Fraunhofer
Heinrich Hertz Institute

NanoSemi

NanoSemi, N.A.T. and Fraunhofer HHI at Mobile World Congress:

Multi-Band/ Multi-Carrier demonstration with a linearized Power Amplifier

At Mobile World Congress, NanoSemi, a Boston area based startup focused on digital signal processing for RF and mixed signal components, N.A.T., a leading supplier of embedded boards and systems based on open standards, and the Fraunhofer Institute for Telecommunications, Heinrich Hertz Institute, HHI will demonstrate how energy efficient transmission for Multi-Band / Multi-Carrier configurations can be realized.

Working with NanoSemi, N.A.T. and Fraunhofer HHI have developed a solution enabling a low cost and low power implementation solution for a multi-band scenario.

NanoSemi applies a power-efficient single digital pre-distortion (DPD) for multiple carriers over non-contiguous bands using four or more channels of narrow band TRx module and a single wide-band power amplifier.

This technique demonstrates a configurable multi-carrier/ multi-band radio with a low power solution.

“Together with Fraunhofer HHI and N.A.T. we continue to demonstrate solutions based on our technology and showcase innovative approaches with higher performance, lower cost and better efficiency for the Communication Infrastructure Market”, says Helen Kim, CEO of NanoSemi Inc.

The demonstration, hosted on Fraunhofer’s booth 7G31 in hall 7, consists of hardware and software products from all three organizations:

- NanoSemi’s linearization solution uses in this case a single wide-band power amplifier and Fraunhofer HHI’s eight-channel 61.44MSPS TRx module (NAMC-SDR), NanoSemi demonstrates operating four or more of 5MHz (or higher bandwidth) LTE carriers across 400MHz, spanning from 2.3GHz to 2.7GHz, simultaneously.
  NanoSemi applies a power-efficient single digital pre-distortion (DPD) through four or more channels of TRx module to compensate for an entire wide bandwidth of a single power amplifier. In low-power operation mode, a single 61.44MSPS receiver can be used to scan the entire RF spectrum. When selecting normal operation mode, dedicated receivers are used to scan multiple bands simultaneously.
- N.A.T.: MicroTCA chassis (NATIVE-C2) with integrated management module (NAT-MCH) and power module (NAT-PM-AC600) and a N.A.T. processor module providing the spectrum analysis display. The carrier-grade, fully redundant chassis can host up to 12 AMCs and provides two 1GbE and two 10GbE connections per slot while, in addition to the system management, the NAT-MCH also contains fully managed switches for 1GbE and 10GbE. The MCH also contains a central clock generation and distribution module specially dedicated to telecoms applications. The processor board in AMC form factor is based on the third

generation Intel® Core™ processor providing up to 16GB of memory and three 1GbE interfaces and other high speed lanes connected to the backplane. The system is powered by up to two fully managed 600W power modules. All components are remotely manageable and hot-swap capable.

- Fraunhofer HHI's 8TRx radio head consists of stacked analog and digital boards in the AMC form factor. The digital board contains a Xilinx Zynq XC7Z045, a clock distribution network with synchronization in- and outputs, 4 x 10 Gbps lanes for CPRI and 10 GbE to the front panel via QSFP, as well as high speed lanes connected to the backplane. The analog board contains up to 4x AD9361 SoC devices, which can be fully synchronized up to 4 GHz, each SoC supporting two transceivers, a tunable carrier frequency between 70 MHz up to 6 GHz, and < 56 MHz analog bandwidth. Dozens of radio heads can be synchronized if more than 8 antennas are required.

About NanoSemi

NanoSemi Inc develops breakthrough digital compensators to linearize non-linear dynamic systems such as wireless radios.
Its performance - particularly its spectral efficiency and low power consumption - gives our customers a considerable competitive advantage in the instrumentation, portable and communication infrastructure markets.

Our dedicated, multidisciplinary team came mainly from MIT and MIT Lincoln Labs. We are based in the Boston, Massachusetts area.
Visit: http://www.nanosemitech.com

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About Fraunhofer Heinrich Hertz Institute

Innovations for the digital society of the future are the focus of research and development work at the **Fraunhofer Heinrich Hertz Institute HHI**. In this area, Fraunhofer HHI is a world leader in the development for mobile and optical communication networks and systems as well as processing and coding of video signals. Together with international partners from research and industry, Fraunhofer HHI works in the whole spectrum of digital infrastructure – from fundamental research to the development of prototypes and solutions. www.hhi.fraunhofer.de

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About N.A.T.

N.A.T. was founded in 1990 with the aim of developing high-performance network interfaces for industrial computers. The company has substantial knowledge in networking technologies across a wide range of open, standards-based architectures including VMEbus, CompactPCI, PMC, PCI Express, xTCA and AMC . Today N.A.T. is one of the leading suppliers for board and system level products based on AMC and MicroTCA. The product portfolio includes intelligent interfaces to wired and wireless communication networks, NPUs, multicore data engines, 19" rack mountable

infrastructure including management and system controllers and of course the communication protocols and middle-ware to build turn-key and application-ready systems. For more information, please visit www.nateurope.com.

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