. For more information, see www.enea.com/telcoplatform

Conclusion

Enea is the only independent software vendor that can provide full support across multiple HW architectures for telecom DSPs.

The combination of a powerful high performance kernel, with distributed IPC, complete IP networking functionality, tools, and combined with Enea's outstanding professional services for customization or porting, makes Enea the choice for any telecom based application requiring DSPs.

Supported Processors

Processor Family	Processor	DSPNet
TI Keystone II SoC, e.g. 66AKH2x	All TCI663x	No
TI C6000 and C5000	TMS320C66x (e.g. C6670/78)	Yes
	TMS320C64x+ (C6455/72/74/82/84/86/87/88)	Yes + IPSEC Open SSL/TLS B4,
	TMS320C67x (TI OMAP-L138)	No
	TMS320C55x	No
	TMS320C54x	No
Freescale	B4-series (e.g. B4860/4420) StarCore 3900 DSP arch	No
	MSC815x (e.g. MSC8156/57) StarCore 3850 DSP arch	Yes
	MSC8144 – StarCore 3400 DSP arch	Yes
LSI Logic	SP27xx both for StarCore 3400 DSP arch and for the Arm-11 MP	Yes
	SP26xx – both for StarCore 3400 DSP arch and for the Arm-11 MP	Yes
CEVA	CEVA-XC323	No
	CEVA-TeakLite-III	No