

## Introducing the nFlex Communications Processor

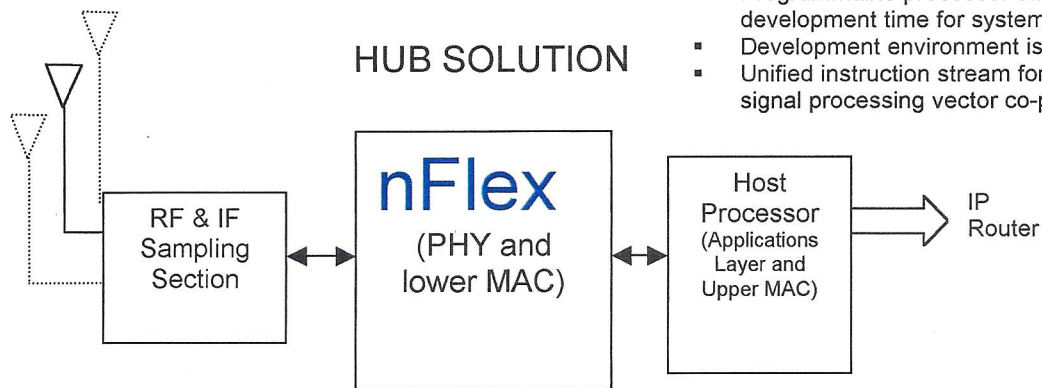
The nFlex Communications Processor from nBand is a software-based solution for applications requiring high-intensity signal processing and control.

### Applications

- Broadband Fixed Wireless (Hub and CPE)
- Wireless Local Area Networks
- Wireless Metropolitan Area Networks
- Multi-Protocol Access Points and Bridges
- Multiple Service Convergence Applications

### Benefits

- Programmable processor enables rapid prototyping, deployment, standards upgrade, or feature additions
- Common platform for hub and Customer Premise Equipment, or across multiple protocols
- Programmable processor approach allows flexible Quality of Service implementation and other custom services
- Unique architecture reduces system cost of Power Amplifier and IQ modulators
- Programmable processor offers low risk, short development time for system implementation
- Development environment is vector-based like Matlab
- Unified instruction stream for control processor and signal processing vector co-processor

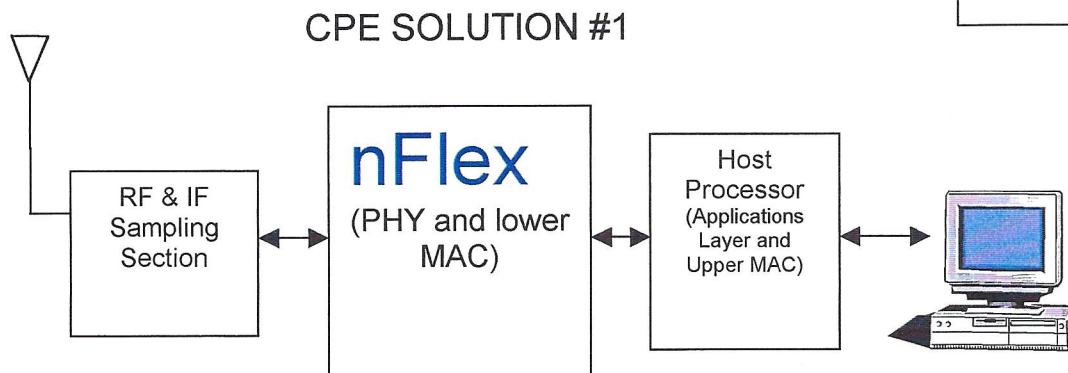


\* Use nFlex for a Hub or CPE solution, or both! nFlex can even be used in multi-chip configurations to provide very high capacity access point solutions. Because nFlex is a programmable solution, the amount of resources allocated to the downstream / upstream balance can be adjusted in software, even dynamically, as network conditions change.

\*\* Use the same nFlex on the CPE side, and reuse common code from the hub. Because nFlex is a programmable solution, an optimized system could dynamically change the modulation or coding to achieve Quality of Service targets.

\*\*\* Use nFlex for Multiple In Multiple Out solutions to increase data rate through advanced signal processing. Because nFlex is a programmable solution, the smart antenna algorithms can be easily upgraded.

\*\*\*\* nFlex's software-based architecture can perform many functions besides PHY and MAC processing, such as digital IQ mod/demod, feed-forward and pre-distortion schemes to reduce the cost of power amplifiers, or multiple voice codecs.



The n14101 is the first product in the nFlex™ family of programmable communications platforms and represents a new era in the design of broadband wireless systems. By combining unprecedented signal processing performance with the simplicity of a RISC programming environment using an efficient vector architecture, nFlex™ allows communication system developers to quickly bring their new ideas to market.

**Key Customer Benefits**

- ◆ High performance signal processor with optimized architecture for wireless applications / systems
- ◆ Programmable flexibility for supporting multiple standards, enabling added value through differentiation, enabling field upgradeability, and future-proofing
- ◆ Ease of implementation with high level vector programming in C/C++ and complete GNUPro™ software development support suite
- ◆ Much faster product development cycle

**Target Applications**

The n14101 communications platform is a perfect choice for wireless devices requiring high performance and flexibility. nFlex products enable a new class of programmable, differentiated wireless products for applications such as:

- ◆ Fixed Broadband Wireless access
- ◆ Universal wireless gateways
- ◆ Wireless LAN (ie. 802.11a & HiperLAN2)
- ◆ Multimode (i.e. TDMA and CDMA) cellular infrastructure.
- ◆ Wireless Local Loop (WLL) access
- ◆ Other high complexity, vectorizable solutions

**Features**

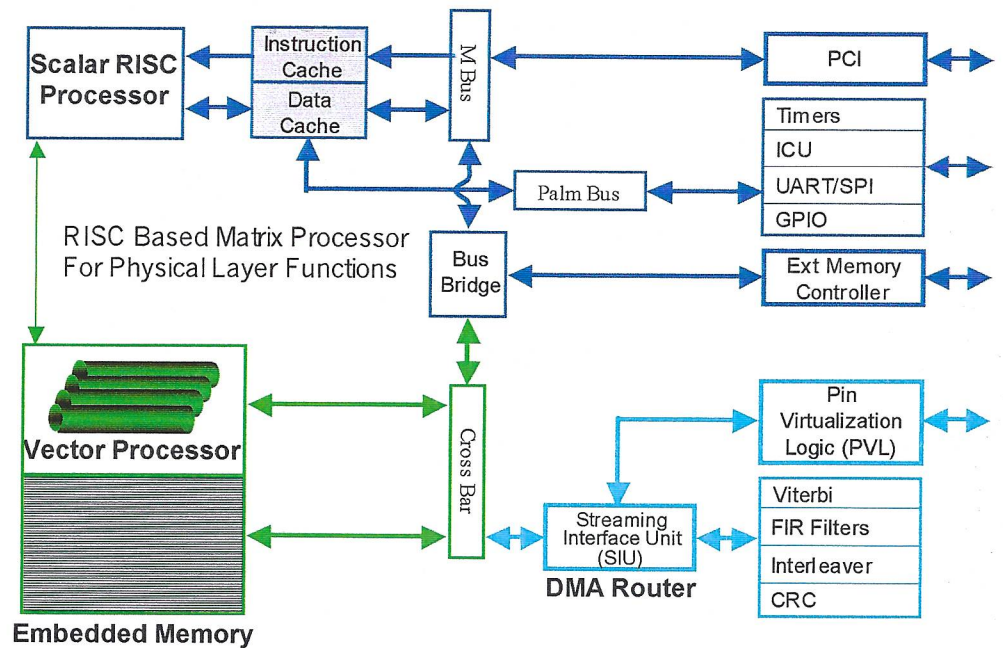
**Optimized for PHY and MAC processing**

- ◆ Real-time processing of multiple data streams supports multi-protocol, multi-air interface products
- ◆ RISC Processor, Vector Co-Processor, memory, and hardware accelerators all unified on chip
- ◆ Vector design matches communications physical layer algorithms
- ◆ RISC processor for MAC and control
- ◆ On-chip memory stores entire working set for most wireless applications
- ◆ Hardware accelerators on-chip to complement vector processor
- ◆ High-speed asynchronous streaming I/O interface to support high data rate broadband applications

**Reduced System Development Time**

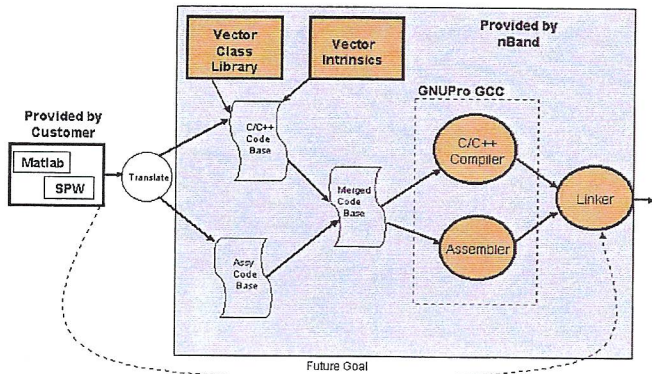
- ◆ Single instruction stream for scalar and vector ops for a unified RISC/DSP development environment
- ◆ Enables high software productivity through a C/C++ vector coding style similar to MATLAB
- ◆ High-level vector programming model

Figure 2: nFlex Block Diagram



**Software Development Flow**

**Figure 3: nFlex Software Development Flow**



**Simplified Development Process:**

- ◆ nFlex development environment provides a significantly shorter development time than DSP/FPGA/ASIC flow
- ◆ Fewer tasks, fewer errors, simpler flow, lower development cost, higher productivity, more time for innovation, faster TTM
- ◆ Reduced programming complexity as well as code development time and cost
- ◆ Matlab source code is similar to the nFlex vector C/C++ source code, which facilitates translation.

**Familiar Development Environment:**

- ◆ Ease of program development in a familiar RISC programming environment – single instruction stream, single thread of control
- ◆ GNUPro software development tool chain, familiar in the embedded market and RTOS companies, makes existing software easier to port
- ◆ Initial host development platform on Sun Solaris 7.0
- ◆ Target system supported under eCos (RTOS), well supported in communications market

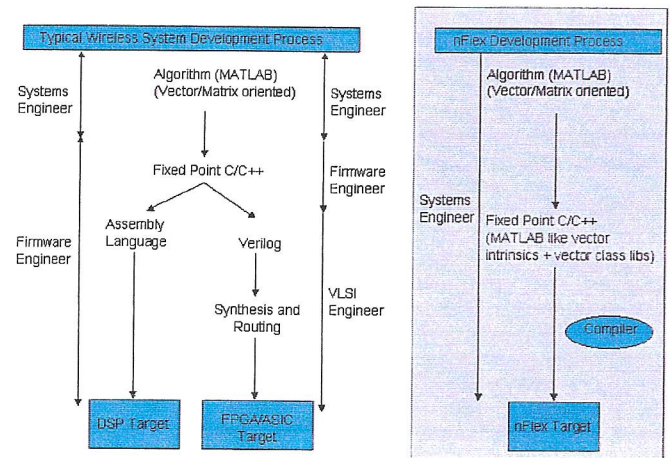
**Future compatibility and code migration:**

- ◆ The n14101 core is the first implementation of the nFlex Instruction Set Architecture (ISA), with which all future nFlex ISA implementations will maintain binary, object-code compatibility.

**GNUPro nFlex Optimizations:**

- ◆ nFlex Simulator, Assembler and Linker
- ◆ C/C++ compiler with vector support
- ◆ Debugger GDB with vector support

**Figure 4: nFlex Simplifies the Development Process**



**nBand Provides**

- ◆ Complete Baseband solution (i.e. 802.11a and BWIF)
- ◆ Reference designs for specific applications
- ◆ PCI development board and tools
- ◆ Complete GNUPro based development support suite ported to and optimized for nFlex (debugger, compiler, simulator, assembler, linker, binary utils)
- ◆ C/C++ vector class libraries and vector intrinsics to facilitate high level language program development

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